MERCK

Annual Report 2023

KEY FIGURES 2023

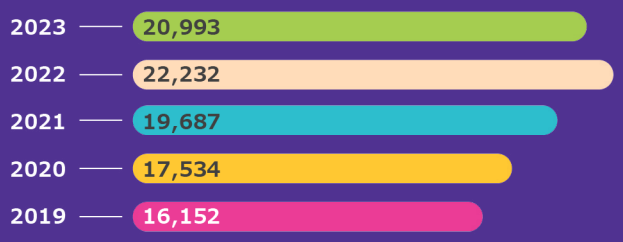
Merck Group

€ million	2023	2022	Change € million	Change %
Net sales	20,993	22,232	-1,239	-5.6%
Operating result (EBIT)[1]	3,609	4,474	-865	-19.3%
Margin (% of net sales)[1]	17.2%	20.1%		
EBITDA[2]	5,489	6,504	-1,015	-15.6%
Margin (% of net sales)[1]	26.1%	29.3%		
EBITDA pre[1]	5,879	6,849	-970	-14.2%
Margin (% of net sales)[1]	28.0%	30.8%		
Profit after tax	2,834	3,339	-505	-15.1%
Earnings per share (in €)	6.49	7.65	-1.16	-15.2%
Earnings per share pre (€)[1]	8.49	10.05	-1.56	-15.5%
Operating cash flow	3,784	4,259	-475	-11.2%

[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Not defined by International Financial Reporting Standards (IFRS); EBITDA corresponds to operating result (EBIT) adjusted by depreciation, amortization, impairment losses, and reversals of impairment losses.

Merck Group

Net sales
€ million



Merck Group

EBITDA pre[1]
€ million

[1] Not defined by International Financial Reporting Standards (IFRS).

AT A GLANCE

A strong team

62,908
employees

141
nationalities

39%
women in leadership positions

Life Science

Together, we impact life and health with science.

Share of net sales **44%**

Share of EBITDA pre **45%**

Healthcare

We help to create, improve and prolong lives.

Share of net sales **38%**

Share of EBITDA pre **41%**

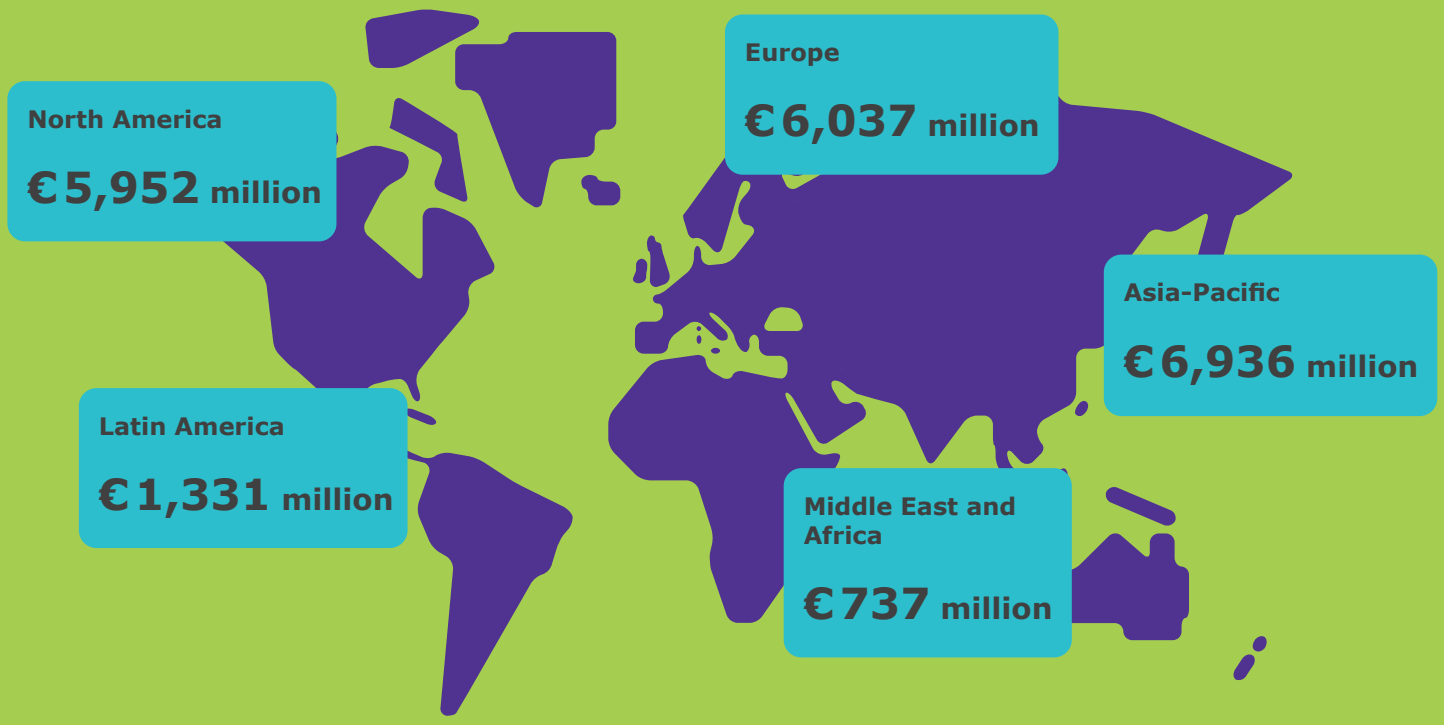
Electronics

We are advancing digital living.

Share of net sales **18%**

Share of EBITDA pre **15%**

Net sales per region



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To our shareholders

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Dear shareholders,
dear friends of Merck,

At Merck, we have successfully navigated through many challenging times in our 355-year history. The year 2023 provided yet another opportunity to demonstrate our resilience to the world. Despite a difficult global macroeconomic environment and the geopolitical situation, our Group performed robustly.

Once again, we demonstrated the competitive strengths of our people, the diversification of our business sectors, and our global footprint. In our Life Science business, demand declined as expected in 2023 due to the end of the Covid-19 pandemic. Pronounced destocking by customers within Process Solutions has also been longer in duration than expected. In parallel, our Electronics business faced a prolonged downcycle in Semiconductor Solutions and the Display Solutions unit was affected by low customer demand.

The strong performance of our Healthcare business sector mainly offset these temporary, industry-wide challenges. In particular, our new products experienced robust growth. Full-year net sales of our multiple sclerosis medicine Mavenclad® exceeded US$ 1 billion for the first time, joining our cancer medicine Erbitux®, which maintained its blockbuster status for the second year in a row. Our immuno-oncology drug Bavencio®, to which we regained sole ownership rights on June 30, 2023, generated organic net sales growth of 23.4%. This was complemented by the solid performance of both our Fertility and our Cardiovascular, Metabolism, and Endocrinology franchises.

The competitive strength of our global business footprint was demonstrated by moderate Group exposure to localized economic trends in 2023. Our business operations in Asia-Pacific, North America and Europe as well as other geographic regions made important financial contributions.

Overall, Group net sales of € 21.0 billion were about at the mid-point of the absolute guidance range. Due to the aforementioned factors as well as negative foreign exchange effects and inflationary pressures, EBITDA pre in 2023 was also within our guidance range at € 5.9 billion, albeit at the lower end of the corridor.

We are grateful to our approximately 63,000 employees around the world for their exceptional dedication and resilience and would like to thank our many partners and suppliers for their important contributions to this performance. Furthermore, in recognition of the contribution of shareholders, we will propose to the Annual General Meeting a dividend of € 2.20 per share for 2023.

"We remain firmly positioned to return to growth in 2024 and generate long-term, sustainable value for our owners, shareholders, customers, patients, employees, and society.

Belén Garijo

Looking forward, we expect that global economic and geopolitical challenges will continue to adversely affect our activities through 2024. However, based on current forecasts, we anticipate a gradual return to organic sales growth during the year.

We expect our Life Science business sector to recover in the course of the year with the expected end of the destocking phase within Process Solutions on the one hand and improving conditions in Science & Lab Solutions on the other hand. Within our Healthcare business sector, growth rates should begin to normalize and more closely align with our mid-term targets. And within our Electronics business sector, we expect to benefit from an upswing in customer demand for Semiconductor Solutions as the market gradually recovers.

Looking beyond 2024, our Group remains firmly positioned for long-term growth and impact as a leading science and technology company with a clear purpose to advance human progress. In addition to favorable macrotrends such as the digital transformation of markets by generative AI and machine learning technologies, many other forces are expected to drive growth across each of our three sectors. They include novel drug modalities in Life Science, growing patient needs for cancer, neurological and immunological treatments in Healthcare, and AI-enabling chips and high-performance computing demanding more and novel materials in Electronics. Our teams are closely monitoring these and other trends to help us anticipate potential scenarios and adapt with speed and agility to protect or expand our competitive positions.

We continue to make strategic investments, enter collaborations, and adapt our businesses in order to constantly improve our competitive position and anticipate emerging market needs even more proactively. In Germany, the United States, Switzerland, China, the United Kingdom, Korea, and other countries across our global network, we invested significantly in new and upgraded sites and capabilities. With these and other significant capital expenditure projects, we are striving to move even closer and become more responsive to customers and patients worldwide. We assume that this overall momentum in operational expenditure will continue through 2025 and beyond. However, we reserve the flexibility to respond to further market changes.

Despite the disappointing news in December 2023 that the Phase III clinical trials of evobrutinib did not meet their primary endpoints, we remain confident in the position of our Healthcare business sector as a global specialty innovator. In addition to the continued resilience of our established product portfolio, we look forward to the progress of many investigational therapies within our Healthcare pipeline, such as xevinapant in oncology and enpatoran to treat autoimmune diseases such as systemic and cutaneous lupus erythematosus. Boosted by various in-licensing of external innovation, including those announced in 2023, such as with Hengrui and Abbisko, we aim to introduce one new product or major indication every 1.5 years on average.

Finally, I am pleased by the significant strides being made to achieve our three core sustainability targets. By 2030, we aim to have fully integrated sustainability into our 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-neutrality and significantly reduce our resource consumption. After entering into virtual power purchase agreements in 2023, renewable energy is expected to cover 100% of our current electricity purchases in Europe, more than 90% in North America, and 70% worldwide from 2025.

As you continue to read this Annual Report, you will see that we remain firmly positioned to both return to growth in 2024 and generate long-term, sustainable value for our owners, shareholders, customers, patients, employees, and society.

On behalf of the Executive Board, I thank you and all our other shareholders for your ongoing trust and support.

Sincerely,

Belén Garijo
Chair of the Executive Board and CEO

The Executive Board

Helene von Roeder	**Kai Beckmann**	**Belén Garijo**	**Peter Guenter**	**Matthias Heinzel**
Member of the Executive Board	Member of the Executive Board	Chair of the Executive Board and CEO	Member of the Executive Board	Member of the Executive Board
Chief Financial Officer	CEO Electronics		CEO Healthcare	CEO Life Science

Short biographies

More information can be found at our **website**.

Merck shares

At a glance

The stock markets got off to a restrained start in 2023 before finishing strongly, with some indices hitting record levels in December as interest rate concerns eased. There was a significant level of sector divergence with subdued performance in Life Sciences and Pharma. Consequently, our share price performance was dampened during 2023.

The resilience of our multi-industry business model was demonstrated with Healthcare largely offsetting market-driven challenges in Electronics and Life Science. Despite the financial results, our share price declined by around 20% in the course of the year. Merck shares underperformed compared with the DAX® index of German blue-chip companies, which rose by around 20% over the year. Our share performance correlated strongly to the share performance of the life sciences industry across the year and tracked the index (-3%) until the December evobrutinib announcement. In comparison, the index for the pharmaceutical industry outperformed Merck shares, rising by almost 5%. The semiconductor industry index rose by around 65% driven by a handful of chip developers and their products for artificial intelligence applications. Merck shares closed at € 144.10 on December 29, 2023 (2022: € 180.90).

The first six months were heavily influenced by uncertainties tied to the continued economic recovery, inflation, rising interest rates and geopolitical tensions. The Covid-19 pandemic business continued to decline, which created a difficult environment in the life science market. Moreover, customers of the Life Science business sector mainly focused on cash preservation as well as working capital optimization, in light of high interest rates. While the semiconductor market is preparing for artificial intelligence fueled growth, it has not yet translated into volume growth for the materials sector. The existing portfolio of Healthcare had a strong year; however, the negative results of the Phase III trials of evobrutinib had a share price impact in December. Taken together, these factors explain why our share price underperformed the DAX® and relevant sector indices in 2023.

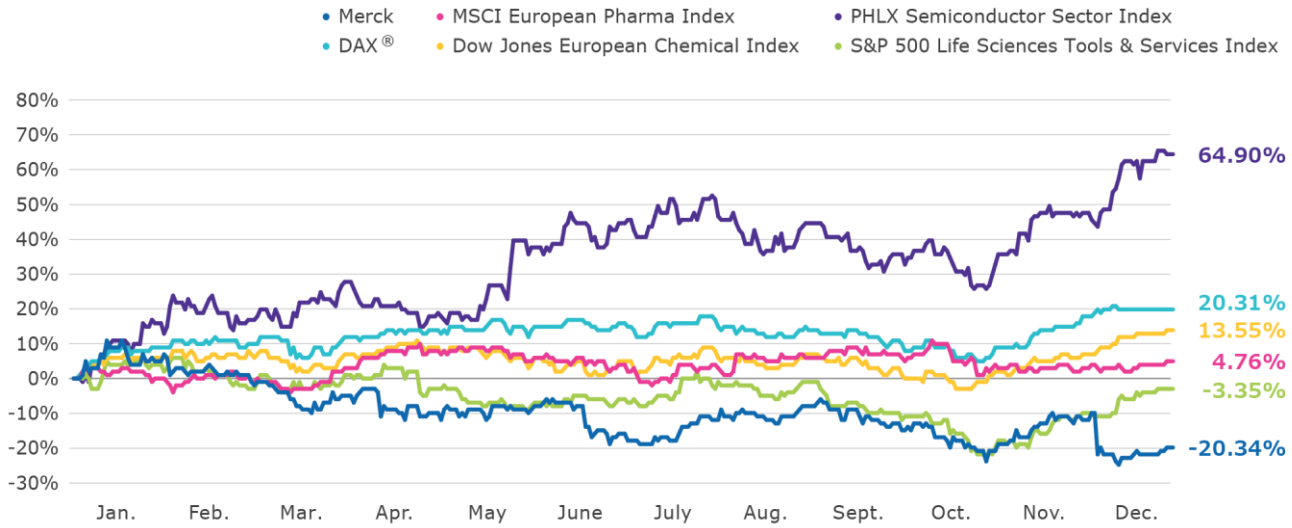
At approximately 329,000 shares per day, the average daily trading volume of Merck shares in 2023 was up around 2% on the prior-year figure of around 321,000. This meant Merck shares bucked the general trend of lower turnover on German securities trading platforms in 2023 compared with the previous year.

Our shareholder structure remained largely stable in 2023 compared with the previous year: Europe continues to account for the largest proportion of the free float at around half, followed by the United States with around 29%. Compared with 2022, the proportion of the value-oriented investors fell slightly in favor of growth oriented investors and GARP (growth at a reasonable price) investors. The top five investors held around 24% of the free float at the end of 2023, up around two percentage points on the previous year.

In 2023, our Executive Board and Investor Relations team held over 1,000 discussions with investors on topics such as strategy, the business model, business performance, corporate governance, and sustainability at our company during investor conferences, roadshows, and conference calls.

Merck Shares

Share price development from January 1, 2023, to December 31, 2023, in %



Merck shares

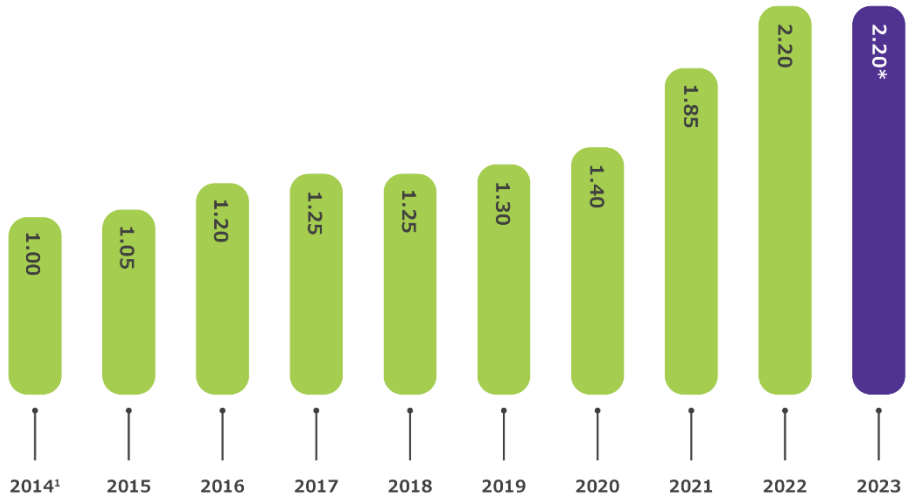
Key share price data[1]

		2023	2022
Dividend[2]	€	2.20	2.20
Share price high	€	201.10	222.90
Share price low	€	135.45	156.10
Year-end share price	€	144.10	180.90
Daily average number of Merck shares traded[3]	Number	329,074	321,232
Market capitalization[4] (at year-end)	€ million	62,651	78,651
Market value of authorized shares[5] (at year-end)	€ million	18,624	23,380

[1] Share price-relevant figures relate to the closing price in Xetra® trading on the Frankfurt Stock Exchange.
[2] 2023 dividend subject to approval by the Annual General Meeting.
[3] Based on the floor trading systems of all German exchanges and the regulated market on Xetra®.
[4] Based on the theoretical number of shares (434.8 million).
[5] Based on the number of shares in free float (129.2 million). Source: Bloomberg, Thomson Reuters.

Merck Shares

Dividend development since 2014



[1] Adjusted to the new number of shares after the share split (June 30, 2014).
* 2023 dividend subject to approval by the Annual General Meeting.

Identified investors by region as of November 2023

Source: Nasdaq Shareholder Identification; Total Shares Outstanding: 129.2 million.

Identified investors by type as of November 2023

Source: Nasdaq Shareholder Identification.

Combined Management Report*

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* The management report of Merck KGaA has been combined with the Group management report and published in the 2023 Merck Annual Report as well as in the annual financial statements of Merck KGaA. The management report also contains the combined non-financial (Group) statement of Merck KGaA, which we issue pursuant to sections 289b–289e and 315b–315c HGB. The 2023 Annual Report is an additional, non-official publication, which does not comply with the requirements of the European Single Electronic Format (ESEF). The official annual financial report for fiscal 2023, prepared in accordance with the ESEF format, has been filed with the electronic German Federal Gazette (elektronischer Bundesanzeiger) and is available on the **website of the German company register**.
This combined management report contains certain financial indicators such as operating result (EBIT), EBITDA, EBITDA pre, net financial debt and earnings per share pre, which are not defined by International Financial Reporting Standards (IFRS). These financial indicators should not be taken into account in order to assess the performance of Merck in isolation or used as an alternative to the financial indicators presented in the consolidated financial statements and determined in accordance with IFRSs.
The figures presented in this combined management report have been rounded. This may lead to individual values not adding up to the totals presented.
The Statement of Corporate Governance according to section 315d HGB in conjunction with section 289f (1) sentence 2 HGB is available at **https://www.merckgroup.com/en/investors/corporate-governance/reports.html**.
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. Even if masculine forms are used, all genders are explicitly meant.

[1] German Commercial Code.

Fundamental information about the Group

Merck

We are Merck, a science and technology company. We are pioneers of human progress, driven by our curiosity. We are working toward a better future in a special organizational setup and are bringing together different disciplines under one roof with the three business sectors Life Science, Healthcare and Electronics.

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.

In our Healthcare business sector, we advance innovation through our research, enable life-changing therapies for serious illnesses, treat patients with cancer, cardiovascular, diabetes, thyroid disorders, and multiple sclerosis, and help people 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 are used in the manufacture of many components for electronic devices. We are thus changing the way in which information is processed and made accessible.

In addition, our specialists also explore visionary new solutions at the interfaces of our three diversified business sectors.

Ever since we were established in 1668, we have continuously reinvented ourselves and adopted a long-term mindset. This approach is rooted in responsibility, care and respect: for our work, our employees, our customers, patients, society, and our planet. We want to become the global 21st century science and technology pioneer and are committed to working towards a better future: sustainable progress for humankind.

The founding family, now in the 13th generation, is still the majority owner. This is made possible by our company structure: a corporation with general partners (Kommanditgesellschaft auf Aktien – KGaA). In a KGaA, the total capital is divided between general partners and limited partners. The founding family holds a 70.274% stake in the listed Merck Kommanditgesellschaft auf Aktien (Merck KGaA), Darmstadt, as general partner via the Group’s ultimate parent company, E. Merck Kommanditgesellschaft, Darmstadt. The remaining 29.726% of the share capital of Merck KGaA is traded on the regulated market of the Frankfurt Stock Exchange and other stock exchanges.

The assessment of business development and the allocation of financial resources are carried out by the entire management of the company for the Life Science, Healthcare and Electronics business sectors as well as the supporting corporate functions. In addition to the Chair of the Executive Board and CEO Belén Garijo, the Members of the Executive Board are Matthias Heinzel, CEO Life Science, Peter Guenter, CEO Healthcare, Kai Beckmann, CEO Electronics, and Helene von Roeder, Chief Financial Officer (CFO). Helene von Roeder was appointed CFO as of July 1, 2023, succeeding Marcus Kuhnert on the Executive Board of Merck.

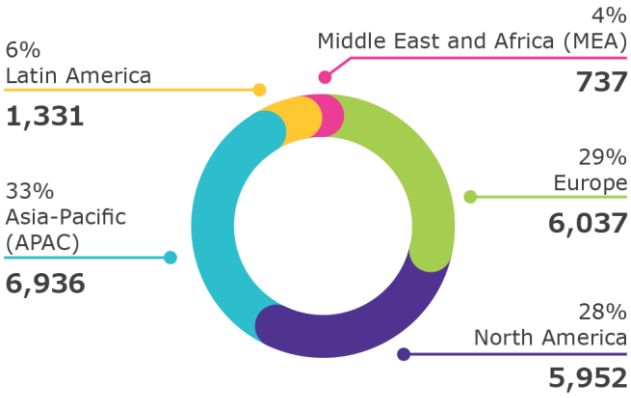
We hold the global rights to the Merck name and brand. The only exceptions are Canada and the United States. In these countries, we operate as MilliporeSigma in the Life Science business, as EMD Serono in the Healthcare business and as EMD Electronics in the Electronics business.

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, 2023, we had 62,908 employees[1] worldwide. The figure as of December 31, 2022, was 64,232 employees[1]. We have summarized further details on our employee structure and important aspects such as Diversity, Equity, and Inclusion in the "**Non-Financial Statement**".

For fiscal 2023, we exercise the option of publishing the Statement on Corporate Governance on the Group's website in accordance with section 315d HGB in conjunction with section 289f (1) sentence 2 HGB. It is available at **https://www.merckgroup.com/en/investors/corporate-governance/reports.html**.

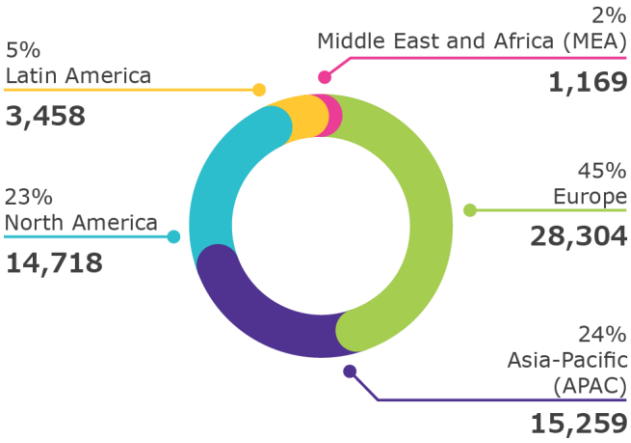
Merck Group

Net sales by region
€ million/in % of net sales



Merck Group

Employees by region as of December 31, 2023[1]
Number/in %



[1] Merck also employs people at sites of subsidiaries that are not fully consolidated. This number refers to people employed in fully consolidated subsidiaries.

Life Science

We are a leading global provider of products and services for a wide range of customers, including research labs, biotech and pharmaceutical companies, diagnostic labs, and the industrial sector.

Across our Life Science business sector, we collaborate with the global scientific community to deliver innovations and to this end, we offer a broad and deep product portfolio as well as global Contract Testing Development Manufacturing Organization (CTDMO) services ranging from process development to commercialization. In 2023, we continued to execute our strategy as a diversified life science company to strengthen our three business units, Process Solutions, Life Science Services, and Science & Lab Solutions. Our R&D teams in the three business units have launched more than 8,500 products to respond to growth trends, including those launched through our “faucet program” for antibodies, reference materials and nanomaterials.

In 2023, Life Science generated 44% of Group sales and 45% of EBITDA pre (excluding Corporate and Other). In recent years, we have steadily expanded our presence in growth markets. Europe and North America generated 70% of Life Science’s sales in 2023; Asia-Pacific and Latin America accounted for 29% of sales.

Process Solutions

The Process Solutions business unit continued to focus on delivering its product offering for the pharmaceutical development and manufacture of filtration devices, chromatography resins, single-use assemblies and systems, processing chemicals, and excipients.

Life Science Services

The Life Science Services business unit offers traditional and novel modalities, including monoclonal antibodies, high-potency active pharmaceutical ingredients (HPAPIs) and antibody-drug conjugates as well as viral and gene therapies, including mRNA. In addition to manufacturing, Life Science Services includes sales and marketing, research and development and supply chain operations. Our integrated CTDMO services support clients from preclinical phases to commercial production.

Science & Lab Solutions

The Science & Lab Solutions business unit serves customers in the pharmaceutical, biotech industries and other industries in production, testing and research, as well as public authorities and research institutions. We provide customers with 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.

In March, we opened a lateral flow assay development lab in St. Louis, Missouri, USA, an innovative space where customers collaborate with our technical experts to troubleshoot point-of-care testing.

Investments to expand capabilities and production

- We have started building a new € 30 million expansion in Allentown, Pennsylvania, USA, which will join the existing facility to create a two-building “distribution campus”.
- In May, we announced an investment of € 35 million in biosafety testing facilities at our Glasgow and Stirling sites in Scotland. Biosafety testing is a step in the drug development and manufacturing process to ensure that drugs are safe, effective and compliant with regulatory requirements. Through the expansion, we plan to create nearly 500 new jobs, bringing our Life Science workforce to over 1,200 employees across the two sites.

- The investment includes a new facility in Glasgow, which will house molecular biology and sequencing services. Testing capacity in current buildings will be expanded to include biosafety testing, analytical development and viral clearance suites. The latest investment follows our recent testing expansions in Rockville, Maryland, USA, and Shanghai, China. With its BioReliance® testing services portfolio, Life Science performs more than 20,000 studies annually in the United Kingdom for more than 400 customers globally. BioReliance® contract testing services and the recently formed Millipore® CTDMO Services are part of the Life Science Services business unit.

- Also in May, we signed a non-binding memorandum of understanding with the Korean Ministry of Trade, Industry and Energy and Daejeon City, Korea, for a new Asia-Pacific bioprocessing center aimed at supporting the region's healthcare ecosystem. The planned bioprocessing facility would support commercial manufacturing for biotech and pharmaceutical customers in this region.

- In June, we announced the expansion of production capacity for highly purified reagents at the site in Nantong, China, a major transportation hub in the Yangtze River Delta region. The approximate € 70 million investment will enable large-scale manufacturing of high-purity reagents for quality control and testing for biopharma customers.

- In July, Life Science announced a € 23 million expansion of its facility in Lenexa, Kansas, USA, adding lab space and production capacity to manufacture cell culture media. Cell culture media is used in processes as varied as vaccine manufacturing, gene therapy and monoclonal antibody manufacturing. The company's strategic investments to expand capacity in existing production facilities in the Lenexa, Kansas, USA, and Nantong, China, sites with dry powder media manufacturing lines will increase both local and global production capacity.

- Since September, CTDMO can offer integrated services for all critical stages of mRNA development, manufacturing and commercialization, including products and testing, with the opening of two new GMP-grade mRNA drug substance manufacturing sites in Darmstadt and Hamburg, Germany. The new sites are part of the company's ongoing € 1 billion investment to advance mRNA technologies and build its global mRNA network and capabilities in addition to key acquisitions such as AmpTec and Exelead. With this € 28 million investment, we can provide mRNA services at different scales and applications from preclinical to commercial.

- In November, we completed the second phase of our new € 29 million Biologics Testing Center in Shanghai, China, expanding our first biosafety laboratories, which we inaugurated in 2022, in this market. This expansion enables us to provide local access to a broad range of testing for cell line characterization and lot release, from preclinical development to commercialization.

Sustainable packaging solutions*

Four years after its inception in 2019, the SMASH Packaging plan has entered its next generation, called SMASH 2.0. So far, more than 100 packaging improvement projects have been completed or are underway, removing tens of thousands of metric tons of CO_2 without sacrificing safety, quality, or performance. Key achievements include avoiding more than 300 metric tons of packaging and achieving a 23% reduction of expanded polystyrene (EPS), also known as Styrofoam. 72.5% of the paper-based materials sourced directly for packing and shipping products therefore aligns with the so-called zero deforestation standards.

Digitalization

In March, Life Science launched its open-source code library for Palantir Foundry on GitHub®. Our source code, "Foundry DevTools", was published under an open-source license in collaboration with Palantir. We have been partnering with Palantir since 2017 to build our data and analytics capabilities and contribute to the digital product portfolios of our Life Science, Healthcare and Electronics business sectors. The source code is freely accessible to all Foundry developers worldwide.

* The contents of this chapter or section are voluntary and therefore not audited. However, our auditor has read the text critically.

Healthcare

In Healthcare, we operate as a global specialty innovator in the Neurology & Immunology and Oncology franchises as well as in the therapeutic areas of fertility and cardiovascular, metabolic and endocrinological disorders. The Healthcare business sector discovers, develops, manufactures, and markets pharmaceutical and biological prescription drugs to treat cancer, multiple sclerosis (MS), infertility, and growth disorders as well as certain cardiovascular and metabolic diseases. Our R&D pipeline is focused on strengthening our position in the fields of oncology, neurology and immunology.

In 2023, Healthcare generated 38% of Group sales and 41% of EBITDA pre (excluding Corporate and Other). Europe and North America generated 53% of Healthcare's net sales in 2023. In recent years, we have steadily expanded our presence in growth markets. In 2023, Asia-Pacific and Latin America accounted for 40% of sales.

Oncology

Erbitux® (cetuximab) remains our best-selling cancer drug with € 1 billion in sales in 2023. The drug is a standard of care for patients with epidermal growth factor receptor (EGFR)-expressing, RAS wild-type metastatic colorectal cancer (mCRC) as well as both recurrent and/or metastatic and locally advanced squamous cell carcinoma of the head and neck (SCCHN). With more than 200 active clinical trials involving Erbitux®, including more than 15 Phase III studies, we are also continuously advancing our broad-based lifecycle management strategy.

We have made progress in changing the standard of care globally for patients with locally advanced or metastatic urothelial carcinoma (UC) as we continue to obtain additional regulatory approvals and reimbursement decisions for our anti-PD-L1 antibody Bavencio® (avelumab) (for further details see "**Research and Development**"). Bavencio® is approved as a first-line maintenance treatment for advanced UC in 71 countries. It has become a standard of care in the treatment of this disease based on the results of the JAVELIN Bladder 100 trial, the only Phase III study of an immunotherapy to demonstrate a significant overall survival benefit in the first-line maintenance setting.

Through our subsidiary Ares Trading SA, we regained exclusive worldwide rights to develop, manufacture and commercialize Bavencio® from Pfizer as of June 30, 2023.

Bavencio® is also approved in the first-line treatment of advanced renal cell carcinoma in combination with axitinib and it is a standard of care as a monotherapy in metastatic Merkel cell carcinoma (MCC), a rare form of skin cancer.

In September 2023, we received U.S. Food and Drug Administration approval of a supplemental Biologics Licensing Application for Bavencio®, converting the MCC indication from accelerated approval into full approval approximately four years earlier than anticipated. As a result, Bavencio® is the first MCC treatment to receive full approval in the U.S. market.

In 2023, we also continued to expand the availability of Tepmetko® (tepotinib), our oral MET inhibitor designed to inhibit the oncogenic MET receptor signaling caused by MET (gene) alterations, with additional regulatory approvals. Tepmetko® is now available in 43 markets globally.

In the therapeutic area of SCCHN, we advanced our global Phase III development program for xevinapant, an IAP (inhibitor of apoptosis protein) inhibitor in 2023, with enrollment completed in the TrilynX study. The recruitment of patients in the XRay Vision study is ongoing (for further details see "**Research and Development**").

In fiscal 2023, we also continued to advance our efforts in novel medicines. For the first antibody-drug conjugate (ADC) developed in our labs, the anti-CEACAM5 ADC M9140, we completed the dose-finding portion of our Phase I study (for further details see "**Research and Development**").

Beyond our ADC platform, we are also evaluating small-molecule DNA damage response (DDR) inhibitors as this therapeutic class has the potential for better outcomes in patients with cancer.

Within our DDR portfolio, we continue to advance the development of our potent and selective inhibitor of ataxia telangiectasia and Rad3-related (ATR), tuvusertib (M1774). We initiated the Phase Ib/IIa DDRiver NSCLC 322 study of tuvusertib in combination with cemiplimab in participants with non-squamous non-small cell lung cancer (NSCLC) (for further details see "**Research and Development**").

Neurology & Immunology

In Neurology & Immunology, we aim to provide transformative treatment solutions to support people living with neurological and immune-mediated conditions while significantly improving quality of life for them and their caregivers. With over two decades of experience in MS, our current portfolio includes two approved products for the treatment of relapsing MS (RMS) – Rebif® (interferon beta-1a) and Mavenclad® (cladribine tablets).

Rebif®, a disease-modifying drug, has been a standard treatment in RMS for over 20 years with more than 1.9 million patient-years of therapy since approval.

Mavenclad®, a short-course oral therapy for the treatment of adults with various forms of highly active RMS, reached blockbuster status in fiscal 2023 with total net sales of more than US$ 1 billion, and is approved in 95 countries worldwide, including those of the European Union, Switzerland, Australia, Canada, and the United States.

With evobrutinib, we had originally aimed to commercialize a first-in-class Bruton's tyrosine kinase (BTK) inhibitor for RMS. In December, we shared the outcome from the EVOLUTION clinical trials, which showed that the investigational drug did not meet its primary endpoint of annualized relapse rate for up to 156 weeks compared to oral teriflunomide.

Fertility

Our Fertility franchise is a global market leader in fertility drugs and treatments.

Infertility is an increasing challenge globally due to demographic changes and lifestyle adjustments such as delayed childbearing. Based on the latest data from WHO, one in six people worldwide is affected by infertility.

According to the latest data, more than five million babies have been born worldwide with the help of Gonal-f®, a therapeutic within our Fertility portfolio. It contains the active ingredient follitropin alfa (r-hFSH alfa), which is a recombinant form of the natural hormone FSH and is available in a convenient and ready-to-use pre-filled injection pen. Treatment with Gonal-f® can result in increased follicles, oocytes, and embryos compared to urinary gonadotropins, thereby improving the chances of pregnancy and live birth.

To support and meet the needs of a variety of patients, in addition to Gonal-f®, we offer another key product called Pergoveris®. It is a product that combines recombinant human follicle-stimulating hormone (r-hFSH) and recombinant human luteinizing hormone (r-hLH). This represents another treatment option for women with severe FSH and LH deficiency. Pergoveris® is also available in a ready-to-use liquid version in a pre-filled injection pen, eliminating the need for mixing.

In September 2023, we announced our new employee "Fertility Benefit" program. The new offer is available to our employees in a number of countries and to their partners, regardless of their marital status. Apart from financial assistance, we offer employees facing fertility issues additional information services related to fertility disorders.

Cardiovascular, Metabolism & Endocrinology

Cardiovascular, Metabolism & Endocrinology (CM&E), which includes the medicines Glucophage®, Euthyrox®, Concor®, and Saizen®, is the largest franchise of the Healthcare business sector in terms of sales.

Concor®/Concor Cor®, containing bisoprolol, is a beta-blocker for treating hypertension and cardiovascular diseases such as coronary heart disease and chronic heart failure. In addition to Concor®/Concor Cor®, the Concor® family includes fixed-dose combinations such as Concor Plus®/Lodoz® (bisoprolol with hydrochlorothiazide).

Euthyrox®, with the active ingredient levothyroxine, is a leading medicine for the treatment of hypothyroidism, a disease with high prevalence but still low diagnosis rates in most emerging markets.

Glucophage®, containing the active ingredient metformin, is a drug for first-line treatment of type 2 diabetes and is available in more than 100 countries. In recent financial years, Glucophage® has been approved by further health authorities for use in prediabetes when intensive lifestyle changes failed.

Saizen®, containing the active ingredient somatropin, is our main endocrinology product and is indicated for the treatment of multiple growth hormone disorders in children and adults. Saizen® can be delivered with the Easypod® electromechanical injection device, the only growth hormone injection device able to wirelessly transfer data such as injection times, dates and doses to the web-based software system Growzen® Connect. Aluetta® (the Saizen® pen) is now available in 67 countries with the objective of expanding the reach of Saizen®, offering additional options for healthcare practitioners and patients and expanding our devices portfolio.

In endocrinology, we build evidence in the digital health space and leverage technology to provide new solutions for patient engagement, partnership with healthcare practitioners and better payer value proposition.

Minimizing the ecological footprint of our operations*

We are continuously taking action to further reduce the negative ecological impact of our operations on our planet with a holistic approach that includes our locations, products, logistics and patients. A portfolio-related activity to reduce the ecological footprint of our operations is the partnership we entered in May with Novo Nordisk, Eli Lilly and Sanofi to pioneer the world's first cross-industry solution for recycling materials from injection pens after use by patients.

Denmark was chosen because of the existing recycling infrastructure in the country. Today, the four companies involved in this partnership account for around six million injection pens used in Denmark annually. The ambitious target for the first 12 months is for 25% of all injection pens distributed by the four companies in Denmark to be recycled, amounting to more than 25 metric tons of plastic.

Electronics

We are a major supplier of materials and solutions for the semiconductor and display industries. We have a portfolio of materials, systems and services as well as R&D and a global production network close to our customers. We have built our portfolio to cater to the continued digitalization and the unabated growth of data. The demand for increasingly sophisticated semiconductor chips and displays will continue to rise, not least thanks to developments such as Artificial Intelligence (AI), 5G (fifth-generation mobile networks) and autonomous driving. In recent years, we have developed into a relevant player in the global electronic materials market. In addition, we offer decorative and functional solutions for surfaces of all kinds.

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In 2021, we started our “Level Up” growth program and are continuing to invest significantly more than € 3 billion in innovation and capacity expansion. Despite difficult market conditions in 2023, we plan to continue our “Level Up” growth program and will adjust the timeframe of our investments in line with market demand.

The Electronics business sector consists of three business units: Semiconductor Solutions, Display Solutions and Surface Solutions. Three cross-functional boards support the business units: Technology Leadership Board, Supply Chain Leadership Board, and Commercial Leadership Board. They define cross-sector standards, steer portfolio management, drive forward the exchange on good practice, and promote transparency.

Electronics accounted for 18% of Group sales in 2023, and its share of EBITDA pre (excluding Corporate and Other) was 15%. In 2023, Asia-Pacific generated 67% of Electronics’ net sales, Europe and North America accounted for 30% of sales.

Semiconductor Solutions

Semiconductor Solutions is the largest business unit in terms of sales within Electronics. It comprises our product and service offering for the semiconductor industry. We are developing materials and solutions to make the next generation of devices – we help make chips smaller, faster, more powerful and more sustainable.

Semiconductor Solutions supplies products for major production steps in wafer processing, including doping, patterning, deposition, planarization, etching, and cleaning. It also supplies delivery equipment for semiconductor manufacturing. Specialty cleans, photoresists, and conductive pastes for semiconductor packaging complement the portfolio. Intermolecular is our center for complex material solutions in Electronics, located in San Jose, California, USA. There, we explore, test, and develop combinations of different materials for next-generation electronics.

Our Semiconductor Solutions business unit consists of the following business fields: Formulations, Thin Films, Specialty Gases and Delivery Systems & Services.

- The Formulations business field comprises the Patterning and Planarization production steps. This includes lithography products for surface treatment such as photoresists and the associated auxiliaries, anti-reflective coatings and materials for directed self-assembly (DSA). The Planarization business comprises CMP materials (chemical-mechanical planarization).
- The Thin Films business field supplies solutions and productions for our customers in the fields of dielectrics (organosilanes and spin-on dielectrics) and metallics product offerings. Many of our materials are used for leading edge nodes, which is the enabler of advanced chips for generative AI.
- The Specialty Gases business field provides high-purity gases for semiconductor manufacturing. These gases are crucial for precise deposition, doping, etching, and cleaning during wafer fabrication. With a strong commitment to meeting the semiconductor industry’s stringent requirements, our Specialty Gases business supports the industry in the development of advanced electronic devices.
- The Delivery Systems & Services (DS&S) business field, with its systems business, develops and installs reliable delivery equipment to ensure the safe and responsible handling of specialty chemicals and gases for semiconductor manufacturing. At many sites of the industry, production facilities and delivery systems are operated and maintained by our MEGASYS® Total Gas and Chemical Services employees.

In 2023, the semiconductor market was impacted by a cyclical downturn, mainly due to advance spending on consumer electronics (PCs, smartphones, game consoles) in previous years due to the Covid-19 pandemic. The situation was amplified by inflation and high interest rates during the fiscal year. These developments prompted consumers to postpone purchases of electronic devices.

Semiconductor manufacturers continue to invest at a high level. This is also evidenced by the strong growth of our equipment business (part of DS&S) in 2023 despite the currently weak semiconductor market. In view of the expected long-term increase in demand, we continue to expand global production capacity for our specialty gas, liquid chemical and slurry delivery systems.

In fiscal 2023, we integrated the chemical business of Mecaro Co. Ltd., which we acquired in 2022, into our Semiconductor Solutions business. We also strengthened our business in thin films technology and our footprint in Korea. In February 2023, we broke ground for a new integrated facility in Kaohsiung, Taiwan. Here we will produce a comprehensive portfolio of semiconductor materials in one single site.

In April 2023, we announced our plans to expand manufacturing capacities at our site in Hometown, Pennsylvania, USA, thus increasing domestic production capacity for electronics components. The roughly € 300 million investment in the Hometown site is intended to further develop our largest integrated specialty gases facility. In June 2023, we commissioned a new production facility for DS&S in Chandler, Arizona, USA.

Display Solutions

Our Display Solutions business unit includes the businesses with liquid crystals (LC), display patterning materials (materials for surface treatment), organic light-emitting diodes (OLED), photoresists, reactive mesogens, smart antenna (LC-based antennas), and liquid crystal glazing (LC-based windows). We support our customers in developing novel display technologies for TV, IT, mobile devices, automotive, gaming, and other applications. Together with our customers we are working in the field of AR/VR to expand the application scenarios of LC & OLED materials and enhance the user experience in small and micro-sized displays. We are working very closely with leading panel makers to develop next-generation products with LCD (liquid crystal display) technology for the electronics market.

While lockdowns and working from home pulled forward demand for TVs and IT devices during the Covid-19 pandemic, this trend has meanwhile reversed. The industry saw a significant reduction in demand during 2023, resulting in a decline in customer factory utilization.

The Covid-19 pandemic has accelerated the shift of the liquid crystals industry towards China and increased competition. In 2023, we maintained our position as manufacturer of innovative LC materials with our XtraBright™ products, winning new projects for large-area displays as well as high-resolution mobile devices. Our OLED and photoresist materials are used in multiple free-form display products. In addition, we are actively working with customers on both LC-on-silicon (LCoS) and OLED-on-silicon solutions for AR/VR displays.

With our OLED materials, we are also supporting our customers in making sustainable OLED structures, which are important for new OLED applications such as IT screens. In 2023, we developed deuterated materials for next-generation OLED displays. They have the potential to more than double the lifetime of OLED stacks without compromising on efficiency and voltage, enabling displays with higher brightness.

Real estate investors use our product eyrise® s350 solar shading (sun protection at the touch of a button) to deliver on ESG (environment, social, governance) objectives. For example, a large real estate investor in Switzerland has already installed eyrise® on all facades of its flagship project in the center of Zurich. More commercial projects are currently in installation.

Surface Solutions

In our Surface Solutions business, we provide our customers with solutions that help them to create functional and decorative surfaces of all kinds. We focus on markets for automotive coatings, cosmetics, and, to a smaller extent, industrial applications. With our portfolio of active ingredients, we enable cosmetics manufacturers to enrich their skin care products with moisturizing, protecting and anti-aging effects. Moreover, our functional solutions serve many innovative applications, from dirt-repellent and easy-care surfaces to laser markings of plastic parts and cables.

Despite the current challenging economic environment, Surface Solutions is continuing to implement its strategic transformation. We continued to invest in digitalizing and modernizing our production plants around the globe while adjusting our capacities to the changing demands in our different markets.

Strategy*

Strategy fundamentals and ambition

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. Our company has a firm foundation with convictions and principles that the Merck family has lived by for generations. We always take them into consideration when discussing and deciding on our enterprise strategy.

Compared to last year, we face greater challenges as the increasingly complex global situation has also impacted some of our end markets. This poses challenges for the global economy and society. With a history of more than 355 years and a truly global footprint today, we have established a solid, resilient foundation that continues to bolster our confidence in our ambition for the future – to become the global 21st century science and technology pioneer. To achieve this, we continue to focus on our key growth drivers: Process Solutions, Life Science Services, Science & Lab Solutions, and Semiconductor Solutions as well as developing specialty drugs in our Healthcare business. Our must-win battles include building an organization with comprehensive data expertise and strengthening our ability to innovate. For instance, in our "Data & Digital" initiatives, we focus on identifying, prioritizing, and implementing technical capabilities across our businesses to promote future growth.

Through our multi-industry business model, we serve attractive global markets with secular growth trends as a trusted partner to advance human progress. Our diversified portfolio benefits from key megatrends. In Life Science, this includes a growing market for complex and novel modalities. In Healthcare, we develop and commercialize specialty pharmaceuticals in the Oncology and Neurology & Immunology franchises. These include the medicines Erbitux® (cancer), Bavencio® (cancer) and Mavenclad® (multiple sclerosis). In addition, we are conducting clinical trials with late-stage xevinapant (head and neck cancer) and further drug candidates in oncology, neurology and immunology in earlier stages of clinical development. With our comprehensive portfolio of semiconductor materials, we expect to benefit in the medium and long term from continuously increasing demand for chips due to the exponential growth of data volumes as well as the further implementation of artificial intelligence (AI) and the Internet of Things (IoT).

We strive to make a positive impact in our communities and on the planet while assessing and considering the ESG (environmental, social, governance) impact of our growth ambition. Since the launch of our sustainability strategy, we have achieved essential milestones in integrating sustainability as a foundational element of our overall governance and decision-making frameworks. We are diligently striving to achieve human progress for more than one billion people through sustainable science and technology by 2030. Fully integrating sustainability into our value chains by 2030 is at the forefront of our priorities. In addition, we are committed to achieving climate neutrality and minimizing resource consumption by 2040.

Active portfolio management is an integral part of our strategy. This has enabled us to transform over the last decades and our evolution into a global science and technology pioneer. In this sense, inorganic growth is a relevant element to accelerate strategic plans and to leverage business opportunities in our attractive end markets. Strengthening our key growth businesses remains the highest priority for which mergers and acquisitions (M&A) could serve as appropriate tools.

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Business strategies

Life Science

Our Life Science business sector is a global leader in the approximately € 230 billion life sciences industry. We continue to consistently deliver long-term profitable growth despite near-term headwinds, including a decline in Covid-19-pandemic-related demand, destocking by key customers and softening of funding for early-stage biotech companies. Our long-term market growth outlook remains unchanged at approximately 5% to 7% C AGR, fueled by increasing demand for commercial medicines and the essential nature of R&D across customer segments. We are well-positioned to weather challenging market conditions and emerge as an even more integral partner to our customers.

Our strategy builds on the transformation we began last year, with a sharpened focus on differentiating both our core and high-growth portfolios and capitalizing on the unique capabilities of our company. We are doing this by leveraging our distinctive breadth of offerings to customers in academia, the biopharmaceutical industry and the industrial sector, including food & beverage, to advance leading edge science. We aspire to comprehensively address customers' scientific needs and serve as a partner across products and services with a focus on enabling novel modalities. We amplify customer value by proactively addressing future customer needs to create lasting differentiation beyond the breadth and performance of our offerings. Our multichannel commercial approach, e-commerce platform and focus on sustainability set us apart. We enhance competitiveness by pursuing operational and commercial excellence and building future-oriented capabilities and ways of working.

This course we have set directs our focus and resources to pursuing opportunities that financially and technologically "move the needle" while deprioritizing those that may distract from our focused ambition to continue to be a global science & technology leader. For example, our Process Solutions business unit is optimizing its go-to-market approaches to address shifting customer behaviors, including expanding access to Process Solutions products via sigmaaldrich.com, our e-commerce platform. Our growing Life Science Services Contract Testing and Development Manufacturing Organization (CTDMO) business is building an end-to-end offering for novel modalities with a focus on anti-drug conjugates (ADCs), mRNA and viral vectors, where customers are seeking greater technical expertise and collaboration.

The diverse customer and portfolio base of our Science and Lab Solutions business provides a stable foundation while continuing to build positions in higher-growth segments. Our Integrated Supply Chain Organization's evolution to become more agile, resilient, and customer-centric is an essential foundation for continued profitable growth. To this end, we have implemented new processes to more closely connect our sales and production plans, using digital tools to align with customers on lead times and other supply expectations, standardizing operations across sites and regionalizing our network – especially in Asia-Pacific (APAC) – to meet local needs and balance risk. We have also embedded sustainability criteria in R&D and operations, providing customers with an expanded range of greener alternatives and data, such as product carbon footprints, to help reach their sustainability goals.

Our strategy reflects our purpose – to impact life and health with science – and allows us to deliver customer and shareholder value now and into the future. We are prepared to address short-term challenges and emerge from the post-Covid-19-pandemic era with deeper customer relationships, high-value innovations and a more resilient and cost-effective operating network.

Healthcare

Despite external volatility in recent years, the pharmaceutical industry has proven its resilience and remains attractive with solid growth expectations. Global megatrends such as growing and aging populations as well as better access to healthcare continue to drive the need for our products. At the same time, the macroeconomic and geopolitical environment has become more uncertain. Our mixed portfolio and our diverse geographic footprint build a resilient foundation to meet these demands and respond appropriately to the dynamics of our markets, paving the way for the future success of our Healthcare business.

Following our successes over the past years, we continue to drive pipeline projects with the aim of bringing groundbreaking medicines to patients, maximizing our existing portfolio and continuing our expansion in growth markets. We are resolute in our ambition to become a global specialty innovator with a high-growth future in oncology as well as neurology and immunology. This ambition is built on a firm foundation and continues to foster sustainable and profitable growth in the Cardiovascular, Metabolism & Endocrinology franchise while further strengthening our leadership position in fertility. We pursue this ambition with a focused leadership approach, concentrating investments on decorrelated opportunities in our pipeline and across therapeutic areas, regions and payer types.

The first pillar of our strategy is to reinforce and expand our global footprint, bringing the innovation of our pipeline to patients and growing our presence in the United States and in China, for example. Driven by well-known demographic trends, the expected absolute global pharma market growth contribution will remain highest in established markets, while the emerging markets are expected to grow faster than developed markets in relative terms as a result of rapidly developing pharma infrastructure. With our diversified portfolio of specialty and mature product businesses, we are benefiting from these trends. While our solid base within established markets (France, Germany, Italy, Japan, Spain, the United Kingdom, and the United States) enables us to achieve growth with our specialty portfolio, the emerging markets will be a large growth driver for many of our established products in the future. Managing the balance between delivering innovative new medicines with first-in-class and/or best-in class potential while leveraging our strengths in other markets and ensuring the profitable growth of the existing business will be one of the strategic imperatives.

The second pillar of our strategy is the focus on specialty medicine franchises. Here, we expect the oncology, neurology and immunology markets to remain highly attractive in terms of size, growth prospects and profitability. Within each specialty franchise, our approach is to develop deep internal expertise and insight, from internal research to commercialization, through external talent searches and strategic partnerships. In order to optimize the holistic value and focus of our pipeline, we continuously monitor and assess the potential of our pipeline candidates, based on clinical data, strategic fit and financial criteria, to determine the best way forward.

The third strategic pillar is innovation. We aim to develop potential first-in-class and best-in-class therapies. We have streamlined our pipeline and expanded our innovation capabilities with strong investigational drug candidates and technologies. In order to maximize the output of our R&D investments and to ensure long-term sustainability, we are focusing our expertise on specific franchises. Further, we increase our intake of external innovation, in line with industry practice, to meet our ambition of launching a new product every 18 months. We are investing in assets with the most promising value generation outlook as well as digital technologies and novel modalities such as antibody-drug conjugates to drive pipeline growth.

Electronics

We are an innovation leader within the electronics industry, targeting the most critical materials segments of the semiconductor wafer processing as well as OLED and LC display panels. Our diversified portfolio proves to be resilient in a dynamic market environment. We partner with leading experts around the world to enable the next generation of electronic devices, innovating with leading-edge customers and being a local partner for their global presence.

The long-term growth prospects of the industry remain very attractive, despite the current downcycle. We believe in the long-term growth drivers of digitalization and its visualization, fueled by an exponential increase in data volumes. Semiconductors will thus continue to be a critical component in many industries. The main accelerator in the industry is and will remain AI. Although the number of AI chips is still small, the high growth rates and the high value of these chips as well as the required materials will fuel the growth of the semiconductor industry. This trend will be supported by technologies such as 5G networks, autonomous driving, electric vehicles, and IoT. Merck will benefit from the high material requirements of these AI chips in terms of value and volume.

In the short term, AI alone cannot offset the current market decline in the electronics industry, which results from weak demand after the Covid-19 pandemic and associated excess inventory along the value chain. However, in the medium and long term, the fundamental growth drivers, such as AI, are expected to accelerate the market development through the next decade. To produce ever more powerful and energy-efficient chips, innovation in novel materials will be even more essential.

To benefit from the strong electronics industry growth, we are continuously expanding our capacities and our capabilities. We are continuing to invest significantly more than € 3 billion in innovation and capacities, which are aligned with the customers and regions we serve. These investments are an essential part of our ongoing Level Up growth program, which we kicked off at the end of 2021. The investments are made in lockstep with the capacity expansions of our customers in order to support their growth and new fabs with a reliable supply of innovative materials and systems. We will continue to invest in our geographic proximity to our customers while boosting R&D and innovation. Electronics also seeks to exploit attractive external growth opportunities through acquisitions.

Our ability to systematically use data and digital methods across the entire value chain differentiates in the market, enabling us to meet and exceed the increasing requirements regarding quality, speed and reliability. Furthermore, we are accelerating important initiatives to transform the industry towards sustainability and investing even further in safety.

After substantial investments in improving our processes and expanding our production capacities in Surface Solutions, we remain confident of successfully implementing our strategic transformation within that business.

Data & Digital strategy

Going forward, we will further identify transformative technologies to serve as pivotal enablers for our growth and innovation ambition. Therefore, we will look into novel technologies beyond our core products and markets while maintaining strategic proximity to our business sectors so as to leverage our existing assets and core competencies. Our Group Science & Technology Office and the newly established Merck Data & AI Organization are leading the implementation of our combined strategy for innovation and “data & digital”. They promote innovation within and between business areas by bringing transformative technology trends into the company and exploiting the potential of high-quality data and state-of-the-art digital capabilities. In addition, we are investing in building smart manufacturing capabilities, across our business sectors thus leveraging synergies across business sectors while also exploring digital business models as a separate growth opportunity.

Furthermore, we are deploying a company-wide harmonized data and analytics operating model and ecosystem. This enables us to derive actionable insights from data, support informed decision-making and scale related activities across the company to solve real business challenges with machine learning and AI.

Data culture is fundamental for our digital transformation. Through targeted measures to improve data literacy activities, we are strengthening the ability of our employees to identify, understand, create, model, analyze, interpret data as well as, communicate and argue with data. We foster generative AI literacy by giving employees the possibility to test AI in a secure environment. With myGPT@Merck, our employees have access to an AI assistant to use when working with confidential and internal information.

Sustainability strategy

Leveraging science and technology

In our view, 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 products 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.

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, it is important to us to keep the environmental impact as low as possible, which is why safe production, high environmental standards and strict quality management are of course so important to us. By supplying products that meet extensive sustainability criteria, we also help other companies to achieve their sustainability goals.

Sustainability is an essential element of our enterprise strategy. We have set ourselves three strategic sustainability goals: In 2030, we will achieve progress for more than one billion people through sustainable science and technology. By 2030, we will fully integrate sustainability into our value chains. By 2040, we will be climate neutral and reduce our resource consumption. With these goals, we are helping to achieve the UN Sustainable Development Goals (SDGs). Overall, our sustainability strategy is centered on seven focus areas within which we are realizing numerous initiatives and projects today and tomorrow, measuring our progress as we go.

Refining the sustainability strategy

In 2023, we revised our sustainability strategy, which we had communicated in 2020. In particular, we sharpened the second goal: Under the new heading “Partnering for sustainable business impact”, we want to strengthen our focus on the social aspects in our value chains and embed sustainability more comprehensively into our decision-making processes. Therefore, in addition to the existing focus area “Sustainable and transparent supply chain”, we are now also working on the new focus areas “Sustainability in our ways of working and decision-making” and “Our people and communities; providing a diverse and inclusive environment”. For the third goal, “Reducing our ecological footprint”, we modified two of our key indicators for waste and water. The two new indicators, which are valid as of 2024, use more common metrics and also include circular economy criteria.

We use 14 key indicators to record and assess our progress towards achieving our sustainability goals. Our annual Long-Term Incentive Plan (LTIP) for Executive Board members and senior executives contains a sustainability factor. We use it to measure performance over a period of three years based on selected key indicators for each of our three sustainability goals. Details on how this sustainability factor is calculated can be found in the “**Compensation Report**”. In 2023, the company tied 15% of variable employee compensation to sustainability parameters for the first time.

We are 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. More information on sustainability topics can be found in the “**Non-Financial Statement**”, which is also part of the management report.

Strategic finance and dividend policy

We pursue a conservative financial policy characterized by the following aspects:

Financial flexibility and a conservative funding strategy

We ensure that we meet our obligations at all times and adhere to a conservative and proactive funding strategy that involves the use of various financial instruments. Our diversified and profitable business activities form the basis for our strong and sustainable cash flow generation capacity. Moreover, we have several funding resources in place. A € 2.5 billion syndicated loan facility is in place until 2028 to cover unexpected cash needs. This credit line is a backup facility that is intended to be used in exceptional circumstances only.

We also agreed upon several bilateral loan facilities. In addition, we have a commercial paper program with a volume of € 2.5 billion at our disposal. Within the scope of this program, we can issue short-term commercial paper with a maturity of up to one year.

The bond market also represents an important source of financing. The most recent bond issue took place in June 2022 (€ 1.0 billion bond issue). The use of various instruments provides a broad financing basis and addresses different investor groups.

Maintaining long-term and reliable business relations with a core group of banks

We work mainly with a well-diversified, financially stable, and reliable group of banks. Due to our long-term business approach, bank relationships typically last for many years and are characterized by professionalism and trust. The banking group consists of banks with strong capabilities and expertise in various products and geographical regions. We regard these banks as strategic partners and involve them in important financing transactions accordingly.

Strong investment-grade rating

The rating of our creditworthiness by external rating agencies is an important indicator of financial stability. A strong investment-grade rating is an important cornerstone of our financial policy as it safeguards access to attractive financial conditions on the capital markets.

In November 2023, our ratings were confirmed by Moody’s (A3, stable outlook) and Standard & Poor’s (A, stable outlook). We discontinued our Scope rating (previously: A, stable outlook) in December 2023.

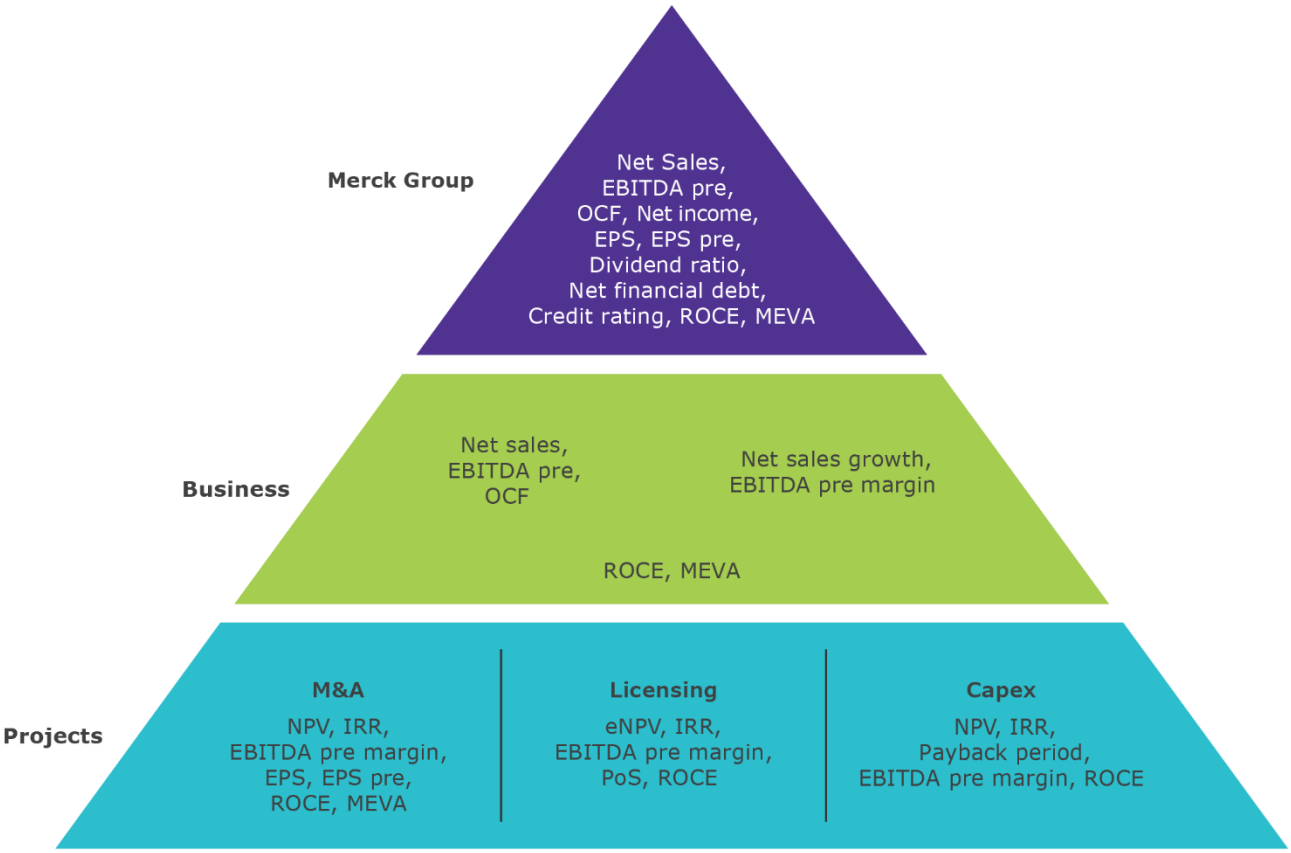
Sustainable dividend policy

We are pursuing a sustainable dividend policy. Provided the economic environment develops in a stable manner, the current dividend represents the minimum level for future dividend proposals. Our dividend policy will follow business development and earnings increases over the coming years. However, dividend growth could deviate, for example, within the scope of restructuring or in the event of significant global economic developments. We aim for a target corridor of 20% to 25% of earnings per share pre.

Internal Management System

As a global company with a diverse portfolio of products and services, we use a comprehensive framework of indicators to manage performance. The most important key performance indicator (KPI) for measuring performance is EBITDA pre[1].

The Value Creation and Financial KPI Pyramid, which summarizes our important financial performance measures, reflects the comprehensive framework of financial KPIs to steer the businesses and prioritize the allocation of cash resources. It consists of three managerial dimensions: Merck Group, Business, and Projects, each of which requires the use of different indicators.



Abbreviations
EBITDA pre[1] = Earnings before interest, income tax, depreciation and amortization as well as adjustments.
EBITDA pre-margin[1] = Earnings before interest, income tax, depreciation and amortization as well as adjustments in percent of the net sales.
EPS = Earnings per share.
EPS pre[1] = Earnings per share before adjustments.
MEVA[1] = Merck value added.
OCF[1] = Operating cash flow.
ROCE[1] = Return on capital employed.
NPV[1] = Net present value.
IRR[1] = Internal rate of return.
eNPV[1] = Expected net present value.
PoS[1] = Probability of success.
M&A = Mergers and acquisitions.

[1] Not defined by International Financial Reporting Standards (IFRS).

Key performance indicators of the Group and its businesses

The three key performance indicators of net sales, EBITDA pre, and operating cash flow (OCF) are the most important financial factors for assessing operational performance. Accordingly, we refer to these KPIs in the "**Report on Economic Position**", the "**Report on Risks and Opportunities**", and the "**Report on Expected Developments**". As the most important indicators of financial business performance, the KPIs are key elements of our performance management system.

Net sales

Net sales are defined as the revenues from the sale of goods, services rendered to external customers, and commission income and profit sharing from collaborations, net of value-added-tax, and after sales deductions such as rebates or discounts. Net sales are the main indicator of our business growth and therefore an important parameter of external as well as internal performance measurement. In addition, organic sales growth compared with the target is used for internal performance management. Organic sales growth shows the percentage change in net sales versus a comparative period, adjusted for exchange rate and portfolio effects. Exchange rate effects may arise as a result of foreign exchange fluctuation between the functional non-euro currency of a consolidated company and the reporting currency (euro). By contrast, portfolio effects reflect sales changes due to acquisitions and divestments of consolidated companies or businesses.

Merck Group

Net sales

			Change	
€ million	**2023**	2022	€ million	%
Net sales	**20,993**	**22,232**	**-1,239**	**-5.6%**

EBITDA pre

EBITDA pre is the main performance indicator measuring ongoing operational profitability and is used internally and externally. To permit a better understanding of the underlying operational performance, the operating result is adjusted to exclude depreciation and amortization, impairment losses and reversals of impairment losses, as well as adjustments. These adjustments are restricted to the following categories: integration expenses, IT expenses for certain projects, restructuring expenses, gains/losses on the divestment of businesses, acquisition expenses, and other adjustments. The classification of specific income and expenses as adjustments follows clear rules and is subject to strict governance at the Group level. Within the scope of internal performance management, EBITDA pre permits process efficiency increases without influencing the performance of the operating business through exceptional items or restructuring expenses. The following table shows the composition of EBITDA pre in fiscal 2023 compared with the previous year. The IFRS figures have been modified to reflect the elimination of adjustments included in the respective functional costs.

Merck Group

Reconciliation EBITDA pre[1]

	2023			2022[2]			Change
€ million	IFRS	Elimination of adjustments	pre[1]	IFRS	Elimination of adjustments	pre[1]	pre[1]
Net sales	**20,993**	**–**	**20,993**	**22,232**	**–**	**22,232**	**-5.6%**
Cost of sales	-8,600	43	-8,558	-8,527	32	-8,496	0.7%
Gross profit	**12,392**	**43**	**12,435**	**13,705**	**32**	**13,737**	**-9.5%**
Marketing and selling expenses	-4,510	44	-4,466	-4,714	32	-4,681	-4.6%
Administration expenses	-1,392	246	-1,146	-1,306	115	-1,191	-3.8%
Research and development costs	-2,445	7	-2,438	-2,521	75	-2,446	-0.3%
Impairment losses and reversal of impairment losses on financial assets (net)	-51	–	-51	-6	0	-6	>100.0%
Other operating income and expenses	-385	138	-247	-685	323	-361	-31.6%
Operating result (EBIT)[1]	**3,609**			**4,474**			
Depreciation/amortization/ impairment losses/reversals of impairment losses	1,880	-87	1,792	2,030	-232	1,798	-0.3%
EBITDA[2]	**5,489**			**6,504**			
Restructuring expenses	249	-249	–	198	-198	–	
Integration expenses/IT expenses	118	-118	–	88	-88	–	
Gains (-)/losses (+) on the divestment of businesses	-51	51	–	-38	38	–	
Acquisition-related adjustments	18	-18	–	29	-29	–	
Other adjustments	56	-56	–	68	-68	–	
EBITDA pre[1]	**5,879**	**–**	**5,879**	**6,849**	**–**	**6,849**	**-14.2%**
thereof: organic growth[1]							-9.0%
thereof: exchange rate effects							-4.9%
thereof: acquisitions/divestments							-0.3%

[1] Not defined by International Financial Reporting Standard (IFRS).

[2] Not defined by International Financial Reporting Standards (IFRS); EBITDA corresponds to operating result (EBIT) adjusted by depreciation, amortization, impairment losses, and reversals of impairment losses.

Operating cash flow (OCF)

Operating cash flow results from Merck's current business activities and describes the cash generated from operating activities. It is influenced mainly by EBITDA pre, income tax, the financial result and changes in net working capital.

Merck Group

Operating cash flow

			Change	
€ million	**2023**	2022	€ million	%
EBITDA pre[1]	**5,879**	**6,849**	**-970**	**-14.2%**
Adjustments[1]	-390	-345	-45	13.1%
Finance result[2]	-125	-187	62	-33.0%
Income tax[2]	-650	-948	298	-31.4%
Changes in working capital[1]	-141	-917	776	-84.7%
thereof: Changes in inventories[3]	-89	-604	516	-85.3%
thereof: Changes in trade accounts receivable[3]	-8	-413	405	-98.0%
thereof: Changes in trade accounts payable/refund liabilities[3]	-43	101	-144	>100.0%
Changes in provisions[3]	188	279	-91	-32.5%
Changes in other assets and liabilities[3]	-755	-445	-310	69.6%
Neutralization of gains/losses on disposal of fixed assets and other disposals[3]	-150	-48	-102	>100.0%
Other non-cash income and expenses[3]	-72	21	-93	>100.0%
Operating cash flow	**3,784**	**4,259**	**-475**	**-11.2%**

[1] Not defined by International Financial Reporting Standard (IFRS). Adjustments according to definition above.

[2] According to Consolidated Income Statement.

[3] According to the Consolidated Cash Flow Statement.

[4] As of January 1, 2023, the tranche of the Merck Long-Term Incentive Plan to be paid out in the months following the balance sheet date is disclosed under other current non-financial liabilities and no longer under current provisions for employee benefits. For better comparability, the previous year's figures have been adjusted.

Investments and value management

Sustainable value creation is essential to secure the long-term success of the company. To optimize the allocation of financial resources, we use a defined set of parameters as criteria for prioritizing investment opportunities and portfolio decisions.

Net present value (NPV)

The main criterion for prioritizing investment opportunities is net present value. It is based on the discounted cash flow method and is calculated as the sum of the discounted free cash flows over the duration of a project. The weighted average cost of capital (WACC), representing the weighted average of the cost of equity and cost of debt, is used as the discount rate. Different markups are applied to the WACC depending on the nature and location of the respective project.

Internal rate of return (IRR)

The internal rate of return is a further important criterion for the assessment of acquisition projects and investments in property, plant and equipment, as well as intangible assets. It is the discount rate that makes the present value of all future free cash flows equal to the initial investment or the purchase price of an acquisition. A project adds value if the internal rate of return is higher than the weighted cost of capital including markups.

Return on capital employed (ROCE)

In addition to NPV and IRR, return on capital employed is an important metric for the assessment of investment projects when looking at individual accounting periods. It is calculated as the adjusted operating result pre (EBIT pre) divided by the sum of property, plant and equipment, intangible assets, trade accounts receivable, trade accounts payable, and inventories.

Payback period

An additional parameter for assessing investments in property, plant & equipment, and intangible assets is the payback period, which indicates the time in years after which an investment will generate positive net cash flow.

Merck value added (MEVA)

Merck value added gives information about the financial value created over a period of time. Added value is created when the return on capital employed (ROCE) of the company or the business is higher than the weighted average cost of capital (WACC). MEVA metrics provide us with a powerful tool to weigh investment and spending decisions against capital requirements and investors’ expectations.

Capital market-related parameters

Net income, earnings per share (EPS) and earnings per share pre (EPS pre)

Earnings per share are calculated by dividing profit after tax attributable to the shareholders of Merck KGaA (net income) by the weighted average number of theoretical shares outstanding. The use of a theoretical number of shares takes into account the fact that the general partner's capital is not represented by shares. As an alternative comparison, we also report earnings per share pre, which are adjusted for the effects of integration expenses, IT expenses for selected projects, restructuring expenses, profits/losses from the divestment of businesses, acquisition expenses, and other adjustments. Amortization of acquired intangible assets is also adjusted for. The adjustment excludes impairment losses on intangible assets for acquired research and development (R&D) projects below a threshold value of € 50 million. Income tax is calculated on the basis of the Group's underlying tax rate. The following table presents the reconciliation of net income to net income pre for the calculation of EPS pre.

Reconciliation net income to net income pre[1]

			Change	
€ million	**2023**	2022	€ million	in %
Net income	**2,824**	**3,326**	**-502**	**-15.1%**
Non-controlling interest	10	14	-3	-25.6%
Income tax	650	948	-298	-31.4%
Amortization of acquired intangible assets	783	830	-47	-5.6%
Adjustments[1]	477	577	-99	-17.2%
Income tax on the basis of the underlying tax rate[1]	-1,044	-1,310	266	-20.3%
Non-controlling interests to be adjusted	-10	-14	3	-25.6%
Net income pre[1]	**3,691**	**4,371**	**-680**	**-15.6%**
Earnings per share pre[1] in €	**8.49**	**10.05**	**-1.56**	**-15.5%**

[1] Not defined by International Financial Reporting Standards (IFRS).

Dividend ratio

We pursue a reliable dividend policy with a target payout ratio based on EPS pre (see definition above) with the aim of ensuring an attractive return for our shareholders.

Credit rating

The rating of our creditworthiness by external agencies is an important indicator of our ability to raise debt capital at attractive market conditions. The capital market makes use of the assessments published by independent rating agencies in order to assist debt providers in estimating the risks associated with a financial instrument. We are currently assessed by Moody's and Standard & Poor's. The most important factor for the credit rating is the ability to repay debt, which is determined in particular by the ratio of operating cash flow to net- or gross financial debt.

Relevant non-financial performance measures

Along with the indicators of the financial performance of the businesses, non-financial measures also play an important role in furthering the success of the company.

High-Impact Culture

Our culture should embody what unites us as well as the way in which we collaborate, lead and work as a team to achieve human progress and drive the company forward. We live our high-impact culture and through this, we measure our ability to attract, develop and retain the right people.

Sustainability

According to our sustainability strategy, which was revised in 2023, we aim to achieve human progress through sustainable science and technology, fully integrate sustainability into our value chains and reduce our ecological footprint. We are pursuing these goals in seven focus areas, within which we are realizing numerous initiatives and projects and measuring our progress.

Diversity, equity and inclusion

We know that diversity drives progress. It strengthens our ability to innovate and makes an essential contribution to our success in science and technology. We actively promote and measure the diversity of our leaders to create an inclusive culture that reflects our values and enables every employee to fulfill their potential.

Research and Development

We conduct research and development (R&D) worldwide to develop new products and services to improve the quality of life of patients and meet the needs of our customers. Further optimizing the relevance and efficiency of our research and development activities – either on our own or in collaboration with third parties – is one of our top priorities. In addition, we are continuously improving the fulfilment of our sustainability criteria and integrating them into our R&D processes starting with our product development stage. In 2023, we evaluated almost all relevant R&D projects, thereby increasing transparency regarding the sustainability performance of our global R&D portfolio.

Around 6,500 employees (2022: approximately 7,300) worked in R&D and related support functions in 2023. They dealt with innovations to address long-term health and technology trends in both established and growth markets.

Expenditure for R&D amounted to € 2.4 billion in 2023 (2022: € 2.5 billion).

The organizational setup of our R&D activities reflects our structure with three business sectors. In the Life Science business sector, our research activities focus on developing innovative technologies for laboratory and life science applications in government and academic labs, the biopharmaceutical industry, and the industrial sector. Our Life Science Technology Office, established in 2022, continues to drive long-term innovation and ensures that R&D investments are aligned with our growth strategy. Our goal is to accelerate and impact scientific discovery across our Life Science business units and the Group as a whole. We focus on digital and automated labware, the factory of the future and novel modalities as well as providing more sustainable products for the lab. In addition, our teams remain dedicated to delivering advancements in our core portfolios, such as filtration, pure water for use in laboratories and diagnostic solutions.

With our Healthcare business sector’s R&D pipeline, we aspire to make a positive difference for patients. Our main research areas include oncology and immunology, including multiple sclerosis. The main focus of our Electronics business sector's research is on developing innovative materials and technologies required for the manufacture of ever smaller, faster, more powerful, and more sustainable processors and memory chips. Furthermore, Electronics develops novel materials for next-generation displays and functional and decorative effect pigments for use in the automotive and cosmetics industries and other industrial applications.

We are firmly convinced that science should not be conducted in silos. We believe that a modern, multidisciplinary approach to science will power the next wave of human progress. We call this approach “bioconvergence” because it leverages synergies across digital and material science as well as biotechnology. Success depends on the ability to combine a broad mix of competencies and technologies across several disciplines to create novel market solutions. We are a diversified science and technology company with leading positions across the life science, healthcare and electronics industries. Our goal is to harness synergies not only within our business sectors, but across them.

Examples of opportunities we are developing at the intersection of our business sectors and converging technologies include:

- Continuing to build our automated design-make-test-analyze platform powered by state-of-the-art artificial intelligence (AI) and lab automation. This will accelerate the discovery of new and better drug candidates and in turn expedite timelines for new therapies to reach patients.
- Using our capabilities across the Group in messenger ribonucleic acid (mRNA) synthesis, lipid nanoparticle (LNP) synthesis and formulation and targeted delivery as well as AI to enable the development of “smarter” LNPs that can more effectively target different tissue types including hard-to-reach biological targets in various disease areas.
- Developing digital twins in smart manufacturing. As virtual models designed to accurately replicate a physical object or organism, they can help to improve the time, cost, quality, and sustainability of manufacturing, process optimization and product development. Examples include making pharma supply chains more traceable and trustworthy. We developed a model for primary packaging in the pharmaceutical industry, and in cooperation with a partner provided proof-of-concept.

- Advanced microphysiological systems based on human cell culture models promise to deliver faster and more accurate drug testing results compared with today's two-dimensional approaches and might reduce animal testing. We are currently looking into this next generation of organoids based on chip technology, bringing our Life Science, Healthcare and Electronics colleagues together to work on this area of innovation.

In our R&D, AI and machine learning have demonstrated their ability to predict the properties of new materials. However, our applications of AI and machine learning go beyond just internal use. One example of AI and machine learning being commercialized is the progress made on AIDDISON™. This AI- powered drug discovery software uses generative AI based on two decades of historic data. The software, which had been in development since 2020, was launched by Life Science in 2023. In addition to external commercialization, we also use it in our Healthcare business sector for internal early drug discovery.

High-quality, interoperable data combined with analytics and AI offer unprecedented potential for new digital business models adjacent to our current product offering and unlock additional growth opportunities. Examples include Syntropy and Athinia™, which are partnerships with Palantir.

Syntropy provides a data integration and analytics environment wherein healthcare organizations can contextualize and analyze infinitely a wide variety of data types across their entire ecosystem in an unlimited and secure manner. In 2023, Syntropy announced a partnership with Evidium to develop an AI operating system for healthcare: This alliance will make it easier for clinicians to contextualize clinical data at the source and for scientists to securely collaborate on that data. In the era of increasingly prevalent generative AI, it is crucial for AI to be trustworthy and responsible, especially in healthcare.

Athinia™ is targeting the semiconductor industry and is a collaborative data ecosystem where multiple companies leverage AI to solve critical challenges by utilizing data to improve supply chain transparency, quality and reliability of materials and to accelerate time to market. In July 2023, Athinia™ expanded its partnerships to include Tokyo Electron for real-time collaborative analysis of the performance of semiconductor manufacturing equipment. As a cloud solution, Athinia™ is an independent platform that provides a secure and specific data analytics tool for the industry. In the context of a sustainability application, data from various sources can be integrated to facilitate seamless collaboration in modeling, exchanging, and calculating carbon emissions data. As a founding member of the Semiconductor Climate Consortium, Athinia™ is leading the way in establishing sustainability standards on a digital platform. Companies can use this platform to benchmark their emissions performance against their industry peers, identify areas for improvement and participate in collaborative initiatives aimed at reducing emissions.

Research and Development Costs

			Change	
€ million	**2023**	2022	€ million	%
Life Science	396	399	-3	-0.7%
Healthcare	1,657	1,694	-37	-2.2%
Electronics	297	308	-11	-3.5%
Corporate and Other	94	119	-24	-20.5%
Total	**2,445**	**2,521**	**-75**	**-3.0%**

The ratio of research expenditure to Group sales was 11.6% (2022: 11.3%). The increase is due to the negative sales development.

Life Science

Across our three business units Process Solutions, Life Science Services, and Science & Lab Solutions, our R&D teams continue to bring expertise and a diversified and relevant portfolio of products and services to our customers around the world.

As the fields of preventive and personalized medicine evolve, it will be essential to set the standard with robust, scalable, efficient processes for viral vector production, next-generation sequencing and autologous cell therapies. This in turn will support the expansion of disruptive cell and gene therapies to treat the most challenging and chronic conditions, including cancer, heart disease, diabetes, and muscular dystrophy.

To this end, a large number of engineers, chemists and biologists across five global hubs are focused on six strategic innovation vectors: building our core portfolio, factories and labs of the future, novel modalities, next generation biology, AI and digital, and sustainability. In 2023, we launched more than 8,500 products including products under our “faucet program” for antibodies, reference materials, chemicals, and nanomaterials.

Process Solutions*

In January, we introduced the Pellicon® Capsule with Ultracel® membrane, which meets the single-use tangential flow filtration (TFF) device requirements for the antibody-drug conjugate (ADC) manufacturing process. Engineered with operator safety in mind, the Pellicon® Capsule features for easy connection to a single-use TFF system. The capsules are resistant to organic solvents commonly used in the ADC manufacturing process.

In April, we launched Ultimus® single-use process container film, designed to provide extreme durability and leak resistance for single-use assemblies used for bioprocessing liquid applications. Ultimus® film is designed with a proprietary woven nylon structure and provides enhanced bag strength and resilience. This technology is now available in Mobius® 3D process containers.

In July, the Mobius® iFlex Bioreactor was launched as the latest addition to the BioContinuum™ Production and Harvest Platform, our integrated solution for perfusion process development and manufacturing. Alongside our portfolio of EX-CELL® Advanced HD Perfusion, Mobius® Breez Microbioreactor and Cellicon® Cell Retention Solution, the Mobius® iFlex Bioreactor enables customers to realize the efficiency gains and cost savings of production intensification and continuous monoclonal antibody (mAb) manufacturing.

In March, Medicine Maker recognized the Process Solutions business unit with its Best Biopharma Equipment Company award.

Life Science Services*

One key R&D investment for Life Science Services was the expansion of Contract Testing Development and Manufacturing Organization (CTDMO) Services with two new GMP-grade mRNA drug substance manufacturing sites in Darmstadt and Hamburg, Germany. Consequently, our offering is the first to encompass all key stages of mRNA technologies, lipids, lipid nanoparticles (LNP), and fill & finish, including key products and biosafety testing.

Life Science Services received three awards in 2023. In March, it was recognized at Life Science Leader’s 2023 CDMO Leadership Awards in five categories: capabilities, compatibility, expertise, quality, and service. In September, it received the API Development Award for ChetoSensar™ at the 2023 CPHI Pharma Awards as well as the Best Biologics CMO Award at the 2023 Asia Pacific Biologics CMO Excellence Awards 2023.

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Science & Lab Solutions*

From nanomaterials enhancing battery performance to optimal media culture for producing lab-cultivated meat, the breadth, and depth of our Science & Lab Solutions portfolio highlights how life science innovation improves important aspects of our daily lives.

The lab of the future

One important driver for the Science &Lab Solutions business innovation is digitalizing the lab of future, with workflows through AI, machine learning, automation, and other solutions. It supports scientists at all stages with tools that can increase efficiency, safety and success rates of delivering new, safer therapies for patients. By combining expertise in small molecules, biologics and new modalities with AI and other digital tools, we are helping to redefine how drugs are discovered, developed and produced.

In December, we launched AIDDISON™ drug discovery software, the first AI-powered software-as-a-service platform that bridges the gap between virtual molecule design and real-world manufacturability through Synthia™ retrosynthesis software Application Programming Interface (API) integration. It combines generative AI, machine learning, and computer-aided drug design to speed up drug screening. Trained on more than two decades of experimentally validated datasets from pharmaceutical R&D, AIDDISON™ identifies compounds from more than 60 billion possibilities that have key properties of a promising active ingredient, such as non-toxicity, solubility, and stability in the body. The platform then proposes ways to best synthesize these drugs.

In February, we launched M-TRACE® All-in-One Computer solution, another example of how we are digitalizing the lab. M-TRACE® offers a cleanroom-friendly way to create test records used during sterility testing and other quality control workflows. Compliant with the QC sterility testing environment, it enables full data traceability.

In November, we launched ChemisTwin™, an online digital reference materials platform. It is a digital reference materials platform that can perform automatic analysis of samples' purity, identity, and degradation of compounds through over 1,500 calibrated algorithm-based digital references. Reference materials ensure the quality and safety of medicines and other products (such as water, food and beverage) from the earliest stages of research and development through quality control and quality assurance testing.

Efficiency and productivity-enhancing tools

We continued to offer incremental and sustainable technologies that improve productivity challenges to address customers' key challenges. In June, we launched mPAGE® Lux electrophoresis gel, a product that decreases, from 90 to three minutes, the time-consuming and key step of gel casting for western blotting, a method for protein separation.

In December, we launched the Milli-Q® SQ-2 series systems. With eight patents for its innovative features, this ultrapure lab water equipment offers greater flexibility, autonomy and sustainability – with less energy and water consumption. The system does not require a direct connection to a water pipe, so researchers can draw ultrapure water via the equipment at the point of use without any intermediate installations.

The next frontier in cell culture

The launch of 3dGRO™ Patient-Derived Organoids (PDOs) is also opening up new possibilities for researchers. During 2023, we launched 20 pancreatic and 20 colorectal organoids, along with 3dGRO™Wnt3a conditioned media supplement used for organoids. These complex, multicellular 3-dimensional in vitro cell models used in biomedical research that closely mimic in vivo organs are a powerful way to study drug responses, disease progression, and more. An important tool in cancer research, organoids provide a more relevant, phenotypic model of cancer than traditional 2D cell culture models.

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Healthcare

With our Healthcare research, we aspire to make a positive difference for patients. Our business sector-wide "Focused Leadership" approach to pipeline enrichment builds on our established expertise in the underlying disease biology of our core therapeutic areas of oncology, neurology and immunology as well as technological capabilities. By building on our existing strengths and maximizing synergies within our pipeline of compounds discovered in-house and with external assets, we will secure sustainable R&D productivity in order to provide innovative medicines to patients in need. In November 2022, we announced that we would aim to launch one new product or indication every 1.5 years on average, bolstered by external innovation.

Oncology*

In Oncology, our scientific curiosity and dedication to patients are at the heart of our efforts to improve the future of people living with cancer. In this core focus area of our R&D portfolio, we aim to deliver transformative treatments. Translational research is embedded into the whole R&D process, with several projects addressing unmet needs in difficult-to-treat cancers through innovative treatment approaches and novel combinations.

We are committed to bringing new standards of care for multiple tumor types to as many patients as possible worldwide. Therefore, in 2023 we continued to explore the impact of our marketed therapies through continued analysis of data from our pivotal studies and the generation of real-world evidence. We are assessing these treatments in new settings as well.

Bavencio®

To date, Bavencio® (avelumab), an anti-PD-L1 antibody, has been approved in 66 countries as a first-line maintenance treatment for locally advanced or metastatic urothelial carcinoma (UC) in adult patients whose disease has not progressed following platinum-based chemotherapy. At the 2023 American Society of Clinical Oncology (ASCO) Genitourinary Cancers Symposium, we presented long-term follow-up data from the Phase III JAVELIN Bladder 100 trial. The data demonstrated median overall survival from start of chemotherapy of 29.7 months among patients receiving Bavencio® who did not progress on first-line platinum-based chemotherapy, thus establishing a new benchmark for treatment outcomes in clinical studies.

We continue to evaluate whether optimization of first-line maintenance treatment by adding a novel therapy to avelumab could improve outcomes for patients with advanced UC whose disease did not progress with first-line platinum-based chemotherapy in the Phase II JAVELIN Bladder Medley study. Initiated in 2022, this randomized umbrella study is assessing avelumab monotherapy versus the combination of avelumab with our investigational anti-TIGIT antibody M6223, avelumab in combination with Nektar Therapeutics' interleukin-15 (IL-15) receptor agonist, NKTR-255, and avelumab in combination with Gilead Sciences' Trodelvy® (sacituzumab govitecan-hziy).

Bavencio® is also approved as a monotherapy for the treatment of metastatic Merkel cell carcinoma (MCC) in 63 countries. In September 2023, we received U.S. Food and Drug Administration approval of a supplemental Biologics Licensing Application for Bavencio®, converting the MCC indication from accelerated approval into full approval. This makes it the first MCC treatment to receive full approval in the U.S. market.

Additionally, Bavencio® is approved for the treatment of advanced renal cell carcinoma (RCC) in combination with axitinib in 60 countries.

Tepmetko®

In 2023, we shared multiple analyses of studies of the oral MET inhibitor Tepmetko® (tepotinib) in advanced non-small cell lung cancer (NSCLC). In a long-term follow-up analysis of the Phase II VISION study published in JAMA Oncology, Tepmetko® showed robust and durable clinical activity across therapy lines in patients with METex14-skipping NSCLC, particularly in previously untreated patients with METex14 skipping confirmed by

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tissue biopsy. An additional subgroup analysis presented at the 2023 World Congress on Lung Cancer (WCLC) in September demonstrated the robust and durable clinical activity of Tepmetko®, particularly as a first-line treatment, with stability in health-related quality of life and a manageable safety profile in Asian patients with advanced NSCLC with METex14 skipping. Tepmetko® is now available for the treatment of METex14-skipping NSCLC in 23 markets globally.

We also shared results of the primary analysis of the Phase II INSIGHT 2 study at the WCLC. These findings suggest the potential of tepotinib plus osimertinib as a chemotherapy-sparing oral targeted therapy option for patients with EGFR-mutant NSCLC with MET amplification who have developed resistance to prior EGFR tyrosine kinase inhibitor therapy.

Novel medicines

As we work towards our vision of creating a world where more cancer patients can become cancer survivors, we continue to pioneer novel medicines, advancing promising molecules in our pipeline that build on our expertise and leadership in core mechanisms and tumor types.

Our Phase III development program for xevinapant, the potentially first-in-class IAP (inhibitor of apoptosis protein) inhibitor, in the treatment of squamous cell carcinoma of the head and neck (SCCHN) continues to progress. Patient enrollment for the TrilynX study (NCT04459715) was completed in 2023. This international, randomized, double-blind, placebo-controlled Phase III study evaluates the efficacy and safety of xevinapant compared to placebo when administered in addition to definitive chemoradiotherapy in patients with unresected, locally advanced SCCHN. Patient recruitment continues in the international, randomized, double-blind, placebo-controlled Phase III XRay Vision (NCT05386550) study, which is evaluating the efficacy and safety of xevinapant versus placebo in combination with adjuvant, post-operative radiotherapy in patients with resected LA SCCHN who are at high risk for relapse and are ineligible for cisplatin treatment.

Additional progress in our pipeline in 2023 includes completion of Phase Ia for our anti-CEACAM5 antibody-drug conjugate (ADC), M9140, with the identification of two doses for evaluation in Phase Ib. M9140 is the first ADC based on our proprietary technology to enter clinical development.

We also continued to advance our pipeline of DNA damage response inhibition (DDRi) assets, exploring multiple hypotheses to determine which regimens may provide the most value to patients. In 2023, we initiated the Phase Ib/IIa DDRiver NSCLC 322 study of tuvusertib (M1774), our potentially best-in-class, potent and selective inhibitor of ataxia telangiectasia and Rad3-related (ATR), in combination with Regeneron Pharmaceutical's PD-1 inhibitor cemiplimab in patients with non-squamous NSCLC that has progressed on prior anti-PD-(L)1 and platinum-based therapies. The first dose was administered in October to a person requiring treatment.

In July 2023, our collaboration partner Telix Pharmaceuticals announced the administration of the first dose in the Phase Ib STARSTRUCK trial. This open-label, single-arm, multicenter dose-escalation and dose-expansion study will evaluate the safety profile, dosing and activity of our DNA-dependent protein kinase (DNA-PK) inhibitor candidate, peposertib (M3814), in combination with Telix's investigational targeted radiation therapy, TLX250, in patients with solid tumors expressing carbonic-anhydrase IX (CAIX).

To diversify our robust internal pipeline in our focus areas of DNA damage response inhibition and antibody-drug conjugates, in October 2023 we announced a strategic collaboration with Jiangsu Hengrui Pharmaceuticals Co. Ltd. (Hengrui). The partnership includes an exclusive global license (excluding mainland China) to develop, manufacture and commercialize Hengrui's next-generation potent and selective PARP1 (poly (ADP-ribose) polymerase 1) trapping inhibitor HRS-1167. The agreement also includes an option for exclusive global development, manufacturing and commercialization (excluding mainland China) of Hengrui's Claudin-18.2 antibody-drug conjugate (ADC) SHR-A1904.

In December, we announced a license agreement with Abbisko Therapeutics Co. Ltd, Shanghai, China, for pimicotinib (ABSK021), which is currently being evaluated in a Phase III study for the treatment of tenosynovial giant cell tumor (TGCT). TGCT is a benign tumor of the joints that can cause swelling, pain, stiffness, and limited mobility of the affected joints. The agreement grants Merck a license to commercialize pimicotinib in mainland China, Hong Kong, Macau and Taiwan, with an option for rest of world.

Highlights of congress publications in 2023

We shared additional new data for our marketed and investigational oncology medicines at major oncology congresses.

In June, 43 abstracts featuring new data for the medicines Bavencio® (avelumab), Erbitux® (cetuximab) and Tepmetko® (tepotinib) and drug candidates from our pipeline including the first-in-class investigational IAP inhibitor xevinapant were presented at the ASCO Annual Meeting.

Highlights included:

- Clinical data for Bavencio® that reinforce its role as a standard of care in first-line maintenance for advanced urothelial carcinoma in patients without disease progression following first-line platinum-based chemotherapy. Poster discussions, including long-term safety analyses and an analysis of quality-adjusted survival from the Phase III JAVELIN Bladder 100 study, confirm the acceptable long-term benefit-risk profile as well as the net benefit estimate of Bavencio® in first-line maintenance and further support its use.
- Long-term outcomes from the VISION study, the largest study of a MET inhibitor in patients with METex14-skipping advanced NSCLC (N=313). Detection was carried out via liquid and/or tissue biopsy. The results demonstrate the robust and sustained clinical activity of Tepmetko®, particularly in the first-line setting: with a median follow-up time of 32.6 months, the overall response rate in 164 people treated with first-line therapy was 57.3% (95% CI: 49.4, 65.0) and the median duration of response 46.4 months (13.8, cannot be estimated).
- Additional presentations for Tepmetko® that included analyses of the INSIGHT 2 study in NSCLC with epidermal growth factor receptor (EGFRm) mutation and MET amplification during treatment with Tepmetko® plus osimertinib.
- Erbitux® data that add to the growing body of evidence supporting the role of cetuximab-based therapies across the continuum of care in the treatment of RAS wild-type metastatic colorectal cancer and as a backbone of treatment in SCCHN.

At the European Society for Medical Oncology (ESMO) Congress 2023, we presented 28 abstracts featuring the latest research on our oncology portfolio addressing unmet treatment needs across bladder, head and neck, lung, colorectal, and other cancers.

Highlights included:

- New analyses and real-world evidence that reinforce the role of Bavencio® first-line maintenance in the treatment of advanced UC in patients with varying characteristics. These include long-term efficacy and safety outcomes from the Phase III JAVELIN Bladder 100 study that confirm the prolonged overall survival (OS), progression-free survival (PFS) and tolerability of first-line maintenance with Bavencio® in patients older than 65 years with advanced UC. Further evidence from France and the United States, including initial data from the French AVENANCE study on patients with advanced UC whose tumors have histological variants, support the findings of JAVELIN Bladder 100 in real-world settings.
- Additional real-world analyses reinforcing the use of Bavencio® as a treatment for advanced/metastatic MCC. After a median follow-up of approximately 29 months, data from the MCC TRIM study showed a median OS of 52 months for patients with metastatic MCC treated with Bavencio® in a real-world setting in Germany. Most patients (approximately 86%) received first-line Bavencio®.
- Updated findings from the Phase II VISION trial, which is the largest study of a MET inhibitor in METex14-skipping NSCLC and served as the basis for regulatory approvals, continue to show clinically meaningful long-term efficacy in patients treated with Tepmetko® regardless of line of therapy (2L, 2L+ and 3L+).
- A new analysis of real-world survival outcomes and survival risk factors in elderly patients with locally advanced SCCHN that highlights poor survival outcomes, especially in patients aged 70 years and older with advanced disease stage and comorbidities, underscoring the need for innovative effective treatments for this population.

Neurology & Immunology*

With a commitment of more than 25 years to people living with multiple sclerosis (MS), our ongoing dedication to science drives us to discover cutting-edge therapies through our research in neurological and immune-mediated disease areas.

Beyond our portfolio in MS, we have a pipeline focusing on discovering new therapies that have potential in other neuroinflammatory and immune-mediated diseases, including systemic lupus erythematosus (SLE), cutaneous lupus erythematosus (CLE) and generalized myasthenia gravis (gMG).

Enpatoran, an investigational highly specific potential first-in-class immune modulator blocking the activation of toll-like receptors (TLR7 and TLR8), is being developed as a new oral therapy for SLE and CLE. It aims to overcome limitations of currently available lupus therapies by providing selective inhibition of lupus-relevant disease drivers, which may increase efficacy while preserving immunity against infections. We anticipate data from our Phase II clinical trials for enpatoran in the first half of 2024.

We are also exploring the potential of oral cladribine beyond MS, developing it for the treatment of gMG, which affects an estimated 700,000 people and where a high unmet need remains, particularly as regards oral treatment options. Cladribine is believed to work by affecting the pathogenic pathways involved in the development of autoimmunity (auto-antibody producing B cells and T cells). In June 2023, the FDA granted Orphan Drug Designation for cladribine for the treatment of myasthenia gravis. We anticipate the initiation of a global Phase III clinical trial program in the second quarter of 2024.

In February 2023, we entered a preclinical licensing and strategic research partnership with Aqilion, a biotech company focused on developing innovative treatments for immune-mediated and neurological diseases.

New data for our existing therapy Mavenclad® (cladribine tablets), as well as for our investigational drug evobrutinib, were presented at key congresses in 2023, including the Americas Committee for Treatment and Research in Multiple Sclerosis (ACTRIMS) Forum in February, the American Academy of Neurology (AAN) Annual Meeting in April and the European Committee for Treatment and Research in Multiple Sclerosis (ECTRIMS) Congress in October.

At ACTRIMS 2023, we presented data that included analyses of the CLARIFY-MS study, showing the potential of Mavenclad® to improve outcomes in an impactful way for people living with RMS. In addition, we showed updated long-term efficacy and safety data from our Phase II program for the investigational drug evobrutinib. In December we shared that the phase III pivotal study did not meet its primary endpoint of annualized relapse rate for up to 156 weeks compared to oral teriflunomide.

At AAN 2023, we presented data from the M AGNIFY-MS study, showing sustained reductions in the memory B-cell numbers, with changes towards anti-inflammatory phenotypes in circulating B- and T-cell types for study participants taking Mavenclad® and provided updated efficacy and safety data from our Phase II program for the investigational drug evobrutinib.

At ECTRIMS 2023, we presented 31 abstracts in total, including long-term efficacy and neurofilament light chain data (from the M AGNIFY-MS study) for Mavenclad® as well as new real-world evidence data highlighting naïve use of the treatment. In addition, we shared updated five-year safety and efficacy data from the Phase II Open Label Extension for investigational evobrutinib as well as baseline demographic data of our Phase III EVOLUTION trials.

Fertility*

As the global market leader in fertility drugs and treatments, our Fertility franchise plays a crucial role in our Healthcare business.

Infertility is an increasing challenge globally due to demographic changes and lifestyle adjustments such as delayed childbearing. Based on the latest data from WHO, one in six people worldwide are affected by infertility.

* The contents of this chapter or section are voluntary and therefore not audited. However, our auditor has read the text critically.

According to updated data, more than five million babies have been born worldwide with the help of Gonal-f®, a leading therapeutic within our fertility portfolio. It contains the active ingredient follitropin alfa (r-hFSH alfa), which is a recombinant form of the natural hormone FSH and is available in a convenient and ready-to-use pre-filled injection pen. Treatment with Gonal-f® can result in increased follicles, oocytes and embryos compared with urinary gonadotropins, thereby improving the chances of pregnancy and live birth. Recent real-world evidence studies based on key European registries (D.I.R., SNDS) showed increased likelihood of live birth with Gonal-f® compared with urinary gonadotropins and biosimilar preparations of follitropin alfa.

Cardiovascular, Metabolism & Endocrinology*

In view of the significant and growing impact of chronic diseases such as diabetes, prediabetes, hypertension, and cardiovascular disease, growth hormone disorders and thyroid disorders on health and society in the 21st century, we are committed to helping patients with these conditions.

The new formulation of Euthyrox® (levothyroxine) for the treatment of hypothyroidism obtained further regulatory approvals in 2023, resulting in a total of 101 countries where this incremental innovation is registered. With its characteristics of delivering precise, fine-tuned and stable T4 doses, Euthyrox® may help optimize disease management, making it a good choice for healthcare providers and patients.

Glucophage®, containing the active ingredient metformin, is the most widely prescribed non-insulin diabetes treatment worldwide for first-line treatment of type 2 diabetes for which we achieved a successful label extension in Europe in 2022. The label update on the mechanism of action is evidence of the still growing body of knowledge and opportunities for metformin in the diabetes continuum. Those label updates are currently being rolled out in all other countries outside Europe where the Glucophage® family of products is available.

Concor®/Concor Cor®, containing bisoprolol, is a beta-blocker for treating hypertension and cardiovascular diseases such as coronary heart disease and chronic heart failure. In addition to Concor®/Concor Cor®, the Concor® franchise includes fixed-dose combinations such as Concor Plus®/Lodoz® (bisoprolol with hydrochlorothiazide) and Concor® AM (bisoprolol with amlodipine). Concor® AM has been registered in 71 countries.

Investments to speed up the availability of new medicines*

Our declared aim is to bring more medicines to more patients faster. In 2023, we supported this aim by reaching key milestones for two transformational investments focusing on complementary therapeutic modalities:

- In June, we inaugurated our Biotech Development Center at our site in Corsier-sur-Vevey, Switzerland. This investment of over € 250 million aims to ensure that our next generations of innovative large-molecule medicines (biotech therapies and potential other new therapeutic modalities) are available for clinical trials on time and in the required quality and quantity with an accelerated process compared with the past. The Biotech Development Center is expected to be fully operational in early 2024 following validation by regulatory authorities.
- In September, we celebrated the topping-out for our Launch and Technology Center at our site in Darmstadt, Germany. This investment of approximately € 160 million is intended to ensure that our next generations of innovative small-molecule medicines (including high-potency compounds) are available for clinical trials, global launches and commercial supply on time and in the required quality and quantity, with accelerated processes compared with the past. The Launch and Technology Center is anticipated to be fully operational by the end of 2025 following validation by regulatory authorities.

Collaborations to strengthen AI-driven drug discovery*

On September 20, we announced two strategic collaborations with Benevolent AI and Exscientia to drive accelerated drug discovery with higher probability of success. Access to end-to-end AI platform capabilities is expected to generate several novel development candidates in oncology, neurology and immunology. AI-powered R&D is an integral part of delivering on our ambition to bring more medicines to more patients, faster.

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Our pipeline

As of December 31, 2023		
Therapeutic area		
Compound	**Indication**	**Status**
Immunology		
Enpatoran (TLR7/8 antagonist)	Systemic lupus erythematosus[1]	Phase II
Enpatoran (TLR7/8 antagonist)	Cutaneous lupus erythematosus[1]	Phase II
Enpatoran (TLR7/8 antagonist)	Idiopathic inflammatory myopathies (DM and PM)[2]	Phase II
Oncology		
Xevinapant (IAP inhibitor)	Locally advanced squamous cell carcinoma of the head and neck – Unresected, cisplatin-eligible[3]	Phase III
Xevinapant (IAP inhibitor)	Locally advanced squamous cell carcinoma of the head and neck – Resected, cisplatin-ineligible[4]	Phase III
Avelumab (anti-PD-L1 mAb) + combinations	Locally Advanced or Metastatic Urothelial Carcinoma[5]	Phase II
Tuvusertib/M1774 (ATR inhibitor)	Solid tumors[6]	Phase Ib
M4076 (ATM inhibitor)	Solid tumors[7]	Phase Ib
M9140 (anti-CEACAM5 Antibody drug conjugate)	Solid tumors	Phase Ia
M6223 (anti-TIGIT mAb)	Solid tumors[8]	Phase Ib
M9466 (HRS-1167; Selective PARPi)	Solid tumors[9]	Phase I
Global Health		
Arpraziquantel (anthelmintic)	Pediatric schistosomiasis[10]	Registration
M5717 (PeEF2 inhibitor)	Malaria	Phase II

On December 04, 2023, Merck announced a license agreement with Abbisko Therapeutics Co. Ltd, China, for pimicotinib (ABSK021), which is currently being evaluated in a Phase III study for the treatment of tenosynovial giant cell tumor (TGCT). The agreement grants Merck a license to commercialize pimicotinib in mainland China, Hong Kong, Macau and Taiwan, with an option for rest of world.

End of December 2023, Merck entered into a licensing agreement with Inspirna, Inc., United States, for ompenaclid (RGX-202), a first-in-class oral inhibitor of the creatine transport channel SLC6A8, and SLC6A8-targeting follow-on compounds. Ompenaclid is currently being evaluated in a Phase II study for the second-line treatment of RAS-mutated (RASmut) advanced or metastatic colorectal cancer (mCRC).

Unless noted otherwise, clinical programs conducted in collaboration with external partners are not shown unless Merck has co-ownership of data. More information on the ongoing clinical trials can be found at **www.clinicaltrials.gov**. Pipeline products are under clinical investigation and have not been proven to be safe and effective. There is no guarantee any product will be approved in the sought-after indication.

[1] Clinical trial passed futility analysis.

[2] Dermatomyositis and Polymyositis.

[3] In combination with cisplatin and radiotherapy in unresected LA SCCHN patients eligible for the treatment with cisplatin.

[5] In combination with radiotherapy in resected LA SCCHN patients ineligible for the treatment with cisplatin.

[5] Combinations include Sacituzumab Govitecan, NKTR-255 and M6223.

[6] Studies as monotherapy and in combination with cemiplimab, niraparib, avelumab or M4076 ATMi. Includes studies (phase I/II) in collaboration with/ sponsored by external partners, e.g. US National Cancer Institute (NCI).

[7] Administered in combination with Tuvusertib/M1774 (ATRi).

[8] Administered in combination, including combinations other than avelumab.

[9] On October 30, 2023, Merck announced a collaboration with Jiangsu Hengrui Pharmaceuticals Co. Ltd., China, including an exclusive license worldwide (excluding China) to develop, manufacture and commercialize the next-generation potent and selective PARP1 trapping inhibitor HRS-1167.

[10] On 14 December, 2023, the Committee for Medicinal Products for Human Use (CHMP) of the European Medicines Agency (EMA) adopted a positive scientific opinion for arpraziquantel for the treatment of schistosomiasis in children aged 3 months to 6 years. The application was submitted by Merck, on behalf of the Pediatric Praziquantel Consortium, under the EU-M4all procedure for high-priority medicines for human use intended for countries outside the European Union.

ATM: ATM serine/threonine kinase
ATR: Ataxia telangiectasia and Rad3-related
BTK: Bruton's tyrosine kinase
CEACAM5: Carcinoembryonic antigen-related cell adhesion molecule 5
IAP: Inhibitor of apoptosis proteins
mAb: Monoclonal antibody
PARP1: poly (ADP-ribose) polymerase 1
Phase Ia: Dose finding
Phase Ib: Dose escalation/expansion and signal seeking
PD-L1: Programmed cell death ligand 1
PeEF2: Plasmodium eukaryotic elongation factor 2
TIGIT: T cell immunoreceptor with Ig and ITIM domains
TLR7/8: Toll-like receptors 7 and 8

Electronics

As a science and technology company, we strive to offer leading-edge products, services, and solutions.

Our R&D strategy follows our overall Electronics technology strategy, which aims to enhance and expand our capabilities, drive organic growth and enable new technology platforms. Our Chief Technology Office (CTO) is identifying trends and vetting technologies that are beyond the time horizon or scope of our business units. As a dedicated technology organization, the CTO is managing research partnerships, shaping our technology roadmaps, and managing our long-term R&D portfolio. Our Technology Leadership Board reviews and optimizes our technology investment across the business sector.

Our R&D is aligned to strengthen our existing position in the industry across many key material and innovation areas, with the addition of artificial intelligence (AI), data services, analytics, and sustainability to enhance our portfolio offering. As an essential part of our "Level Up" growth program, we are continuing to invest significantly more than € 3 billion in innovation and capacity expansion. With our R&D investments within "Level Up", we are also scaling up our research and development capabilities for next-generation semiconductor and display materials to further strengthen our position as one of the leading suppliers to the electronics industry.

Our R&D is focused on finding solutions for the needs that drive our industry: increase energy efficiency of devices, enhance performance of materials, reduce environmental impact on the planet. Consequently, sustainability, and the use of AI and machine learning are key focus areas of our R&D.

Sustainable technologies and materials*

We are continuing to drive sustainability in R&D to address the increasing push for lower emissions along the value chains. Ongoing key programs focus on, e.g. NF_3 abatement and more sustainable processes and manufacturing technologies as well as green solvents, sustainable etch gases and PFAS replacement.

NF_3 abatement

Nitrogen trifluoride (NF_3) accounts for about 60% of our global emissions, mainly from our specialty gases business. We developed and tested an abatement solution using a modified commercial thermal destruction technology and demonstrated the ability to destroy NF_3 with 99% efficiency.

PFAS

PFAS, a generic term that covers about 10,000 per- and polyfluoralkyl substances, is used for several critical applications in the manufacture of microchips, e.g. photolithography, plasma etching and wafer cleaning. While it is currently not possible to manufacture semiconductors without PFAS, we have already developed several alternative products for some applications in Electronics. One area in which we are highly advanced is the replacement of PFAS surfactants with non-PFAS alternatives in photoresists and related ancillary products such as rinse solutions.

Scorecard

To embed sustainable design into R&D and steer our portfolio in a more sustainable direction in the long term, we have developed a scorecard that focuses on sustainable criteria in the development of new products and solutions. The scorecard is a tool for driving a sustainability culture in R&D and considers every step of the value chain to identify opportunities and risks at an early stage and act accordingly.

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Academic research program

With the objective of enabling more sustainable semiconductor manufacturing solutions, we have joined forces with the Intel Corporation to jointly fund an academic research program over three years. The program will specifically leverage AI and machine learning technologies to achieve innovative breakthroughs in sustainable semiconductor manufacturing processes and technologies. Potential solutions include environmentally friendlier materials, more efficient use of resources, AI-based solutions for modeling chemical processes, and opportunities for reducing waste and emissions. The focus is on building open-source tools for the benefit of the entire scientific and industrial community.

R&D activities in the business units*

Semiconductor Solutions

In our R&D we are addressing critical material needs through every step of the wafer manufacturing process. Top R&D programs for our Semiconductor Solutions business units include:

Business field Thin Films

Our Thin Films business field is actively developing new dielectrics (organosilanes and spin-on dielectrics) and metallics offerings. Many of these new products are qualified by multiple customers and we are developing new materials for leading-edge nodes that will enable chips and chiplets used for generative AI. The integration of the chemical business of Mecaro into our business enables us to develop new precursors for high performance DRAM and provides us with unique capabilities to expand our development in Asia. In addition, we continued to expand our metallics portfolio to support our customers' roadmaps, providing innovative solutions for ALD (atomic layer deposition) and CVD (chemical vapor deposition). We achieved significant advancements in high-performance, conformal dielectric ALD films which address key customer pain points. Our spin-on-dielectrics platform focuses on developing new formulations for gap-fill applications in increasingly deep and narrow insulating features with the improved performance needed to enable next-generation V-NAND (vertical flash memory) and DRAM (dynamic random-access memory).

Business field Specialty Gases

Our etch gas technology program continues to develop new chemistries to enable more than 100-layer, single-stack etching for advanced memory devices such as V-NAND (vertical flash memory). We are also seeing good progress in our etch gas development work for new low-GWP (global warming potential) gases for etching applications and in our cooperation with customers to develop low-GWP gas solutions used in the production of semiconductors.

Business field Formulations (patterning and planarization)

The main driver of our R&D engagements in patterning is the manufacturing capability and costs associated with extreme ultraviolet (EUV) lithography systems. We are increasing our efforts in the development of EUV lithography materials to directly help our key customers address these challenges. Our Patterning Solutions team achieved a breakthrough in PFAS-free EUV rinse development, paving the way for a sustainable solution to prevent the collapse of structures in EUV lithography.

We are also investing in directed self-assembly (DSA) capabilities as we support customers' integration of DSA into advanced nodes, and we are beginning to sample photoresists and rinse materials from our PFAS-free portfolio development.

Our Planarization business is driving new product development across advanced oxide and metal segments. For example, we are achieving technical progress using dielectric high-performance cerium dioxide particles for advanced oxide CMP (chemical mechanical planarization).

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Display Solutions

With the proliferation of multiple applications and display trends, the display industry's technological requirements are significantly expanding. Our display materials are enabling the fast-growing market of innovative displays for current and future applications such as foldable smartphones, flexible displays for automotive or AR/VR (augmented reality/virtual reality) devices.

As our liquid crystals business remains a strong focus area, our R&D team is continuously working to develop new liquid crystal mixtures for our customers who need differentiated performance such as high transmittance, high contrast ratio, and high reliability to realize displays for new applications. We are working with our customers in the field of AR/VR to expand the application scenarios of liquid crystals and continue to enhance the user experience in small and micro-sized displays. We remain fully committed to advancing LCD technology and are working very closely with leading panel makers to develop next-generation products for the electronics market.

In the display industry, OLED is regarded as state-of-the-art technology for its excellent visual experience. It is also considered as the technology of the future of displays as it enables the production of flexible, foldable, rollable, and even transparent displays. We introduced new barrier materials that offer superior flexibility, higher reliability and a longer lifetime in flexible OLED devices compared with existing solutions. Devices with fully flexible OLED displays are one of the fastest-growing trends in data-driven electronics. Our innovative ALD material won the "Display Component of The Year 2023" award from Society for Information Display (SID), the world's largest display association. In addition, our innovative deuterated material won the "Technology Innovation Award" from LG Displays in September 2023.

Surface Solutions

In our Surface Solutions business, we offer our customers solutions for designing surfaces that meet their specific requirements. Together with our customers, we are consistently developing new formulations that, in combination with existing products and product innovations, provide customized solutions across various industries.

In our automotive pigments business, we are continuously expanding our portfolio of Colorstream® multicolor-effect pigments. A recent example is the development of Colorstream® F20-52 SW Mineral Red pigment, a new silica-based pigment that extends the red color palette of Surface Solutions into a more blueish-red range.

In our cosmetics business, we are further developing our range of high-color intensity pigments with metallic optical effects entirely without the use of metals. These Ronaflux® pigments are based on an entirely new proprietary technology employing fluidized bed processes for depositing ultrathin and highly stable carbon layers onto pearlescent pigments – a major precondition for spectacular shine effects. The carbon layers intensify the colors of the effect pigments, thus enabling brilliant shades of blue and green without the addition of chrome oxides, Prussian blue or other colorants. This new offering enables manufacturers of eye makeup and lipsticks to meet the strict regulatory requirements while offering brilliant metallic blue and green shades that do not contain any metal-based pigments.

To produce realistic color effects on electronic devices, we are focusing on methodologies to transfer coloristic measuring data into 3D visible effects. As a first step, we have introduced the first digital tool for visualizing car colors in various light conditions in a realistic way. Under controlled, calibrated conditions, color data, measured state-of-the-art technology, can be used to produce a realistic display.

Report on Economic Position

Macroeconomic and Sector-Specific Environment

In its latest World Economic Outlook published on January 30, 2024, the International Monetary Fund (IMF) predicts that the global economic recovery will prove surprisingly resilient despite numerous crises, but the speed of the recovery will vary depending on the economy. Global gross domestic product (GDP) growth slowed from 3.5% in 2022 to a projection of 3.1% in 2023. Overall, economic activity remains below pre-pandemic levels. Major impediments to economic recovery are long-term consequences of the pandemic and geopolitical tensions as well as cyclical factors such as inflation and tightened monetary policy. The ongoing war in Ukraine and the resurgent conflict in the Middle East are weighing on the economic development by accelerating the geoeconomic fragmentation and hindering the flow of commodities, which could lead to food or energy price peaks.

Overall, the IMF expects global inflation to decline more than expected in 2023 but remained above target levels. The persistently high inflation rates prompted central banks to increase interest rates and high debt levels led to tighter fiscal policies in some countries. China's property sector crisis still poses a risk as it could deepen and cause global spillovers.

The development of gross domestic product (GDP) in selected countries and regions was as follows:

Annual change in %	**2023**[1]	2022
World	3.1	3.5
Advanced Economics	1.6	2.6
USA	2.5	1.9
Euro Area	0.5	3.4
Japan	1.9	1.0
Emerging Markets and Developing Economies	4.1	4.1
Emerging Markets and Developing Economies Asia	5.4	4.5
India	6.7	7.2
China	5.2	3.0

[1] Figures for fiscal 2023 estimated

The development of selected sector specific environments was as follows:

	Change 2023[1]	Change 2022
Life Science		
Growth in market for laboratory products[2]	-5.6%	4.2%
Growth in global sales of biopharmaceutical drugs[3]	16.9%	14.5%
Share of biopharmaceutical sales in the global pharmaceutical market[3]	38.2%	35.8%
Early clinical monoclonal antibody (mAb) pipeline growth[4]	17.4%	7.7%
Healthcare		
Global pharmaceutical market	9.2%	7.8%
Market for multiple sclerosis therapies[5]	-2.3%	2.5%
Market for type 2 diabetes therapies[5]	19.1%	18.1%
Market for fertility treatment[5]	10.9%	4.2%
Market for the treatment of colorectal cancer[6]	-0.1%	4.5%
Electronics		
Growth of wafer area for semiconductor chips	-14.1%	3.9%
Growth of display surface area[7]	-1.5%	-3.9%
Global sales of cosmetics and care products	4.2%	12.2%
Global number of produced light vehicles	10.1%	7.1%

[1] Predicted development. Final development rates for 2023 were not available for all industries when this report was prepared.

[2] Global Market for Laboratory Products, October 2023, Frost & Sullivan.

[3] Global pharmaceutical spending at a constant exchange rate. IQVIA market data based on the past 12 months as of the third quarter 2023.

[4] Number of programs in Phase I or Phase II clinical trials, Cortellis.

[5] Growth rates based on market data in local currency, translated at a constant euro exchange rate. The IQVIA market data on the growth of indications are based on current figures, including the third quarter of 2023. Annual growth based on the values for the past 12 months. The type 2 diabetes market excludes the United States since this market is insignificant to Merck.

[6] Growth rates based on market data stated in US dollars. Market data from EvaluatePharma on the growth of indications are based on published company reports and are subject to exchange rate fluctuations.

[7] Growth of display area is a pure volume indicator.

Life Science

Our Life Science business sector is one of the leading global suppliers of products, tools and services for research laboratories, pharma and biotech production, as well as industrial and testing laboratories. The convergence of several adverse developments (macroeconomics, capital constraints, declining Covid-19 pandemic demand, and high customer inventory) has challenged growth of life science companies compared with previous years.

Accordingly, the markets in which the Life Science business sector of Merck operates slowed down in 2023 compared with 2022. According to the market research firm Frost & Sullivan, the market for laboratory products, which is relevant to our Science & Lab Solutions business unit, declined by -5.6% in 2023 (2022: 4.2%). This decline is due to a challenging macroeconomic outlook (declining GDP growth and persistent inflation) and a sustained slowdown of investment in early stage biotech companies (according to Citi Research, venture capital and IPOs remain below pandemic highs).

Once capital markets stabilize, spending on laboratory products is likely to increase again. In the pharma and biotech production market, in which our Process Solutions and Life Science Services business units are active, demand is driven by the development and manufacture of therapeutics and vaccines. According to the pharmaceutical market research firm IQVIA, the end market for biopharmaceuticals grew by 16.9% in 2023 (2022: 14.5%) to € 496 billion (or 38.2% of the global pharmaceutical market). The number of monoclonal antibodies (mAbs) in phase I or II development grew by 17.4% (2022: 7.7%). While the biopharmaceutical market grew in 2023, laboratory consumables and materials used in manufacturing were pre-purchased to a significant extent in 2022, resulting in high inventories among our customers.

Healthcare

In its latest study from September, IQVIA forecasts growth of 9.2% in 2023 (2022: 7.8%) for the global overall pharmaceutical market. After the recovery from the Covid-19 pandemic, the pharmaceutical market is expected to see still high growth rates benefitting from accelerated approval pathways and increased access to innovative medicines globally. This is balanced by further increasing cost containment measures and policies driving biosimilar and generics uptake as well as stricter price reviews and prescription controls.

The developments at a regional level follow the described trend. EMEA (Europe, Middle East and Africa) grew by 9.2% in 2023 (2022: 8.2%) with the EU5 (Germany, France, UK, Italy, and Spain) growing by 7.8% (2022: 8.0%). North America grew by 10.2% (2022: 9.6%) with the United States growing at a rate of 10.3% (2022: 9.5%). In absolute terms, the pharmaceutical market in the United States remains the biggest and most important market by far. Latin America achieved double-digit growth of 19.2% (2022: 12.5%) impacted by high inflation. This is followed by the Asia-Pacific region (excluding China and Japan) with 8.2% growth (2022: 9.6%). Despite continued extension of price regulations (for example, volume-based procurement), China returned to growth with 4.3% in 2023 (2022: -0.8%) due to the lifting of Covid-19 pandemic measures, increased access to innovative products and growing healthcare infrastructure).

Not only the growth of the pharmaceutical sector as a whole, but also the market development for biotechnologically produced active ingredients is relevant to our business. According to IQVIA, these products accounted for 38.2% of the global pharmaceutical market in 2023 (2022: 35.8%), thus continuing the increase in market share of recent years. The most important market for biological pharmaceuticals remains the United States, with a 64.2% share of global biopharmaceutical market volumes.

The developments in the therapeutic areas of relevance to Merck saw differing trends in the reporting year. The global market for type 2 diabetes, excluding the United States, followed the growth trend of previous years and accelerated growth, achieving 19.1% in 2023 (2022: 18.1%). The therapeutic area of infertility grew 10.9% in the reporting year (2022: 4.2%). Colorectal cancer declined by -0.1% in 2023 (2022: increase of 4.5%) due to biosimilar penetration. The growth trend in the market for multiple sclerosis therapies declined slightly compared with previous year level by -2.3% (2022: 2.5%), as new product launches are counteracted by the effect of generic competition.

Electronics

The semiconductor industry is the most important market for our business with materials, solutions and services for the production of integrated circuits (Semiconductor Solutions). In particular, the growth in demand for semiconductor materials depends mainly on the wafer area produced for semiconductors. The silicon wafers required as raw materials are used as an indicator to estimate the demand for semiconductor materials overall.

According to the global industry association SEMI (forecast as of Q3 2023), the delivered silicon wafer area experienced a -14.1% decline in 2023, following moderate growth in 2022 (3.9%). The current cyclical industry downturn is amplified by macroeconomic challenges such as high interest rates and changing consumer buying behaviors with a preference for services. Semiconductor manufacturers have responded by reducing utilization rates to address excess inventory, resulting in declining demand for silicon wafers and related materials and services.

Despite the current downturn, we foresee a positive outlook for the Electronics business sector. We anticipate that the semiconductor market will regain momentum in 2024, driven by AI solutions, the Internet of Things, and the increase in data volumes related to big data.

With our Display Solutions business, we are a significant producer of liquid crystal mixtures and OLED materials for the display industry. After the Covid-19-pandemic-induced “stay at home boom,” the display industry underwent demand normalization in 2022. There are several indications that display market is slowly recovering after supply inventory adjustments. Due to sluggish demand in the fourth quarter of 2023, however, the market research company OMDIA (forecast as of Q3 2023) forecasted a slight decline in growth for 2023. In the medium to long term, liquid crystals will continue to play a key role in the display industry in the future. OLED technology, for which we have a strong position as material supplier, is becoming increasingly important in high-end display applications.

The markets for automotive coatings and cosmetics are crucial to our Surface Solutions business. According to the December 2023 report from GlobalData (formerly LMC), a leading global provider of automotive forecasts, global automobile production grew significantly by 10.1% in 2023 compared with growth of 7.1% in 2022. Underlying drivers include an unmet global demand, with China continuing to be one of the most important markets. According to Euromonitor’s report from October 2023, the market for cosmetics and care products grew more slowly in 2023 after a very strong development in 2022 with an overall growth of 4.2% in 2023 (2022: 12.2%).

Review of Forecast against Actual Business Developments

The forecast of the Merck Group for fiscal 2023 published in the Annual Report for fiscal 2022 comprised the forecast for the Group as well as the forecast for the three business sectors: Life Science, Healthcare, and Electronics.

Net sales

We forecast slight to solid organic net sales growth for the Group in 2023. In particular, the macroeconomic, geopolitical and industry-specific conditions changed over the course of the year. Furthermore, the Life Science business sector saw sustained high inventory levels and a reluctance to invest on the part of customers, while the Electronics business sector was affected by the ongoing weakness of the market for semiconductor materials.

Waning demand for products in connection with the Covid-19 pandemic meant that, as expected, net sales declined sharply in fiscal 2023. All in all, we reported an organic decline in net sales of -1.6% in fiscal 2023, which fell within the forecast range of between -2% and +2% that we revised in the second quarter and confirmed in the third quarter. At the start of the year, we anticipated a negative exchange rate effect totaling between -1% and -4%, especially as a result of the expected development of the U.S. dollar and the Chinese renminbi. Several currencies, including the U.S. dollar and the Chinese renminbi as well as some currencies of emerging economies, saw less favorable development than expected as the year progressed. The negative exchange rate effect in 2023 as a whole was -4.1%, thus falling within the range of -3% to -6% which we most recently revised in the second quarter and confirmed in the third quarter. The slightly positive portfolio effect was negligible at +0.1%. All in all, net sales amounted to € 20,993 million, representing a year-on-year decrease of -5.6%. This was below the mid-point of the forecast range of € 20,500 million to € 21,900 million and thus was consistent with the more specific forecast issued together with the figures for the third quarter (trending slightly below the mid-point).

Life Science

Our Life Science business sector reported an organic decline in net sales of -7.9% in fiscal 2023. This was at the lower end of the forecast range of between -8% and -2%, which we adjusted in the second quarter and confirmed in the third quarter, meaning that Life Science fell below our original forecast of slight to moderate organic growth. All of the business units – Process Solutions, Life Science Services and Science & Lab Solutions – recorded a downturn in organic net sales. As expected, Process Solutions and Life Science Services saw the most pronounced organic decline in net sales, whereas the downturn in the Science & Lab Solutions business unit was only slight. All in all, net sales in the Life Science business sector fell by -10.6% to € 9,281 million including a negative exchange rate effect of -2.7% and a positive portfolio effect of 0.1%. This was in the lower half of the forecast range of € 9,100 million to € 9,950 million, which is consistent with the more specific forecast issued at the end of the third quarter (trending in the lower half of the forecast range).

Healthcare

We originally forecast moderate to solid organic sales growth for our Healthcare business sector compared with the previous year. We then quantified this organic sales growth forecast at between +5% and +9% when we published the figures for the first quarter. We raised this forecast range to between +6% and +9% with the publication of the figures for the second quarter and confirmed this at the end of the third quarter. With full-year organic growth of +8.5%, the business sector achieved the forecast for fiscal 2023. This development was driven in particular by the significant growth of the oncology business and, above all, the strong performance of our recently approved product Bavencio®. Neurology & Immunology made a substantial contribution to full-year organic sales growth in fiscal 2023 thanks to our recently approved product Mavenclad® in particular. Sales growth was also driven by our established portfolio, especially fertility products. Taking into account the negative exchange rate effect of -5.8%, net sales in the Healthcare business sector increased by +2.7% to € 8,053 million in fiscal 2023, thereby falling within the upper half of the forecast range. This was consistent with the more specific forecast issued together with the report on the third quarter (trending slightly above the mid-point).

Electronics

Despite the economically and geopolitically difficult conditions in the market for semiconductor materials, we forecast slight to solid organic net sales growth for our Electronics business sector at the start of the year based on the assumption that the semiconductor market would recover in the second half of 2023. We quantified our organic sales growth forecast at between -2% and +3% when we published the figures for the first quarter. Compared with the previous forecast, we anticipated an even more pronounced weakening of the market followed by a delayed but stronger recovery which should now only occur later in the second half of the year. We adjusted this forecast with the publication of the figures for the second quarter, stating that we expected an organic decline in net sales of between -6% and -1% in light of the further delay in the recovery of the semiconductor market. We then confirmed this forecast at the end of the third quarter. The organic decline in net sales for fiscal 2023 as a whole was -5.1%, which is in line with the lower end of the forecast range. Due to negative exchange rate effects of -4.1% and taking into account a portfolio effect of +0.3%, net sales in the Electronics business sector declined by -8.8% year-on-year to € 3,659 million, thereby falling within the forecast range of between € 3,500 million and € 3,800 million. This was consistent with the more specific forecast issued together with the report on the third quarter (trending around the mid-point).

EBITDA pre

Our original forecast for the Merck Group's EBITDA pre for 2023 ranged from a moderate decline to roughly stable organic development compared with the previous year. This assumption was based on the expectation of a moderate decline to roughly stable organic development in the Life Science business sector, slight to moderate organic growth in the Healthcare business sector, and a slight to strong organic decline in the Electronics business sector. We originally expected negative exchange rate effects to impact EBITDA pre by between -1% and -4% compared with the prior year. With the presentation of the figures for the first quarter, we quantified our forecast at organic development of between -5% and 0%. In response to inflation-related cost increases and the underutilization of our production capacities, especially in the Life Science and Electronics business sector, we revised our forecast to between -9% and -3% at the end of the second quarter. This forecast was confirmed with the publication of the figures for the third quarter. Due to negative exchange rate effects, we revised our forecast for the impact of exchange rate effects twice in the course of fiscal 2023, ultimately ending with a forecast of between -6% and -3%. EBITDA pre amounted to € 5,879 million in fiscal 2023, representing an overall decline of -14.2% compared with the previous year (-9.0% organic, -4.9% from currency effects, -0.3% from portfolio effects). This is in the lower half of the forecast range of between € 5,800 million and € 6,400 million, and hence is consistent with the more specific forecast range (trending in the lower half of the range).

Life Science

In contrast to the expected net sales development, we originally expected EBITDA pre in Life Science to be in a range from a moderate decline to organically about stable in fiscal 2023 due to inflation-driven price increases weighing more heavily on earnings. At the end of the first quarter, we quantified our forecast for the organic decline in EBITDA pre at between -8% and -4%. In response to the underutilization of our production capacities, we then lowered this to between -21% and -12% with the publication of the figures for the second quarter. Along with the exchange rate effect that was most recently forecast at between -6% and -2% (originally: slightly negative exchange rate effect), this resulted in a forecast range for EBITDA pre in the Life Science business sector of between € 2,750 million and € 3,200 million. The business sector achieved this forecast with EBITDA pre of € 2,820 million in fiscal 2023 (2022: € 3,760 million). This corresponded to a decline of -25.0% compared with the previous year (-21.4% organic, -3.3% due to exchange rate effects). EBITDA pre therefore also fell within the more specific forecast range issued at the same time as the report on the third quarter (trending in the lower half of the range of € 2,750 million to € 3,200 million).

Healthcare

With our new products expected to continue to deliver a substantial earnings contribution, especially Mavenclad® and Bavencio®, we forecast slight to moderate organic growth in EBITDA pre for our Healthcare business sector. Largely because of the sustained high level of prices due to inflation, this original forecast was slightly below the expected organic growth in net sales (moderate to solid organic sales growth). With the publication of the figures for the first quarter, we quantified our forecast for organic growth in EBITDA pre at between +8% and +12% in fiscal 2023. We then raised this forecast to between +14% and +19% at the end of the second quarter, especially as business performance was expected to be stronger. We confirmed this forecast range at the end of the third quarter. Along with the exchange rate effect that was most recently forecast at between -17% and -13% (originally: negative exchange rate effect in a high single-digit to low double-digit percentage range), this resulted in a forecast range for EBITDA pre in the Healthcare business sector of between € 2,450 million and € 2,600 million. With EBITDA pre of € 2,543 million in fiscal 2023 (2022: € 2,477 million), the business sector came in at the upper end of this range. This was also consistent with the more specific forecast issued together with the report on the third quarter (trending at the upper end of the range). This corresponded to an increase of +2.7% compared with the previous year (+17.1% organic, -14.4% due to exchange rate effects, -0.7% from portfolio).

Electronics

We originally anticipated a slight to strong organic decrease in EBITDA pre for our Electronics business sector in fiscal 2023. We expected inflation-driven cost increases to have a particularly pronounced impact on material costs, and that we would only be able to pass on cost increases to a limited extent in the coming quarters due to the price pressure faced by our customers. With the presentation of the figures for the first quarter, we quantified our forecast for the organic decline in EBITDA pre as ranging from -12% to -3%. Having lowered our forecast considerably to between -18% and -10% with the report on the second quarter in response to inflation-related cost increases and the underutilization of our production capacities, we reiterated this guidance at the end of the third quarter. Along with the exchange rate effect that was most recently forecast at between -10% and -7% (originally: significantly negative exchange rate effect), this resulted in a forecast range for EBITDA pre in the Electronics business sector of between € 870 million and € 980 million. EBITDA pre of € 913 million in fiscal 2023 (2022: € 1,192 million) was in the lower half of the forecast range. This was consistent with the more specific forecast issued along with the report on the third quarter (trending in the lower half of the range) and corresponded to a decline of -23.4% compared with the previous year (-17.1% organic, -5.6% due to exchange rate effects).

Corporate and Other

The expenses for Corporate and Other in EBITDA pre amounted to € -397 million in fiscal 2023. This meant that EBITDA pre was slightly below the original forecast range of between € -370 million and € -330 million. However, we specified our forecast with the presentation of the figures for the third quarter. Due to substantially lower expected income from currency hedging transactions, we have forecast that EBITDA pre for corporate costs and other is expected to be slightly below the forecast range of -330 to -370 million €. The original forecast for fiscal 2023 provided for a significant decline in the expenses in this area. Compared with the prior-year figure of € -579 million, the expenses decreased significantly by -31.5%.

Operating cash flow

We originally anticipated a moderate decline to roughly stable development for the operating cash flow of the Merck Group in 2023 (2022: € 4,259 million). We then specified the forecast range at between € 3,700 million and € 4,300 million with the publication of the figures for the first quarter. As we expected the development of operating cash flow to be largely in line with operating performance, we lowered our forecast to between € 3,500 million and € 4,100 million at the end of the second quarter and confirmed this forecast in our report on the third quarter. The operating cash flow amounted to € 3,784 million in fiscal 2023, which was within the most recent forecast range of between € 3,500 million and € 4,100 million. This corresponded to a decline of -11.2% compared with the previous year (2022: € 4,259 million). The decisive factor for this was the development of EBITDA pre.

Course of Business and Economic Position

Merck Group

Merck Group

Key figures

€ million	2023	2022	Change € million	Change %
Net sales	20,993	22,232	-1,239	-5.6%
Operating result (EBIT)[1]	3,609	4,474	-865	-19.3%
Margin (% of net sales)[1]	17.2%	20.1%		
EBITDA[2]	5,489	6,504	-1,015	-15.6%
Margin (% of net sales)[1]	26.1%	29.3%		
EBITDA pre[1]	5,879	6,849	-970	-14.2%
Margin (% of net sales)[1]	28.0%	30.8%		
Profit after tax	2,834	3,339	-505	-15.1%
Earnings per share (€)	6.49	7.65	-1.16	-15.2%
Earnings per share pre (€)[1]	8.49	10.05	-1.56	-15.5%
Operating cash flow	3,784	4,259	-475	-11.2%

[1] Not defined by International Financial Reporting Standards (IFRS).

[2] Not defined by International Financial Reporting Standards (IFRS); EBITDA corresponds to operating result (EBIT) adjusted by depreciation, amortization, impairment losses, and reversals of impairment losses.

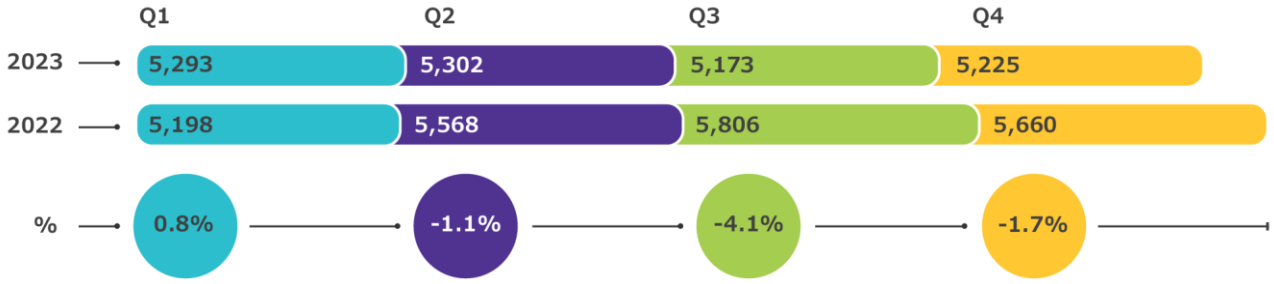
Development of sales and results of operations

The net sales in the individual quarters as well as the respective organic growth rates in 2023 are presented in the following graph:

Merck Group

Net sales and organic growth[1] by quarter[2]

€ million/organic growth in %



[1] Not defined by International Financial Reporting Standards (IFRS).

[2] Quarterly breakdown unaudited.

In fiscal 2023, the net sales by business sector developed as follows:

Merck Group

Net sales by business sector

€ million	2023	Share	Organic growth[1]	Exchange rate effects	Acquisitions/ divestments	Total change	2022	Share
Life Science	9,281	44%	-7.9%	-2.7%	0.1%	-10.6%	10,380	47%
Healthcare	8,053	38%	8.5%	-5.8%	–	2.7%	7,839	35%
Electronics	3,659	18%	-5.1%	-4.1%	0.3%	-8.8%	4,013	18%
Merck Group	**20,993**	**100%**	**-1.6%**	**-4.1%**	**0.1%**	**-5.6%**	**22,232**	**100%**

[1] Not defined by International Financial Reporting Standards (IFRS).

In fiscal 2023, the Merck Group recorded the following regional sales performance:

Merck Group

Net sales by region

€ million	2023	Share	Organic growth[1]	Exchange rate effects	Acquisitions/ divestments	Total change	2022	Share
Europe	6,037	29%	-1.3%	-2.1%	–	-3.4%	6,248	28%
North America	5,952	28%	-3.8%	-2.7%	0.1%	-6.4%	6,361	29%
Asia-Pacific (APAC)	6,936	33%	-4.3%	-5.8%	0.2%	-9.9%	7,697	35%
Latin America	1,331	6%	18.6%	-10.5%	–	8.1%	1,231	5%
Middle East and Africa (MEA)	737	4%	8.8%	-2.7%	–	6.1%	695	3%
Merck Group	**20,993**	**100%**	**-1.6%**	**-4.1%**	**0.1%**	**-5.6%**	**22,232**	**100%**

[1] Not defined by International Financial Reporting Standards (IFRS).

- In fiscal 2023, the Merck Group generated net sales of € 20,993 million (2022: € 22,232 million), representing a year-on-year decline of € 1,239 million or -5.6%. Negative exchange rate effects served to reduce net sales by € 902 million or -4.1% in fiscal 2023. These effects largely resulted from the exchange rate development of the Chinese renminbi, the US dollar, and the Argentinian peso. Net sales fell by € 357 million or -1.6% organically. Net sales in the Life Science and Electronics business sectors declined, while the Healthcare business sector recorded organic growth. The portfolio-related net sales increase of € 19 million mainly resulted from the acquisition of M Chemicals Inc., Korea.
- Net sales in the Life Science business sector decreased by € 1,100 million or -10.6% year-on-year to € 9,281 million (2022: € 10,380 million). This development was mainly attributable to organic effects, which amounted to € 821 million or -7.9%. Exchange rate effects of € 285 million or -2.7% also contributed to the downturn in net sales. The Life Science business sector accounted for the largest share of Group net sales at 44% (2022: 47%), followed by Healthcare at 38% (2022: 35%). Net sales in the Healthcare business sector increased by € 214 million or 2.7% year-on-year to € 8,053 million (2022: € 7,839 million). Negative exchange rate effects of -5.8% were offset by organic growth of 8.5%. The € 354 million decline in net sales in the Electronics business sector to € 3,659 million (2022: € 4,013 million) was driven by organic effects of -5.1% and exchange rate effects of -4.1%. This was offset by a positive effect of 0.3% from the acquisition of M Chemicals Inc., Korea. The percentage contribution of Electronics to Group net sales was unchanged year-on-year at 18%.
- Orders already received by the reporting date that will result in net sales in future periods amounted to around € 4 billion as of December 31, 2023 (December 31, 2022: around € 6 billion), of which around € 3 billion related to the Life Science business sector (December 31, 2022: around € 4 billion).

The Consolidated Income Statement of the Merck Group is as follows:

Merck Group

Consolidated Income Statement

€ million	2023	%	2022	%	Change € million	Change %
Net sales	**20,993**	**100.0%**	**22,232**	**100.0%**	**-1,239**	**-5.6%**
Cost of sales	-8,600	-41.0%	-8,527	-38.4%	-73	0.9%
Gross profit	**12,392**	**59.0%**	**13,705**	**61.6%**	**-1,313**	**-9.6%**
Marketing and selling expenses	-4,510	-21.5%	-4,714	-21.2%	203	-4.3%
Administration expenses	-1,392	-6.6%	-1,306	-5.9%	-86	6.6%
Research and development costs	-2,445	-11.6%	-2,521	-11.3%	75	-3.0%
Impairment losses and reversals of impairment losses on financial assets (net)	-51	-0.2%	-6	–	-45	>100%
Other operating income and expenses	-385	-1.8%	-685	-3.1%	300	-43.8%
Operating result (EBIT)[1]	**3,609**	**17.2%**	**4,474**	**20.1%**	**-865**	**-19.3%**
Financial result	-125	-0.6%	-187	-0.8%	62	-33.0%
Profit before income tax	**3,484**	**16.6%**	**4,287**	**19.3%**	**-803**	**-18.7%**
Income tax	-650	-3.1%	-948	-4.3%	298	-31.4%
Profit after tax	**2,834**	**13.5%**	**3,339**	**15.0%**	**-505**	**-15.1%**
Non-controlling interests	-10	–	-14	-0.1%	3	-25.6%
Net income	**2,824**	**13.5%**	**3,326**	**15.0%**	**-502**	**-15.1%**

[1] Not defined by International Financial Reporting Standards (IFRS).

Merck Group

Research and development costs by business sector[1] - 2023
€ million/%

[1] Not presented: research and development costs of € 94 million allocated to Corporate and Other.

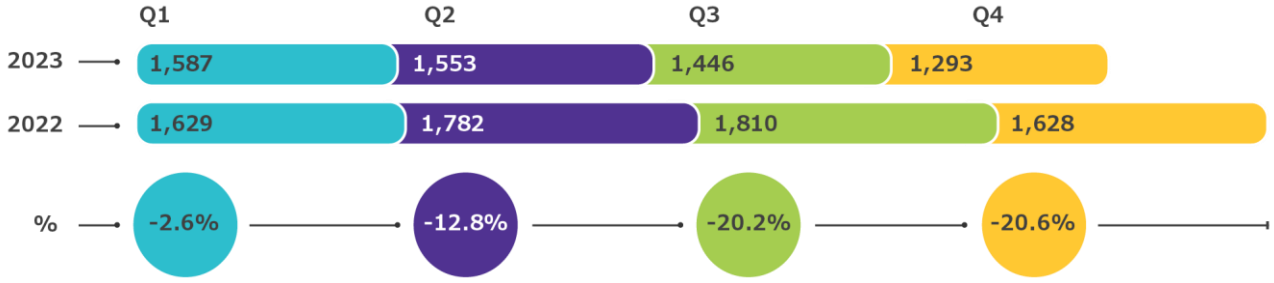
There was a year-on-year decline in the operating result (EBIT) in fiscal 2023. This was largely due to the lower level of gross profit, which was only partially offset by a reduction in operating expenses. In particular, the year-on-year decline in the gross margin was due to lower sales of high-margin products in the Life Science business sector that had experienced strong demand in conjunction with the Covid-19 pandemic. In addition, as a result of the agreement terminating the strategic alliance with Pfizer Inc., United States, the cost of sales included royalties for the Bavencio® product for the first time from July 1, 2023, which in turn reduced the gross margin.

- Marketing and selling expenses declined on the back of lower logistics costs in particular.
- Administration expenses increased as a result of a program to continuously improve processes and align the Group Functions more closely with the businesses in particular.
- Accounting for a 70% (2022: 70%) share of Group R&D spending (excluding research and development cost allocated to Corporate and Other), Healthcare was the most research-intensive business sector of the Merck Group. Further information can be found in the "**Research and Development**" chapter.
- Other operating income and expenses fell compared with the previous year, mainly as a result of lower profit transfer expenses in the Healthcare business sector. Impairment losses on non-financial assets also declined.
- Overall, the aforementioned developments led to a reduction in the EBIT margin by around three percentage points, from 20.1% in the previous year to 17.2%.
- Compared to the previous year, EBITDA pre, the key financial indicator used to steer operating business, fell by € 970 million or -14.2% to € 5,879 million (2022: € 6,849 million).
- The financial result improved by 33.0% to € -125 million (2022: € -187 million). This was due in particular to the positive development of net interest income. Details about financial income and expenses can be found in Note (40) "**Finance income and expenses/Net gains and losses from financial instruments**" in the Notes to the Consolidated Financial Statements.
- Income tax expense amounted to € 650 million (2022: € 948 million) and resulted in a tax rate of 18.7% (2022: 22.1%). The downturn in earnings was accompanied by a corresponding reduction in taxes. Furthermore, a non-recurring deferred tax income had a reducing effect on the tax rate.
- The net income attributable to Merck KGaA shareholders declined by 15.1% to € 2,824 million (2022: € 3,326 million) and resulted in a reduction in earnings per share to € 6.49 (2022: € 7.65).

The development of EBITDA pre in the individual quarters in comparison with 2022 as well as the respective growth rates are presented in the following overview:

Merck Group

EBITDA pre[1] and change by quarter[2]
€ million/change in %



[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Quarterly breakdown unaudited.

Merck Group

EBITDA pre[1] by business sector[2] - 2023
€ million/%

[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Not presented: Decline in Group EBITDA pre by € -397 million due to Corporate and Other.

Net assets and financial position

Merck Group

Balance sheet structure

	Dec. 31, 2023		Dec. 31, 2022		Change	
	€ million	**%**	€ million	%	€ million	%
Non-current assets[1]	**36,102**	**74.4%**	**36,334**	**74.9%**	**-232**	**-0.6%**
thereof:						
Goodwill[1]	17,845		18,389		-544	
Other intangible assets[1]	6,551		7,335		-784	
Property, plant and equipment[1]	9,056		8,204		852	
Other non-current assets	2,650		2,406		244	
Current assets	**12,393**	**25.6%**	**12,201**	**25.1%**	**192**	**1.6%**
thereof:						
Inventories	4,637		4,632		5	
Trade and other current receivables	4,004		4,114		-110	
Other current financial assets	499		321		178	
Other current assets	1,271		1,280		-9	
Cash and cash equivalents	1,982		1,854		128	
Total assets[1]	**48,495**	**100.0%**	**48,535**	**100.0%**	**-40**	**-0.1%**
Equity	**26,754**	**55.2%**	**26,005**	**53.6%**	**749**	**2.9%**
Non-current liabilities[1]	**13,042**	**26.9%**	**13,015**	**26.8%**	**26**	**0.2%**
thereof:						
Non-current provisions for employee benefits	2,192		2,030		162	
Other non-current provisions	277		299		-22	
Non-current financial debt	9,239		9,200		39	
Other non-current liabilities[1, 2]	1,333		1,486		-153	
Current liabilities[1]	**8,699**	**17.9%**	**9,514**	**19.6%**	**-815**	**-8.6%**
thereof:						
Current provisions[2]	658		453		205	
Current financial debt	702		1,228		-526	
Trade and other current payables/ refund liabilities[1]	3,422		3,411		11	
Other current liabilities[2]	3,918		4,422		-504	
Total equity and liabilities[1]	**48,495**	**100.0%**	**48,535**	**100.0%**	**-40**	**-0.1%**

[1] Previous year's figures have been adjusted, see Note (6) "**Acquisitions and Divestments**" in the Notes to the Consolidated Financial Statements.

[2] Previous year's figures have been adjusted, see Note (2) "**Reporting principles**" in the Notes to the Consolidated Financial Statements.

- The total assets of the Merck Group were essentially unchanged at € 48,495 million as of December 31, 2023 (December 31, 2022: € 48,535 million).
- Goodwill was down as against the previous year as a result of the depreciation of the U.S. dollar against the euro in particular.
- Other intangible assets were reduced by amortization and currency effects, in particular stemming from the U.S. dollar. Slightly higher investment than in the previous year, in particular from in-licensing in the Healthcare business sector (further information can be found under "**Other intangible assets**" in the Notes to the Consolidated Financial Statements), was not enough to offset this development.
- The year-on-year increase in property, plant and equipment was attributable to additions of € 1,981 million (2022: € 1,730 million), which significantly exceeded depreciation and disposals in the reporting period.
- Of the additions to property, plant and equipment in 2023, € 391 million (2022: € 279 million) related to strategic investments in Germany, including € 329 million for the expansion of the Darmstadt site. At the Darmstadt site, the Healthcare business sector invested € 51 million in a new research center and the Life Science business sector invested € 31 million in a new membrane production facility. Furthermore, the Life Science business sector invested € 50 million in a new filling and logistics center in Schnelldorf. Outside Germany, there were high levels of investment in strategic projects in the United States (€ 330 million), Ireland (€ 157 million) and China (€ 90 million) in particular. In the United States, the Life Science business sector invested € 69 million in expanding its capacities for biosafety testing and analytical development services in Rockville, while the Electronics business sector invested € 30 million in a new production facility for specialty gases for the semiconductor industry in Hometown. In Ireland, the Life Science business sector invested € 149 million in the expansion of membrane production capacities and the construction of a new filtration plant in Cork. In China, the Electronics business sector invested € 34 million in the establishment of a site for advanced semiconductor solutions in Zhangjiagang.
- Trade and other current receivables mainly developed in line with the business volume. At the same time, this item was reduced by exchange rate effects.
- In fiscal 2023, the equity of the Merck Group rose by 2.9% to € 26,754 million (December 31, 2022: € 26,005 million). Profit after tax (€ 2,834 million) contributed to this development. By contrast, a negative currency translation difference (€ 1,003 million) and the dividend payments and profit distribution in the reporting year served to reduce equity (see "**Consolidated Statement of Changes in Net Equity**" in the Consolidated Financial Statements). Partially as a result of the ongoing reduction in net financial debt, the equity ratio improved by more than one percentage point to 55.2% (December 31, 2022: 53.6%).
- The increase in non-current provisions for employee benefits essentially resulted from actuarial losses in connection with the discount rate.
- Current provisions increased as a result of follow-on obligations in connection with the discontinuation of the development program for evobrutinib and ongoing efficiency programs (further information can be found in Note (27) "**Other provisions**" in the Notes to the Consolidated Financial Statements).
- Current financial liabilities were reduced by the repayment of a bond in the amount of € 600 million and an early partial repayment of hybrid bonds in the amount of € 275 million.

The composition and the development of net financial debt were as follows:

Merck Group

Net financial debt[1]

€ million	Dec. 31, 2023	Dec. 31, 2022	Change € million	Change %
Bonds	7,802	8,726	-924	-10.6%
Bank loans	283	203	80	39.4%
Liabilities to related parties	1,196	919	276	30.1%
Loans from third parties and other financial debt	68	59	9	15.7%
Liabilities from derivatives (financial transactions)	77	30	47	>100.0%
Lease liabilities	515	491	24	5.0%
Financial debt	**9,941**	**10,428**	**-487**	**-4.7%**
less:				
Cash and cash equivalents	1,982	1,854	128	6.9%
Other current financial assets[2]	459	247	212	85.9%
Net financial debt[1]	**7,500**	**8,328**	**-828**	**-9.9%**

[1] Not defined by International Financial Reporting Standards (IFRSs).

[2] Excluding current derivatives (operational) and contingent considerations, which are recognized in the context of business combinations according to IFRS 3.

Bonds were reduced by the repayment of a bond in the amount of € 600 million in December 2023 and the partial repurchase of a nominal volume of € 275 million of hybrid bonds issued in 2019 and 2020.

Merck Group

Reconciliation of net financial debt[1]

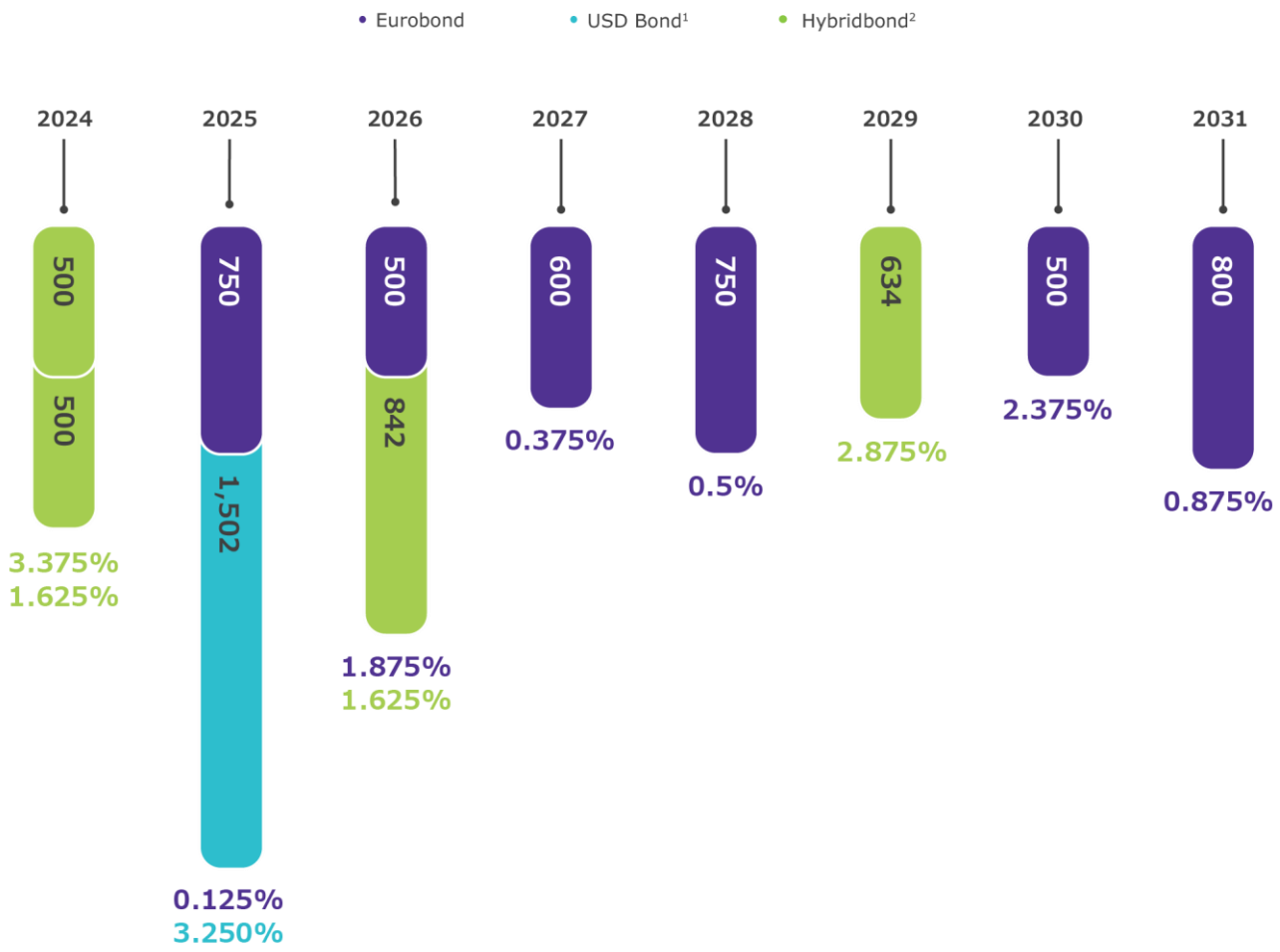
€ million	2023	2022
January 1	**8,328**	**8,753**
Operating Cash Flow	-3,784	-4,259
Payments for investments in intangible assets[2]	216	275
Payments from the disposal of intangible assets[2]	-136	-38
Payments for investments in property, plant and equipment[2]	1,807	1,531
Payments from the disposal of property, plant and equipment[2]	-19	-21
Acquisitions[2]	12	854
Payments from divestments[2]	–	-4
Change in lease liabilities	201	187
Dividend payments/profit withdrawals[2]	1,164	967
Currency translation difference	-30	86
Other	-258	-3
December 31	**7,500**	**8,328**

[1] Not defined by International Financial Reporting Standards (IFRS).

[2] As reported in the Consolidated Cash Flow Statement.

- Traditionally, the capital market represents a major source of financing for Merck, for instance via bond issues. As of December 31, 2023, there were liabilities of € 3.9 billion from a debt issuance program most recently renewed in fiscal 2023 (December 31, 2022: € 4.5 billion).
- Loan agreements represent a further source of financing for Merck. A € 2.5 billion syndicated loan facility is in place until 2028 to cover unexpected cash needs. This credit line is a backup facility that is intended to be used in exceptional circumstances only. Merck also agreed upon several bilateral loan facilities.
- In addition, Merck has a commercial paper program with a volume of € 2.5 billion at its disposal. Within the scope of this program, Merck can issue short-term commercial paper with a maturity of up to one year.

- The maturities of our financial liabilities are aligned with our planned free cash flow. The repayment profile of the issued bonds was as follows:



[1] The nominal volumes of bonds denominated in U.S. dollars were converted into euros at the closing rate on December 31, 2023.
[2] For the hybrid bonds, repayment is assumed at the earliest possible date.

- The capital market uses the assessments published by rating agencies to help lenders assess the risks of a financial instrument used by Merck. Merck is currently rated by Standard & Poor's and Moody's. Standard & Poor's has issued a long-term credit rating of A with a stable outlook, while Moody's has issued a rating of A3 with a stable outlook. An overview of the development of our rating in recent years is presented in the "**Report on Risks and Opportunities**".

- The financial debt was not secured by liens or similar forms of collateral. The loan agreements do not contain any financial covenants. There were no indications that the availability of extended credit lines was restricted. Cash and cash equivalents included restricted cash amounting to € 404 million (December 31, 2022: € 456 million). We pursue a sustainable dividend policy and aim for a target corridor of 20% to 25% of earnings per share pre when determining the amount of the dividend. The average borrowing cost on December 31, 2023, was 2.1% (December 31, 2022: 1.9%).

The development of key balance sheet figures was as follows:

Merck Group

Key balance sheet figures

%		Dec. 31, 2023	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2020	Dec. 31, 2019
Equity ratio[1]	Total equity / Total assets	55.2%	53.6%	47.2%	40.7%	40.9%
Asset ratio[1]	Non-current assets / Total assets	74.4%	74.9%	75.8%	77.8%	79.4%
Asset coverage[1]	Total equity / Non-current assets	74.1%	71.6%	62.3%	52.3%	51.5%
Finance structure[1]	Current liabilities / Liabilities (total)	40.0%	42.2%	43.6%	37.3%	45.7%

[1] Not defined by International Financial Reporting Standards (IFRS).

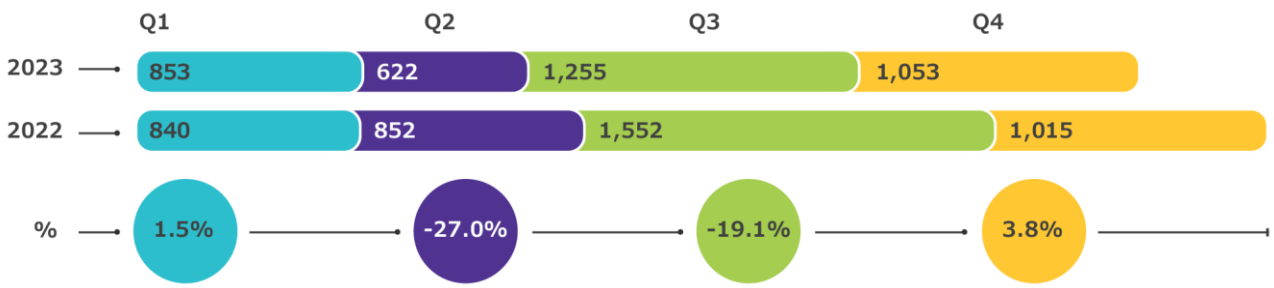
In the area of financial risks and opportunities, Merck uses an active management strategy to reduce the effects of fluctuations in exchange and interest rates. This also includes the use of derivative financial instruments. Further details on liquidity, counterparty and financial market risks and opportunities are presented in the "**Report on Risks and Opportunities**" in the "**Financial risks and opportunities**" section.

In fiscal 2023, operating cash flow, which is one of the three most important key performance indicators alongside net sales and EBITDA pre, decreased by -11.2% to € 3,784 million (2022: € 4,259 million). This was mainly due to the development of EBITDA pre. This was countered by a reduction in working capital and lower tax payments. Further information about the development of the operating cash flow can be found in the "**Internal Management System**" chapter in this Combined Management Report, under "**Consolidated Cash Flow Statement**" in the Consolidated Financial Statements and in Note (16) "**Operating cash flow**" in the Notes to the Consolidated Financial Statements.

The distribution of operating cash flow across the individual quarters and the percentage changes in comparison with 2022 were as follows:

Merck Group

Operative cash flow[1] and change by quarter[2]
€ million/change in %



[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Quarterly breakdown unaudited.

Overall assessment of business performance and economic situation

- Despite the challenging macroeconomic environment and headwinds in individual markets, Merck can look back on a predominantly steady fiscal 2023 thanks to the diversified nature of its business sectors. As anticipated, Life Science business declined as a result of the forecast downturn in demand for products in connection with the Covid-19 pandemic and the slower than expected reduction in customer inventories in the Process Solutions business unit. Additionally, the economic slowdown in the semiconductor industry led to weak business performance in the Electronics business sector. However, Healthcare achieved strong organic growth that partially offset the negative development in the other business sectors.
- All in all, the Merck Group's net sales declined by -5.6% or € -1.2 billion to € 21 billion in fiscal 2023. Our most important key performance indicator, EBITDA pre, fell by -14.2% to € 5.9 billion. Earnings were adversely affected by the challenging market conditions and exchange rate effects. We will propose to the Annual General Meeting an unchanged dividend payment of € 2.20 per share for fiscal 2023.
- The solid financing policies of the Merck Group were reflected in its consistently good key balance sheet figures. The equity ratio remained at 55.2% as of December 31, 2023 (December 31, 2022: 53.6%). Net financial debt was reduced further, amounting to € 7.5 billion at the end of the fiscal year (2022: € 8.3 billion).
- Based on our solid net assets and financial position as well as our diversified operations, we view the economic situation of the Merck Group as positive overall. Thanks to our resilient business model and our clear positioning as a science and technology company, we are well positioned even in economically challenging times.

Life Science

Life Science

Key figures

€ million	2023	2022	Change € million	Change %
Net sales	9,281	10,380	-1,100	-10.6%
Operating result (EBIT)[1]	1,850	2,808	-958	-34.1%
Margin (% of net sales)[1]	19.9%	27.1%		
EBITDA[2]	2,731	3,678	-946	-25.7%
Margin (% of net sales)[1]	29.4%	35.4%		
EBITDA pre[1]	2,820	3,760	-940	-25.0%
Margin (% of net sales)[1]	30.4%	36.2%		

[1] Not defined by International Financial Reporting Standards (IFRS).

[2] Not defined by International Financial Reporting Standards (IFRS); EBITDA corresponds to operating result (EBIT) adjusted by depreciation, amortization, impairment losses, and reversals of impairment losses.

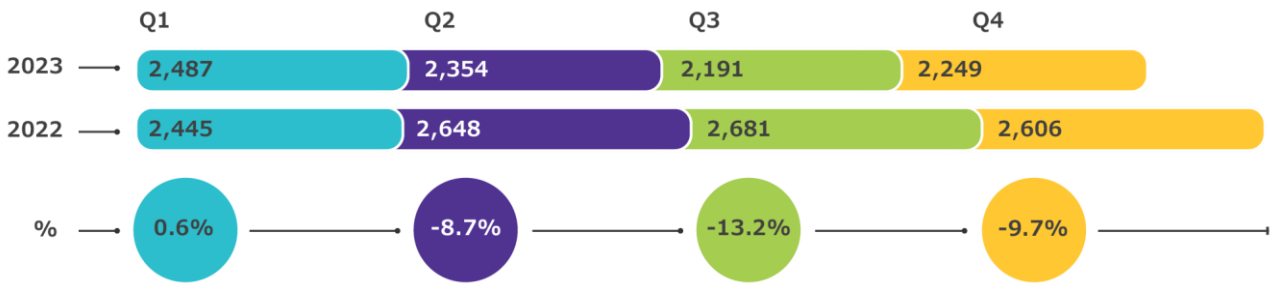
Development of sales and results of operations

The development of sales in the individual quarters in comparison with 2022 as well as the respective organic growth rates are presented in the following graph:

Life Science

Net sales and organic growth[1] by quarter[2]

€ million/organic growth in %



[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Quarterly breakdown unaudited.

Life Science

Net sales by business unit

€ million	2023	Share	Organic growth[1]	Exchange rate effects	Acquisitions / divestments	Total change	2022[2]	Share
Science & Lab Solutions	4,706	51%	-0.6%	-3.3%	–	-3.9%	4,898	47%
Process Solutions	3,782	41%	-14.4%	-2.3%	–	-16.7%	4,540	44%
Life Science Services	792	8%	-14.6%	-2.0%	0.6%	-15.9%	943	9%
Life Science	**9,281**	**100%**	**-7.9%**	**-2.7%**	**0.1%**	**-10.6%**	**10,380**	**100%**

[1] Not defined by International Financial Accounting Standards (IFRS).

[2] Previous year's figures were adjusted due to internal restructuring in the Life Science division.

- The Science & Lab Solutions business unit, which provides products and services to support life science research for pharmaceutical, biotechnology, academic research laboratories and researchers, and scientific and industrial laboratories, had organically stable sales in 2023. While the core business[1] generated organic growth in the first half of 2023, sales saw an organic decline in the second half of 2023 amid further decreasing pandemic-related demand as well as decreasing demand in China due to the current economic environment. Including an unfavorable foreign exchange effect of -3.3%, net sales decreased to € 4,706 million in 2023 (2022: € 4,898 million). Science & Lab Solutions accounted for 51% of Life Science net sales (2022: 47%). Geographically, Europe showed organic growth in 2023, while net sales in North America and Asia-Pacific (APAC) declined organically.

- The Process Solutions business unit, which markets products and services for the entire pharmaceutical production value chain, saw an organic mid-teens percentage decrease in sales for 2023. This was attributable to the continued decline in pandemic-related sales and a slowdown of the core business in 2023, driven mainly by the effects of destocking by key customers. Including an unfavorable foreign exchange effect of -2.3%, net sales decreased across all core regions (North America, Europe, Asia-Pacific (APAC)) with exception to Latin America and Middle East and Africa (MEA) to € 3,782 million in 2023 (2022: € 4,540 million). The percentage contribution of the Process Solutions business unit to Life Science net sales was 41% (2022: 44%).

- The Life Science Services business unit, which offers fully integrated Contract Development and Manufacturing Organization (CDMO) and contract testing services, recorded a significant organic sales decline in the mid-teens for 2023.This was driven by decreasing pandemic-related sale partially offset by growth in the core business. Including an unfavorable foreign exchange effect of -2.0%, net sales decreased across all regions to € 792 million (2022: € 943 million).

Net sales of the business sector by region developed as follows:

Life Science

Net sales by region

€ million	2023	Share	Organic growth[1]	Exchange rate effects	Acquisitions/ divestments	Total change	2022	Share
Europe	3,178	34%	-7.6%	-0.2%	–	-7.8%	3,445	33%
North America	3,372	36%	-12.0%	-2.3%	0.1%	-14.2%	3,931	38%
Asia-Pacific (APAC)	2,263	25%	-5.1%	-5.6%	–	-10.7%	2,536	25%
Latin America	352	4%	10.3%	-10.8%	0.1%	-0.3%	353	3%
Middle East and Africa (MEA)	116	1%	5.3%	-5.5%	–	-0.1%	116	1%
Life Science	**9,281**	**100%**	**-7.9%**	**-2.7%**	**0.1%**	**-10.6%**	**10,380**	**100%**

[1] Not defined by International Financial Accounting Standards (IFRS).

[1] The core business consists of "Net sales excluding the Covid-19 pandemic business". This is a financial indicator that is not defined by International Financial Reporting Standards (IFRS). It should not be taken into account in order to assess the performance of Merck in isolation or as an alternative to the financial indicators presented in the consolidated financial statements and determined in accordance with IFRS.

The following table presents the composition of EBITDA pre for 2023 in comparison with 2022. The International Financial Reporting Standards (IFRS) figures have been modified to reflect the elimination of adjustments included in the respective functional costs.

Life Science

Reconciliation EBITDA pre[1]

	2023			2022			Change
€ million	IFRS	Elimination of adjustments	Pre[1]	IFRS	Elimination of adjustments	Pre[1]	Pre[1]
Net sales	**9,281**	**–**	**9,281**	**10,380**	**–**	**10,380**	**-10.6%**
Cost of sales	-4,236	6	-4,230	-4,280	7	-4,273	-1.0%
Gross profit	**5,044**	**6**	**5,050**	**6,100**	**7**	**6,107**	**-17.3%**
Marketing and selling expenses	-2,245	12	-2,232	-2,400	16	-2,384	-6.3%
Administration expenses	-425	53	-372	-400	22	-377	-1.4%
Research and development costs	-396	3	-393	-399	-0	-399	-1.5%
Impairment losses and reversals of impairment losses on financial assets (net)	-2	–	-2	-9	–	-9	-75.5%
Other operating income and expenses	-126	48	-78	-85	61	-24	>100.0%
Operating result (EBIT)[1]	**1,850**			**2,808**			
Depreciation/amortization/ impairment losses/reversals of impairment losses	881	-34	848	870	-24	845	0.3%
EBITDA[2]	**2,731**			**3,678**			
Restructuring expenses	30	-30	–	41	-41	–	
Integration expenses/IT expenses	53	-53	–	24	-24	–	
Gains (-)/losses (+) on the divestment of businesses	–	–	–	–	–	–	
Acquisition-related adjustments	6	-6	–	18	-18	–	
Other adjustments	–	–	–	–	–	–	
EBITDA pre[2]	**2,820**	**–**	**2,820**	**3,760**	**–**	**3,760**	**-25.0%**
of which: organic growth[1]							-21.4%
of which: exchange rate effects							-3.3%
of which: acquisitions/ divestments							-0.3%

[1] Not defined by International Financial Reporting Standards (IFRS).

[2] Not defined by International Financial Reporting Standards (IFRS); EBITDA corresponds to operating result (EBIT) adjusted by depreciation, amortization, impairment losses, and reversals of impairment losses.

- Adjusted gross profit for the Life Science business sector was lower in 2023 in comparison with 2022. This was attributable to the organic sales decline following the continued decrease in pandemic-related sales combined with a slowdown of the core business as well as plant fix costs. At 54.4%, the adjusted gross margin in 2023 was below the year-earlier period (2022: 58.8%).

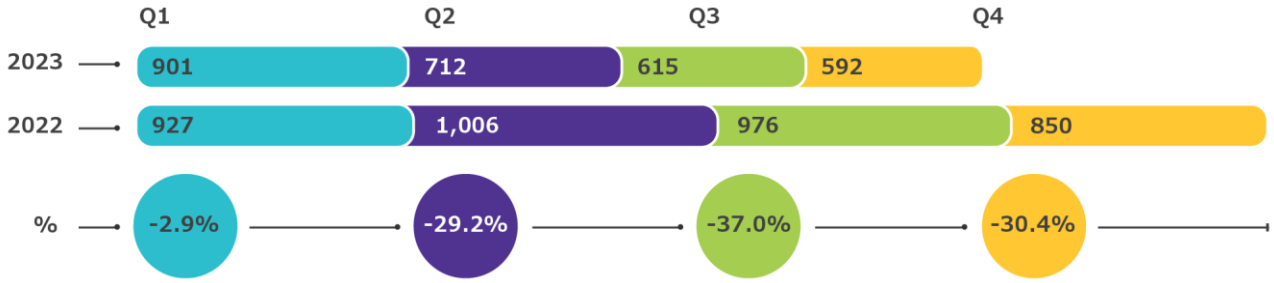
- The decrease in marketing and selling expenses in 2023 was largely driven by lower logistics costs following lower sales volume and a decline in personnel costs. In 2023, administration expenses and Research & Development costs remained organically largely stable in comparison to 2022. In addition to our organic development, positive foreign exchange effects impacted the development of costs compared to 2022. The net position of other operating income and expenses decreased compared to 2022 due to one-off effects in 2022 which did not repeat in 2023. Among other items, there was one-off income from a contractual arrangement with a supplier.

- In 2023, EBITDA pre saw an organic mid-twenties percentage decline compared to 2022, resulting in an EBITDA pre margin of 30.4% (2022: 36.2%).

The development of EBITDA pre in the individual quarters in comparison with 2022 is presented in the following overview:

Life Science

EBITDA pre[1] and change by quarter[2]
€ million/change in %



[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Quarterly breakdown unaudited.

Healthcare

Healthcare

Key figures

€ million	2023	2022	Change € million	Change %
Net sales	8,053	7,839	214	2.7%
Operating result (EBIT)[1]	2,225	1,895	330	17.4%
Margin (% of net sales)[1]	27.6%	24.2%		
EBITDA[2]	2,545	2,385	160	6.7%
Margin (% of net sales)[1]	31.6%	30.4%		
EBITDA pre[1]	2,543	2,477	66	2.7%
Margin (% of net sales)[1]	31.6%	31.6%		

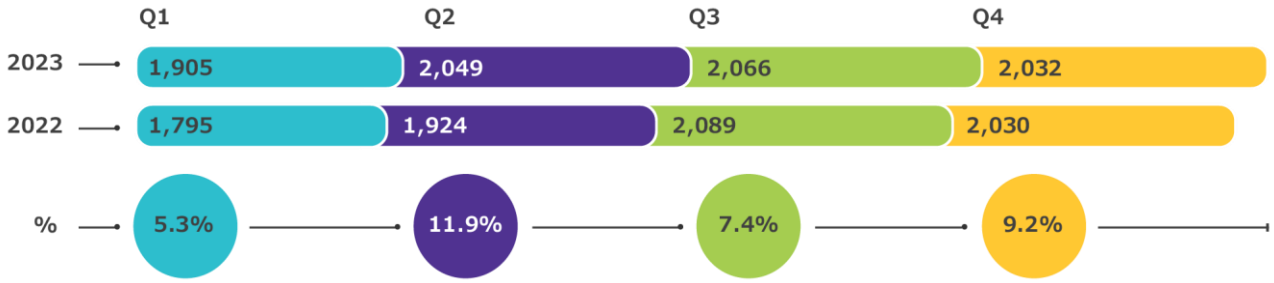
[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Not defined by International Financial Reporting Standards (IFRS); EBITDA corresponds to operating result (EBIT) adjusted by depreciation, amortization, impairment losses, and reversals of impairment losses.

Development of sales and results of operations

The net sales in the individual quarters as well as the respective organic growth rates in 2022 are presented in the following graph:

Healthcare

Net sales and organic growth[1] by quarter[2]
€ million/organic growth in %



[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Quarterly breakdown unaudited.

Net sales of the key product lines and products developed as follows in 2023:

Healthcare

Net sales by major product lines/products

€ million	2023	Share	Organic growth[1]	Exchange rate effects	Total change	2022	Share
Oncology	**1,819**	**22%**	**17.3%**	**-9.2%**	**8.1%**	**1,683**	**22%**
thereof: Erbitux®	1,025	13%	10.9%	-10.6%	0.3%	1,023	13%
thereof: Bavencio®	713	9%	23.4%	-6.8%	16.6%	611	8%
Neurology & Immunology	**1,665**	**21%**	**-0.9%**	**-3.5%**	**-4.5%**	**1,743**	**22%**
thereof: Mavenclad®	956	12%	15.9%	-4.3%	11.7%	856	11%
thereof: Rebif®	709	9%	-17.2%	-2.9%	-20.1%	887	11%
Fertility	**1,547**	**19%**	**14.9%**	**-7.8%**	**7.0%**	**1,446**	**18%**
thereof: Gonal-f®	847	11%	10.5%	-7.8%	2.7%	825	11%
Cardiovascular, Metabolism & Endocrinology	**2,786**	**35%**	**4.0%**	**-4.6%**	**-0.7%**	**2,805**	**36%**
thereof: Glucophage®	882	11%	-0.5%	-4.6%	-5.1%	930	12%
thereof: Concor®	571	7%	1.6%	-4.9%	-3.3%	590	8%
thereof: Euthyrox®	565	7%	5.4%	-3.2%	2.2%	553	7%
thereof: Saizen®	332	4%	35.7%	-10.6%	25.1%	266	3%
Other	**235**	**3%**				**161**	**2%**
Healthcare	**8,053**	**100%**	**8.5%**	**-5.8%**	**2.7%**	**7,839**	**100%**

[1] Not defined by International Financial Reporting Standards (IFRS).

- The cancer drug Erbitux® (cetuximab) saw low double-digit percentage organic net sales growth in 2023, largely on the back of increased demand in the Asia-Pacific (APAC), Latin America and Europe regions. By contrast, organic net sales performance in the Middle East and Africa region in the reporting period was negative.

- In immuno-oncology, net sales of the oncology drug Bavencio® (avelumab) saw organic growth in the low-twenties percentage range in the reporting period. This was driven by all regions, with Europe, North America and Asia-Pacific (APAC) enjoying particularly strong performance with double-digit organic growth rates. The main driver of this development was the continued growth in the drug's market share for first-line maintenance treatment for patients with locally advanced or metastatic urothelial carcinoma (UC).

- Mavenclad®, for the oral short-course treatment of highly active relapsing multiple sclerosis, recorded encouraging organic net sales growth in the mid-teen percentage range in the past fiscal year and reached blockbuster status with total net sales of more than US$ 1 billion. The North America region made a particularly strong contribution to the positive sales performance, but Latin America, Europe and the Middle East and Africa region also saw organic growth in net sales. Net sales in the Asia-Pacific (APAC) region remained essentially unchanged year-on-year in organic terms.

- The reporting period saw a high-teens percentage decline in net sales of Rebif®, which is used to treat relapsing forms of multiple sclerosis (MS). The sustained downturn in sales was anticipated and largely reflects the momentum on the interferon market, which is expected to remain negative in the future due to the persistently difficult competitive situation and the competition from oral dosage forms and high-efficacy MS therapies.

- The Fertility franchise recorded strong organic net sales growth in the mid-teen percentage range in the reporting period. Gonal-f®, a leading recombinant hormone used in the treatment of infertility, saw low double-digit percentage growth in net sales on the back of higher demand as well as supply bottlenecks affecting a rival product. Other Fertility products also contributed to the strong growth in the franchise with organic net sales growth in the mid-teen percentage range in some cases. This development was also attributable to supply bottlenecks affecting a rival product as well as higher demand.

- The Cardiovascular, Metabolism and Endocrinology franchise, which includes drugs for the treatment of cardiovascular, thyroid and growth disorders and diabetes, recorded solid year-on-year growth in net sales in the past financial year. Net sales of the diabetes drug Glucophage® were largely stable, with organic sales growth in Europe and Latin America not quite offsetting the organic downturn in the Asia-Pacific (APAC) and Middle East and Africa (MEA) regions. Net sales of the beta-blocker Concor® increased slightly in organic terms in the reporting period, while the thyroid product Euthyrox® enjoyed solid organic growth compared with the previous year. The franchise also benefited from encouraging organic growth in the net sales of Saizen® in the mid-thirty percentage range, which was due to rising demand as well as supply bottlenecks affecting a rival product.

Healthcare

Product sales and organic growth[1] of Erbitux®, Mavenclad® and Glucophage® by region – 2023

		Total	Europe	North America	Asia-Pacific (APAC)	Latin America	Middle East and Africa (MEA)
Erbitux®	€ million	1,025	421	–	464	87	53
	Organic growth[1]	10.9%	2.4%	–	14.2%	54.4%	-12.8%
	Share	100%	41%	–	45%	9%	5%
Mavenclad®	€ million	956	360	490	20	45	41
	Organic growth[1]	15.9%	3.4%	23.2%	-0.7%	62.6%	28.5%
	Share	100%	38%	51%	2%	5%	4%
Glucophage®	€ million	882	128	–	467	203	84
	Organic growth[1]	-0.5%	2.9%	–	-4.0%	14.9%	-12.8%
	Share	100%	14%	–	53%	23%	10%

[1] Not defined by International Financial Reporting Standards (IFRS).

Net sales in the Healthcare business sector by region in 2023 developed as follows:

Healthcare

Net sales by region

€ million	2023	Share	Organic growth[1]	Exchange rate effects	Acquisitions/ divestments	Total change	2022	Share
Europe	2,541	31%	9.6%	-5.1%	–	4.5%	2,433	31%
North America	1,793	22%	3.9%	-3.2%	–	0.6%	1,781	23%
Asia-Pacific (APAC)	2,232	28%	6.4%	-7.7%	–	-1.3%	2,261	29%
Latin America	941	12%	23.1%	-10.8%	–	12.3%	838	10%
Middle East and Africa (MEA)	546	7%	5.1%	-1.3%	–	3.8%	527	7%
Healthcare	**8,053**	**100%**	**8.5%**	**-5.8%**	**–**	**2.7%**	**7,839**	**100%**

[1] Not defined by International Financial Reporting Standards (IFRS).

The following table presents the composition of EBITDA pre in fiscal 2023 in comparison with 2022. The IFRS figures have been modified to reflect the elimination of adjustments included in the functional costs.

Healthcare

Reconciliation EBITDA pre[1]

	2023			2022			Change
€ million	IFRS	Elimination of adjustments	Pre[1]	IFRS	Elimination of adjustments	Pre[1]	Pre[1]
Net sales	**8,053**	**–**	**8,053**	**7,839**	**–**	**7,839**	**2.7%**
Cost of sales	-2,029	-1	-2,030	-1,925	4	-1,921	5.7%
Gross profit	**6,024**	**-1**	**6,023**	**5,914**	**4**	**5,917**	**1.8%**
Marketing and selling expenses	-1,668	29	-1,639	-1,644	13	-1,631	0.5%
Administration expenses	-314	20	-294	-313	18	-296	-0.7%
Research and development costs	-1,657	2	-1,655	-1,694	73	-1,622	2.0%
Impairment losses and reversals of impairment losses on financial assets (net)	-41	–	-41	2	–	2	>100.0%
Other operating income and expenses	-120	-41	-161	-370	172	-198	-18.7%
Operating result (EBIT)[1]	**2,225**			**1,895**			
Depreciation/amortization/ impairment losses/reversals of impairment losses	320	-10	310	490	-187	303	2.3%
EBITDA[2]	**2,545**			**2,385**			
Restructuring expenses	32	-32	–	91	-91	–	
Integration expenses/IT expenses	20	-20	–	16	-16	–	
Gains (-)/losses (+) on the divestment of businesses	-53	53	–	-15	15	–	
Acquisition-related adjustments	–	–	–	–	–	–	
Other adjustments	–	–	–	–	–	–	
EBITDA pre[1]	**2,543**	**–**	**2,543**	**2,477**	**–**	**2,477**	**2.7%**
of which: organic growth[1]							17.1%
of which: exchange rate effects							-14.4%
of which: acquisitions/ divestments							–

[1] Not defined by International Financial Reporting Standards (IFRS).

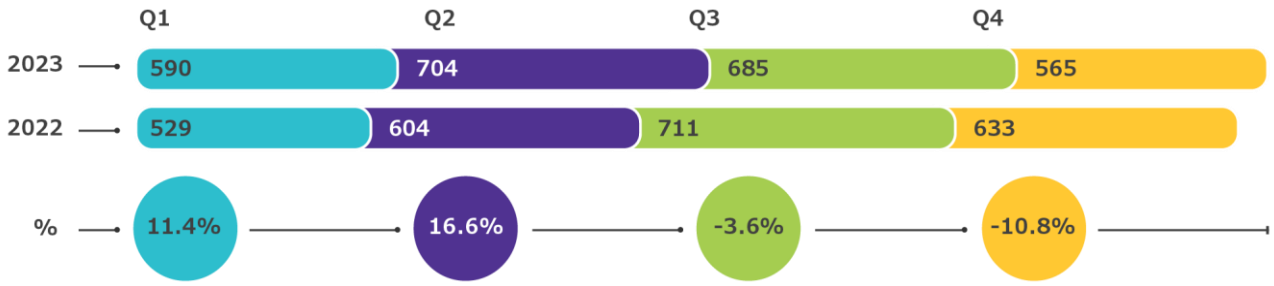
[2] Not defined by International Financial Reporting Standards (IFRS); EBITDA corresponds to operating result (EBIT) adjusted by depreciation, amortization, impairment losses, and reversals of impairment losses.

- Adjusted gross profit increased slightly in fiscal 2023, while the gross margin declined slightly to 74.8% (2022: 75.5%).
- Marketing and sales costs and administrative expenses were essentially unchanged year-on-year in the reporting period. The adjusted research and development costs increased slightly compared with the previous year, which was largely due to the provisions recognized for follow-on obligations in connection with the discontinuation of the development program for evobrutinib, a BTK inhibitor used in the treatment of relapsing multiple sclerosis (RMS).
- Net adjusted other operating expenses and income were negative but declined in fiscal 2023. This positive development was mainly driven by the end of the strategic alliance with Pfizer Inc., United States, on the co-development and co-commercialization of the oncology drug Bavencio® effective June 30, 2023. The royalties paid to Pfizer Inc., United States, instead of the profit share previously reported in other operating expenses have been reported in the cost of sales since July 2023, leading to a corresponding increase in this item. This development outweighed the year-on-year reduction in license income, meaning that the net figure improved as a result.
- The moderate increase in EBITDA pre in fiscal 2023 meant that the EBITDA pre margin amounted to 31.6% (2022: 31.6%).

The development of EBITDA pre in the individual quarters in comparison with 2022 is presented in the following overview:

Healthcare

EBITDA pre[1] and change by quarter[2]
€ million/change in %



[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Quarterly breakdown unaudited.

Electronics

Electronics

Key figures

€ million	2023	2022	Change € million	Change %
Net sales	3,659	4,013	-354	-8.8%
Operating result (EBIT)[1]	248	572	-325	-56.8%
Margin (% of net sales)[1]	6.8%	14.3%		
EBITDA[2]	816	1,138	-322	-28.3%
Margin (% of net sales)[1]	22.3%	28.3%		
EBITDA pre[1]	913	1,192	-279	-23.4%
Margin (% of net sales)[1]	25.0%	29.7%		

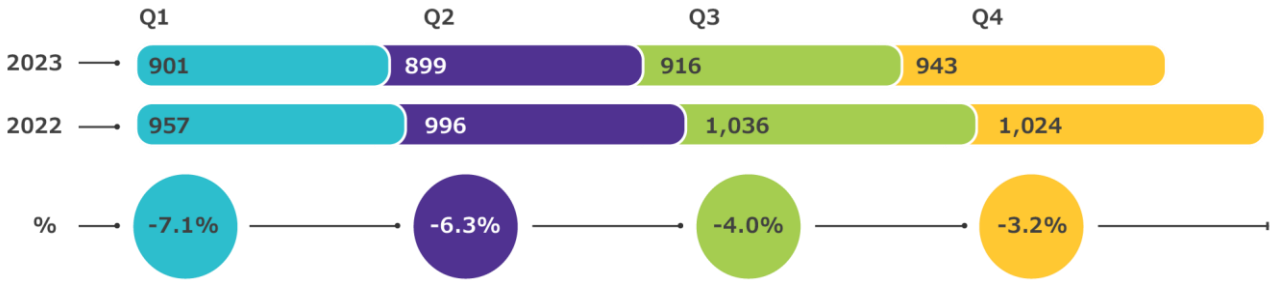
[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Not defined by International Financial Reporting Standards (IFRS); EBITDA corresponds to operating result (EBIT) adjusted by depreciation, amortization, impairment losses, and reversals of impairment losses.

Development of net sales and results of operations

The net sales in the individual quarters as well as the respective organic growth rates in 2023 are presented in the following graph:

Electronics

Net sales and organic growth[1] by quarter[2]
€ million/organic growth in %



[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Quarterly breakdown unaudited.

Electronics

Net sales by business unit

€ million	2023	Share	Organic growth[1]	Exchange rate effects	Acquisitions/ divestments	Total change	2022	Share
Semiconductor Solutions	2,479	68%	-3.9%	-3.9%	0.5%	-7.3%	2,674	67%
Display Solutions	770	21%	-9.2%	-5.3%	–	-14.5%	900	22%
Surface Solutions	411	11%	-3.6%	-2.9%	–	-6.5%	439	11%
Electronics	**3,659**	**100%**	**-5.1%**	**-4.1%**	**0.3%**	**-8.8%**	**4,013**	**100%**

[1] Not defined by International Financial Accounting Standards (IFRS).

- The Semiconductor Solutions business unit, which comprises two businesses, namely Semiconductor Materials and Delivery Systems & Services (DS&S), reported a moderate decline in net sales in organic terms in fiscal 2023. The cyclical slow-down in the semiconductor industry, which has significantly impacted the sales volumes of the Semiconductor Materials business, is proving to be both longer and more severe than the industry initially expected and affected every quarter of 2023. DS&S partially compensated for the decline in Semiconductor Materials due to the strong demand for equipment and projects throughout 2023 as our key customers continue to invest in long-term capacity increases. The portfolio effect was due to the acquisition of the chemical business of Mecaro Co. Ltd., Korea, trading as M Chemicals Inc., Korea, on December 30, 2022.

- Net sales of the Display Solutions business unit, consisting mainly of the business with liquid crystals, photoresists for display applications as well as OLED materials, decreased sharply in organic terms in 2023. Even though utilization at key customers in Liquid Crystals improved in the second half of 2023, this was more than offset by the combined impact of lower first-half utilization, weaker pricing stemming from continued competitive pressure, and an unfavorable product mix.
- The Surface Solutions business unit reported a moderate organic net sales decline in 2023. While the Cosmetics business continued to show strength again in 2023, especially in Asia and EMEA, these gains were more than offset by weaker demand for Industrials and Coatings across all regions.

Net sales of the Electronics business sector by region developed as follows:

Electronics

Net sales by region

€ million	2023	Share	Organic growth[1]	Exchange rate effects	Acquisitions/ divestments	Total change	2022	Share
Europe	318	9%	-13.6%	-0.6%	–	-14.2%	371	9%
North America	787	21%	25.2%	-3.8%	–	21.3%	649	16%
Asia-Pacific (APAC)	2,440	67%	-11.8%	-4.5%	0.4%	-15.9%	2,901	72%
Latin America	39	1%	-2.3%	-1.6%	–	-3.9%	40	1%
Middle East and Africa (MEA)	75	2%	53.6%	-11.2%	–	42.4%	53	2%
Electronics	**3,659**	**100%**	**-5.1%**	**-4.1%**	**0.3%**	**-8.8%**	**4,013**	**100%**

[1] Not defined by International Financial Reporting Standards (IFRS).

The following table presents the composition of EBITDA pre for 2023 in comparison with 2022. The IFRS figures have been modified to reflect the elimination of adjustments included in the respective functional costs.

Electronics

Reconciliation EBITDA pre[1]

	2023			2022			Change
€ million	IFRS	Elimination of adjustments	Pre[1]	IFRS	Elimination of adjustments	Pre[1]	Pre[1]
Net sales	**3,659**	**–**	**3,659**	**4,013**	**–**	**4,013**	**-8.8%**
Cost of sales	-2,332	37	-2,295	-2,314	21	-2,292	0.1%
Gross profit	**1,327**	**37**	**1,364**	**1,700**	**21**	**1,721**	**-20.7%**
Marketing and selling expenses	-591	3	-588	-662	3	-659	-10.9%
Administration expenses	-147	29	-118	-128	8	-120	-1.0%
Research and development costs	-297	1	-297	-308	2	-306	-3.2%
Impairment losses and reversals of impairment losses on financial assets (net)	–	–	–	–	–	–	–
Other operating income and expenses	-44	70	26	-28	40	12	>100.0%
Operating result (EBIT)[1]	**248**			**572**			
Depreciation/amortization/ impairment losses/reversals of impairment losses	568	-42	526	565	-20	545	-3.5%
EBITDA[2]	**816**			**1,138**			
Restructuring expenses	60	-60	–	31	-31	–	
Integration expenses/IT expenses	24	-24	–	13	-13	–	
Gains (-)/losses (+) on the divestment of businesses	–	–	–	–	–	–	
Acquisition-related adjustments	13	-13	–	11	-11	–	
Other adjustments	–	–	–	–	–	–	
EBITDA pre[1]	**913**	**–**	**913**	**1,192**	**–**	**1,192**	**-23.4%**
of which: organic growth[1]							-17.1%
of which: exchange rate effects							-5.6%
of which: acquisitions/ divestments							-0.7%

[1] Not defined by International Financial Reporting Standards (IFRS).

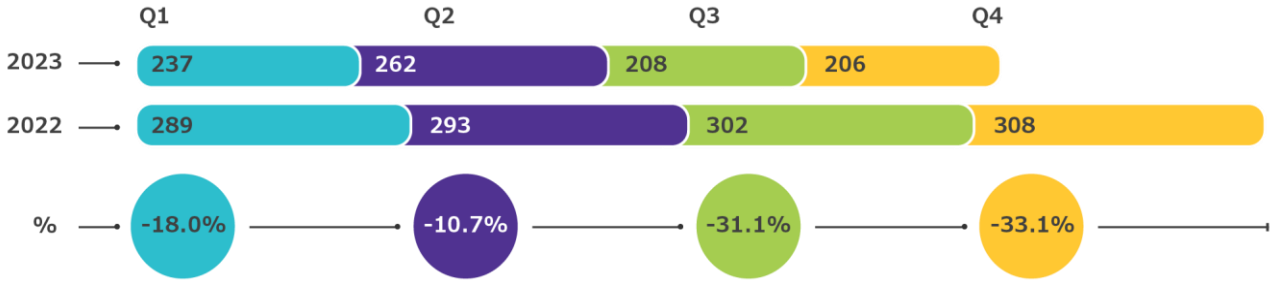
[2] Not defined by International Financial Reporting Standards (IFRS); EBITDA corresponds to operating result (EBIT) adjusted by depreciation, amortization, impairment losses, and reversals of impairment losses.

- Adjusted gross profit for the Electronics business sector decreased in 2023 driven by the aforementioned sales decline. At 37.3%, the adjusted gross margin declined compared with the previous year (2022: 42.9%) owing mainly to lower volumes to cover fixed costs, unfavorable price and mix in Liquid Crystals, rising raw material costs and adverse foreign exchange effects.
- Marketing and selling expenses decreased versus prior year, primarily due to lower logistics costs along with favorable foreign exchange effects and tighter personal cost management. Research and development costs were also favorable due to tighter cost management and project scrutiny and favorable foreign exchange effects. Adjusted other operating income improved in 2023 compared to the prior year due to the sale of a patent portfolio in the second quarter of 2023.
- As a result, EBITDA pre was down year-on-year in fiscal 2023. The EBITDA pre margin declined to 25.0% in the reporting period (2022: 29.7%), as the volume-based margin reduction and other factors affecting gross profit outlined above were only partially compensated by good operating cost management, the sale of a patent portfolio and lower logistics expenses.

The development of EBITDA pre in the individual quarters in comparison with 2022 is presented in the following overview:

Electronics

EBITDA pre[1] and change by quarter[2]
€ million/change in %



[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Quarterly breakdown unaudited.

Corporate and Other

Corporate and Other comprises administrative expenses for central Group functions that cannot be directly allocated to the business sectors.

Corporate and other

Key figures

€ million	**2023**	2022	Change € million	Change %
Operating result (EBIT)[1]	-713	-801	88	-11.0%
EBITDA[2]	-603	-696	93	-13.4%
EBITDA pre[1]	-397	-579	182	-31.5%

[1] Not defined by International Financial Reporting Standards (IFRS).

[2] Not defined by International Financial Reporting Standards (IFRS); EBITDA corresponds to operating result (EBIT) adjusted by depreciation, amortization, impairment losses, and reversals of impairment losses.

The year-on-year improvement in the operating result, EBITDA and EBITDA pre in fiscal 2023 was due in particular to the positive currency result from cash flow hedging. Cross-business research and development costs amounting to € 94 million (2022: € 119 million) were allocated to Corporate.

Report on Risks and Opportunities

As a global science and technology enterprise, identifying risks and opportunities is an intrinsic part of making our businesses resilient and generating value. We operate in a highly complex, global and interconnected business environment that further necessitates the competent management of risks and opportunities. Therefore, managing risks and opportunities is an imperative and a core component of our internal business planning and forecasting. We have processes, tools and responsibilities in place to enable the early identification of risks and to supply effective and efficient mitigation strategies.

In our internal risk reporting framework, we define risks as potential future events or developments that could result in unfavorable deviations from our financial and non-financial targets. Risk parameters in this context are the probability of financial (quantitative) impact (EBITDA pre/Operating Cash Flow) or non-financial (qualitative) impact (reputation/brand, Environment, Social, Governance (ESG) including workforce and ethics, strategy, operations).

Opportunities imply favorable deviations from targets. Future events and expected developments are considered in internal planning if a likely occurrence can be assumed within the planning period. The following section presents the risks and opportunities that could result in favorable and unfavorable deviations from existing plans and targets.

The following report is relevant from the perspective of both Merck KGaA and the overarching Merck Group. For additional information and details regarding the non-financial topics, please refer to the "**Non-Financial Statement**".

Three Lines of Defense

To organize risk management and controls, we use the well-established "Three Lines of Defense Model", which was developed by the Federation of European Risk Management Associations (FERMA), the European Confederation of Institutes of Internal Auditing (ECIIA) and the Institute of Internal Auditors (IIA). The model divides our company functions for controlling risks properly and effectively into three areas, the so-called lines of defense:

The first line of defense consists of all functions that are responsible for the operational business and whose day-to-day business risks can have an impact. Risk owners (i.e. the heads of the business units, enabling Group functions and local Managing Directors) establish processes in accordance with the requirements set by the second line of defense to identify, assess, and monitor risks and to develop measures for proper risk mitigation. Results of these assessments are regularly communicated to the Executive Board.

The second line of defense includes enabling functions at both Group and local level that control and monitor the operational business (first line of defense). This includes, among other things, the design and implementation of methods and procedures for risk management and the internal control system (financial and non-financial) as well as its regular monitoring.

The third line of defense is our Internal Auditing function. As an objective and independent auditing body, it examines both the operational business (first line of defense) and the controls and monitoring functions (second line of defense) to ensure that risks are effectively identified, evaluated and controlled vis-à-vis the Executive Board and the Supervisory Board.

Both the second and third line of defense functions regularly report to the Executive Board and the Audit Committee of the Supervisory Board.

Internal control system

Internal control system for the (Group) accounting process

The objective of the internal control system for the accounting process is to implement controls that provide assurance that the financial statements are prepared in compliance with the relevant accounting laws and standards. This system covers measures designed to ensure the complete, correct, and timely reporting and presentation of information that is relevant for the preparation of the Consolidated Financial Statements and the Combined Management Report.

Our internal control system for financial reporting is based on the COSO (Committee of Sponsoring Organizations of the Treadway Commission) framework, a globally recognized standard divided into five components: control environment, risk assessment, control activities, information and communication as well as monitoring activities. Each of these components is regularly documented, tested and/or assessed. This control system aims to ensure the accuracy of the consolidated accounting process through functioning internal controls with reasonable assurance.

The Group Accounting function centrally steers the preparation of the Consolidated Financial Statements of Merck KGaA as the parent company of the Merck Group. This Group function defines the reporting requirements that all companies of the Merck Group must meet. At the same time, this function steers and monitors the scheduling and process-related requirements of the Consolidated Financial Statements. The Merck Business Services organization manages all changes to the equity holding structure and correspondingly adapts the Group's scope of consolidation. The proper elimination of intragroup transactions within the scope of the consolidation process is ensured. Group-wide accounting guidelines form the basis for the preparation of the financial statements according to International Financial Reporting Standards (IFRS), which are reported to Group Accounting; the guidelines are adapted in a timely manner to reflect changes in the financial regulatory environment and are updated in accordance with internal reporting requirements. For special issues, such as the accounting treatment of intangible assets within the scope of business combinations in accordance with IFRS 3 or defined benefit obligations, external experts are additionally involved where necessary.

The individual legal entities, including Merck KGaA, have a local internal control system within a global framework. Where financial processes are handled by the Merck Business Services organization, the internal control system of the Merck Business Services organization is additionally applied. Both ensure that accounting complies with IFRS and with the Group accounting guidelines.

Group Accounting provides support to the local contacts and ensures a consistently high quality of reporting throughout the entire reporting process.

For Group financial reporting purposes, most of our subsidiaries use standard SAP software. Consolidation software from SAP is also used for the elimination of intragroup transactions. A detailed authorization concept ensures the segregation of duties with respect to both single-entity reporting and the Consolidated Financial Statements. The accounting process is generally designed to ensure that all units involved adhere to the principle of dual control.

The operational effectiveness of our internal financial control system is regularly tested within the scope of self-assessments by our legal entities and enabling Group functions including the Merck Business Services organization. The quality is systematically reviewed by a dedicated global financial control and governance team. Control deficiencies are properly recorded and, wherever necessary, adequate countermeasures are taken to remediate control deficiencies in a timely manner.

The overall effectiveness of our internal financial control system with regard to accounting and compliance with financial reporting on the part of the relevant individual companies is confirmed by both the local Managing Director and the local Chief Financial Officer by signing the single-entity reporting and a separate confirmation regarding the effectiveness of the financial control system (internal financial control system sign-off letter). For the accounting treatment of balance sheet items, Group Accounting closely cooperates with Group Risk Management to correctly present potential risks in the balance sheet.

All the structures and processes described in the foregoing relate to the Group Accounting procedures and are subject to regular review by Group Internal Auditing based on an annual audit plan set out by the Executive Board.

The results of the self-assessments, quality reviews, and internal audits are dealt with by the Executive Board, the Supervisory Board and the Audit Committee. The internal financial control system at Merck makes it possible to lower the risk of material misstatements in accounting. However, residual risk cannot be entirely ruled out as no internal control system is infallible, irrespective of its design.

Non-financial internal control system and overall evaluation*

In the context of constantly evolving external and internal requirements for the management of non-financial risks, work continued in fiscal 2023 on the development of a procedural and organizational concept as well as a roadmap for expanding non-financial risk management. An important decision was to consolidate the management of financial and non-financial risks under unified organizational leadership (with the Chief Financial Officer being responsible commencing with fiscal 2024) to increase efficiency and quality. This also includes the non-financial internal control system.

For fiscal 2023, the Group Legal & Compliance function provides the organizational framework for the non-financial internal control system. In line with the risk situation of the Group and to ensure regulatory compliance, non-financial topics such as sustainability, cyber security and supply chain are core areas of the internal control system. We base this on international standards, such as the framework for the governance of Group Cyber Security, which includes organizational, process-related, and technical measures for information security. The existing process of Cyber Security Risk Management is designed pursuant to ISO 27005:2018. In comparison with the previous year, a monthly Group Security Forum has been established, where new risks from the risk register are reported, and actions are tracked.

Additionally, the non-financial internal control system aligns with the sustainability strategy and ongoing projects for implementing sustainability reporting (e.g. CSRD). The goal is to continuously improve regulatory compliance pursuant to CSRD requirements through the implementation of organization-wide measures and controls.

The aim of our internal control system as the entirety of all systematically defined controls is therefore to prevent and reduce the probability of potential risks occurring as well as actively steer risks in business processes. Thereby, it helps to ensure the compliance of the company's activities with laws and regulations. The entire internal control system and the applied methods are continuously developed further. The responsibility for the effectiveness of the internal control system and the further development of the non-financial key metrics lies with the respective responsible senior leaders or risk and process owners.

Relevant representatives from the business sectors and the enabling Group functions reported to the Executive Board through the implemented control system in 2023. In this context, areas where potential for improvement and optimization had been identified and relevant ongoing projects were also presented to the Executive Board. Finally, the individual Group functions and business sectors issued an assessment to the Executive Board regarding the appropriateness and effectiveness of the control system, considering the recommended improvement opportunities, where applicable. Based on this as well as the review of the non-financial internal control system, and reporting by Internal Auditing, as of December 31, 2023, the Executive Board was not aware of any indications with regard to material issues that the system is not appropriate or effective.

Given the multi-layered process landscape and the high speed of change regarding the catalog of requirements for non-financial information, the degree of development of the non-financial internal control system does not yet match that of the (Group) accounting-related internal control system. Based on risk-based assessments of the financial and non-financial internal control system, compliance and risk management and reporting by Internal Auditing, as of December 31, 2023 the Executive Board was not aware of any indications with regard to material issues that this system is not appropriate or effective.

* The contents of this chapter or section are voluntary and therefore not audited. However, our auditor has read the text critically.

Risk and opportunity management

Group Controlling & Risk Management provides the organizational framework for risk management and reports to the Group Chief Financial Officer. We have established a holistic risk management system aimed at safeguarding the long-term achievement of our Group's goals and addressing risks to ensure our continued existence and future success. Within the scope of audits, Group Internal Auditing regularly reviews the performance of risk management processes within the units on local level and, at the same time, the communication of relevant risks from the operating businesses to Group Risk Management. Additionally, the external auditor examines the risk early warning system in accordance with section 317 (4) of the German Commercial Code (HGB) as part of the year-end audit of Merck KGaA.

Our risk management activities aim to continuously and promptly identify, assess and manage risks so that appropriate measures can be implemented to mitigate their potential negative impact. The responsibilities, objectives, and procedures of risk management are outlined in our internal group standard for risk management. The designated risk owners, including business heads, managing directors of Merck subsidiaries, and the heads of enabling Group functions, are responsible for overseeing and running local risk management processes. These processes encompass various requirements, such as identifying risks considering internal and external factors (impacting both financial and non-financial targets), analyzing risks, implementing appropriate mitigation actions, establishing preventive measures and contingency plans if applicable, and documenting risks and mitigation efforts.

The risk owners continuously assess the status of risks and report their risk portfolio to Group Risk Management twice a year. To facilitate and support these activities, we employ dedicated risk management tools. Group Risk Management coordinates and supervises the bottom-up risk reporting process. This includes validating the plausibility of the reported risks, assessing the effectiveness of mitigation measures and time frames, and determining the residual risk. The net risk is then presented in the internal risk report.

For the internal bottom-up risk reporting process, reporting is based on defined thresholds, and a variety of distribution functions are used to reflect scenarios with varied occurrence probabilities. Risks below the global reporting threshold are managed and monitored at a local level. The timeframe applied for internal risk and opportunity reporting is five years. It may extend beyond this timeframe in specific cases, such as for regulatory risks related to climate change. The outlined risks and their evaluation are based on respective annual values within the reporting period. The assessment of the risks presented relates to December 31, 2023. No significant changes occurred after the balance sheet date that would necessitate an amended presentation of the Group’s risk situation.

Group Risk Management analyzes the reported information to determine the current risk portfolio of the Group. This assessment is presented in a comprehensive report, accompanied by detailed explanations, to the Executive Board, the Supervisory Board, and relevant committees twice a year. This also encompasses a quantitative aggregation of risks at Group level, using a Monte Carlo simulation. Moreover, any notable changes in the assessment of existing risks or the identification of new significant risks can be reported at any time and promptly communicated to the Executive Board.

Our internal controlling processes incorporate the opportunity management process, which is aligned with the Group’s strategy within the operating units. As part of the strategy and planning processes, the business sectors analyze and evaluate possible business-related opportunities. In this context, investment opportunities are carefully examined and prioritized primarily in terms of their potential value proposition, ensuring optimal resource allocation. We target investment in growth markets to leverage the opportunities of dynamic development and customer proximity at a local level.

Identified opportunities that are deemed likely to occur are integrated into the business plans and forecasts. Additionally, trends and events that have the potential to positively impact EBITDA pre or Operating Cash Flow. These opportunities have the potential to have a positive effect on our medium-term prospects.

Risk and opportunity assessment

The significance of a risk is evaluated based on its potential unfavorable deviation from our financial and non-financial targets in conjunction with the probability of occurrence of the respective risk.

The underlying scales for measuring these factors are shown below:

Probability of occurrence

Probability of occurrence	Explanation
< 1%	Highly improbable
1 – 5%	Improbable
5 – 20%	Possible
20 – 50%	Likely
> 50%	More likely than not

Degree of impact

Degree of impact	Explanation
> € 500 million	Critical negative impact on EBITDA pre and/or Operating Cash Flow
€ 100 – 500 million	Significant negative impact on EBITDA pre and/or Operating Cash Flow
€ 25 – 100 million	Moderate negative impact on EBITDA pre and/or Operating Cash Flow
€ 10 – 25 million	Minor negative impact on EBITDA pre and/or Operating Cash Flow
< € 10 million	Immaterial negative impact on EBITDA pre and/or Operating Cash Flow

To enable a thorough evaluation of both financial and non-financial risks, a qualitative rating scale is available to evaluate the indirect financial impact. The use of this scale is mandatory for the assessment of non-quantifiable and qualitative risks such as Environmental, Social, and Governance (ESG), reputational, strategic, and operational risks as well as for material risks that also require a qualitative evaluation. The scale categorizes the risks as low, moderate, significant, or critical and provides a comprehensive reference for assessment.

Opportunities are assessed within their respective business environment. During short-term and strategic planning, general measures of business functions are quantified, typically in relation to EBITDA pre (earnings before interest, taxes, depreciation, and amortization), and operating cash flow. In addition, we identify and leverage opportunities as part of our regular business operations and through our daily observation of internal processes and markets.

Investment opportunities are primarily evaluated and prioritized using metrics such as net present value, internal rate of return, return on capital employed (ROCE), and the payback period of the investment. These indicators are used to assess the potential of investment projects and prioritize them accordingly. Similarly, scenarios are used to simulate the impact of possible fluctuations and changes in the respective parameters on results.

Business-related risks and opportunities

Political and regulatory risks and opportunities

As a global corporate group, we face political and regulatory changes in a large number of countries and markets.

Risk of more restrictive regulatory requirements regarding drug pricing and reimbursement as well as pricing-related opportunities

Our business is affected by numerous regulations that are continuously changing – and could even become more stringent. For example, in the Healthcare business sector, the known trend towards increasingly restrictive requirements in terms of drug pricing, reimbursement, and the expansion of rebate groups is continuing. With globally rising healthcare expenditures, both in absolute amounts and relative to GDP, healthcare budgets around the globe face increasing pressure. Specifically, in the United States, a pricing reform on prescription drugs is part of the agenda of the current administration. These requirements can negatively influence the profitability of our products, as can market referencing between countries, and the success of market launches. Foreseeable effects are considered as far as possible in the business sector's plans. Close communication with health and regulatory authorities serves as a preventive measure to avert such risks. The remaining risks beyond the current plans resulting from restrictive regulatory requirements are possible to likely with a moderate to significant impact. While we consider the possibility of resulting price cuts in our forecasts, there is also an opportunity that price pressure from healthcare systems worldwide is less pronounced than expected or materializes at a later point in time versus the base assumption. Additionally, as a global specialty innovator that pursues a focused leadership approach in attractive therapeutic areas, we are positioned to benefit from attractive pricing schemes for demonstrated major therapeutic improvements.

Risk of stricter regulations for the manufacturing, testing, and marketing of products

We must adhere to a multitude of regulatory requirements regarding the manufacturing, testing and marketing of many of our products. Specifically, in the European Union, we are subject to the EU chemicals regulation REACH. Similar regulations are emerging globally in relevant markets, particularly in Asia. These regulations demand comprehensive tests for chemicals. Moreover, the use of chemicals, such as per- and polyfluorinated alkyl substances (PFAS), in production and final products could be restricted, which would negatively impact the ability to manufacture and market certain products. With the EU Chemicals Strategy for Sustainability, an initiative of the European Green Deal, we expect increasing demands concerning the substitution of specific hazardous substances. We are constantly pursuing research and development (R&D) in substance characterization and the possible substitution of critical substances so as to mitigate this risk. Nevertheless, risks of stricter regulations are classified as possible to likely with moderate to significant impacts.

Risk of negative political and macroeconomic developments

The current political and macroeconomic situation, characterized by high uncertainty and volatile global developments, is a strategic factor for us as potential negative developments can also impact our businesses. The ongoing general trend of bloc building and reshoring of critical supplies and processes is leading to a further increase in the establishment of trade barriers and the general weaponization of trade to assert interests. While the global economy continues to gradually recover from the aftermath of the Covid-19 pandemic and Russia's invasion of Ukraine, the increased threat from armed conflicts including the resurgent conflict in the Middle East as well as the tensions between the United States and China could lead to further sanctions and economic measures that harm global trade and affect bilateral and multilateral relationships. For example, multiple countries have already implemented measures to restrict the export and transfer of technology to China, particularly in relation to advanced chips that could be utilized for AI, quantum computing and military applications.

These risks can have a negative impact on our supply chains and sales in our key countries and regions. Such risks are considered as fully as possible in the business plans of the affected countries and regions, and are mitigated through product, industry and regional diversification as well as measures to ensure resilience of supply chains and networks. For instance, in the Electronics business sector, a strong local presence in China enables us to remain competitive in the country while our global footprint could provide opportunities to capture

the demand shifting from Asia to other geographies (i.e. the United States and Europe). Also, given the considerable investments of several countries in the domestic chip industry (e.g. the U.S. Chips Act, EU Chips acts) to establish local supply of this critical component. Besides that, strategic geopolitical risk management is in place at the Group and business sector levels to continuously monitor and assess the global developments and to prepare Merck holistically for foreseeable risks.

Global economic growth is projected to slow down with growing regional divergences. Weak economic growth or even a recession could lead to less government spending or other cost-containment policies. Global inflation declined gradually in 2023, but remained significantly above target levels, keeping costs at an elevated level which could negatively impact our business. Persistently high inflation could increase our operating expenses (e.g. raw materials, operating costs and logistics) as well as capital expenditures. It could also prompt central banks to increase interest rates further and curb fiscal policy for some economies. In the course of 2022 and 2023, the European Central Bank as well as the U.S. Federal Reserve increased key interest rates significantly, which may affect our refinancing costs. Financial markets remain volatile, which could have numerous potential impacts.

The net risks of negative geopolitical and macroeconomic developments are seen as possible and might have significant to critical effects. However, our assumptions on geopolitical developments exclude extreme scenarios with severe escalation of tensions. The materialization of such scenarios would jeopardize entire industries and the balance of geopolitical and economic structures, posing a substantial challenge for us, as for any other company.

Further details on the macroeconomic development can be found under "**Macroeconomic and Sector-Specific Environment**".

Market risks and opportunities

We compete with numerous companies in the pharmaceutical, chemical, and life science sectors. Rising competitive pressure can have a significant impact on the quantities that can be sold and prices attainable for our products.

Risks and Opportunities in Life Science

The portfolio of our Process Solutions business unit encompasses a broad range of pharmaceutical development and manufacturing solutions, including filtration devices, chromatography resins, single-use assemblies and systems as well as processing chemicals and excipients. We have strategically positioned ourselves to capture numerous opportunities from the industry's shift towards biologics, coupled with the growing demand for bioproduction driven by many drug candidates and more regulatory approvals. In addition, we are well-prepared to benefit from our customers' investments in expanding bioreactor capacity. Our commitment to innovation and our customer-focused approach positions us to advance the field of biomanufacturing.

The growing use of biologics is creating a need for more efficient and higher-yield manufacturing processes. This represents an opportunity for us to enable continuous and intensified processing through our ongoing innovation in single-use technologies and advancements in bioproduction.

Consequently, faster market growth driven by the aforementioned industry shifts can lead to a more positive development compared with our latest plan.

Our Life Science Services business unit fully integrates Contract Testing, Development, and Manufacturing Organization (CTDMO) services to meet the evolving needs of our global customers across all stages of drug development, from preclinical to commercialization. Our CTDMO services cover a wide range of modalities, including monoclonal antibodies (mAbs), high-potency active pharmaceutical ingredients (HP-APIs), antibody-drug conjugates (ADCs), viral and gene therapies (VGTs), and end-to-end mRNA offerings. We continually invest in expanding our portfolio and production capabilities to offer specialized solutions for both traditional and innovative therapies. This positions us to capitilize on the potential of the growing biopharmaceutical market by providing leading CTDMO services to our customers. Through quicker establishment of model modalities on the market in combination with our broad and integrated portfolio, we can increase the potential beyond the assumptions reflected in our plan.

Our Science & Lab Solutions business unit serves customers in the pharmaceutical and biotech industries and other industries in production, testing and research, as well as public authorities and research institutions. Despite current headwinds – a complex macroeconomic environment, and softer market demand, especially in the United States and China – the business unit is well-positioned to deliver long-term, profitable growth. We aim to offer our customers a streamlined experience and a comprehensive portfolio of offerings to facilitate their research and analytical processes. This includes several customer solutions in the area of innovative digitalization and automation. A faster recovery from the aforementioned macroeconomic adverse development as well as greater commercial success of our innovative digital and automation solutions could imply an increased potential compared to our latest plans.

Further details on the industry, market developments and associated risks, such as the challenging market environment in the life science industry, can be found under "**Risks due to increased competition and customer technology changes as well as related opportunities**" and "**Macroeconomic and Sector-Specific Environment**".

Risks and opportunities in the semiconductor industry

Our Semiconductor Solutions business unit leverages a broad portfolio of independent technologies. This enables us to supply products for all essential production steps of wafer processing, helping our customers to achieve their technology roadmaps.

The underlying semiconductor industry is cyclical by nature. The current downturn has been exacerbated by a post-Covid-19 pandemic recession. The economic weakening has led to a temporary weakness of the traditional industry growth drivers such as PCs, smartphones and traditional data centers, while the new growth drivers such as AI and automotive are still too small to compensate for these effects. The multi-layered macro-economic effects and poor transparency throughout the supply chain cause a certain degree of uncertainty when estimating the timing and shape of the industry recovery. However, it may also imply upsides compared with our plan if the industry recovers faster and stronger than expected. The semiconductor cyclical correction risk is considered as likely with a significant impact.

Irrespective of the current turbulent macroeconomic situation, the positive medium- and long-term growth prospects of our markets remain unchanged. We see long-term growth opportunities in the semiconductor market due to the significantly accelerating global demand for innovative semiconductor materials with potential growth upside beyond the assumptions reflected in our plan, driven by a faster market adaptation and penetration. This demand is driven by exponential data growth and highly impactful technology trends such as autonomous driving, electric vehicles, Internet of Things (IoT) and 5G. We will benefit from the high material requirement of these AI chips and are working with our customers on almost all of these groundbreaking technological innovations in the semiconductor sector. That is why we are investing in our highly attractive growth markets and purposefully expanding production capacities with a smart localization of our footprint to further boost customer proximity and ensure supply stability. Having the right capacity in the right place to bring new products and higher volumes to our customers enables us to stay flexible about the timing of the market upswing and can serve as a competitive advantage.

The aforementioned trends and the continued announcements of major capacity expansions in the industry in the coming years also benefit our DS&S business. With this portfolio of gas and chemical cabinets and the potential to provide our largest customers with turnkey solutions for the delivery of bulk gases in the manufacturing process, we are well positioned to capture upcoming opportunities.

Risks due to increased competition and customer technology changes as well as related opportunities

In the Healthcare business sector, both our biopharmaceutical products and classic pharmaceutical business are exposed to increased competition from other rival products, especially in the form of biosimilars and generics but also in innovative R&D. We compete with other pharmaceutical companies in various therapeutic indications and rely on high quality data to successfully market our products. For this reason, we closely observe our competitive landscape and make assumptions with regard to future competitor entries that pose competition to our products. Due to the uncertainty that is inherent to clinical trials, there is the possibility that competitor trials fail to meet primary endpoints in their studies or deliver inferior data than we initially anticipated. If there

are no new competing products or if our competitors deliver less promising data, this could represent opportunities for us in therapeutic areas in which we are active.

In the Life Science and Electronics business sectors, risks are posed by not only cyclical business fluctuations but also changes in the technologies used or customer sourcing strategies. We use close customer relationships and in-house further developments as well as market proximity, including precise market analyses, as mitigating measures. Overall, the occurrence of these risks is possible to likely and could have a significant impact.

Further details on the industry and market development can be found under "**Macroeconomic and Sector-Specific Environment**", e.g. on the market challenging environment in the life science industry.

Risks and opportunities of research and development

Innovation driven by R&D is a major element of the Group strategy – including fostering innovation at the intersection of our business sectors – and is particularly important in the Healthcare business sector. In regular portfolio management reviews, we continually evaluate and, if necessary, realign research areas and R&D pipeline projects to focus our investments in areas where patient needs are served best. Nevertheless, R&D projects can experience delays, expected budgets can be exceeded, or targets can remain unmet. Sometimes, development projects are discontinued after high levels of investment at a late phase of clinical development. Decisions – such as those relating to the transition to the next clinical phase – are taken with a view to balance risks and opportunities.

In addition to in-house R&D efforts, strategic alliances with external partners and the in- and out-licensing of programs also form part of the catalog of measures to develop innovative medicine and ensure the efficient allocation of resources. Strategic alliances with partners as well as in- and out-licensing transactions always follow a stringent selection process along clear strategic and financial decision criteria. An example of such in-licensing deals is the recently announced partnership with Jiangsu Hengrui Pharmaceuticals Co. Ltd. for a next-generation selective PARP1 (poly (ADP-ribose) polymerase 1) inhibitor and ADC (antibody drug conjugate) which represents a strong strategic fit leveraging our internal DNA damage response expertise and in-house ADC capabilities. This agreement provides the opportunity to advance more therapeutic options for patients with difficult-to-treat cancers. However, in general, there is a possibility that we may not be able to identify a sufficient number of in-licensing assets on financially acceptable terms.

The aforementioned development opportunities are associated with different types of risks. There is the risk that regulatory authorities either do not grant or delay approval or grant only restricted approval. The risk that undesirable side effects of a pharmaceutical product could remain undetected until after approval or registration could result in a restriction of approval or withdrawal from the market. Furthermore, we cannot guarantee that all the assets we are currently developing will achieve the desired commercial success. The failure to meet targets in this area could have significant effects, for example due to lower net sales or the non-occurrence of milestone payments from collaboration agreements. These risks are evaluated with probabilities ranging from possible to likely.

Moreover, in Electronics, we will also continue to invest heavily in R&D in leading-edge material solutions. The aim is to seize growth opportunities arising from the increasing global demand for innovative semiconductors. Promising opportunities for innovation are constantly arising throughout our Semiconductor Solutions business. We work closely with our customers to exploit these. Technology inflection points bring opportunities to our material solutions and the chance to differentiate from competition. We are further developing new dielectric platforms in cooperation with our key customers for 3D NAND applications.

In addition, we see opportunities in organic light-emitting diode (OLED) materials in high-quality display applications. We have been conducting R&D in the area of OLED technology for more than 15 years and have grown into a well-positioned material supplier for OLEDs. Through our semiconductor and display knowledge, we will be able to contribute to the new display devices including foldable displays and Augmented Reality/ Virtual Reality applications, which require a broad set of materials.

More detailed descriptions on our R&D activities worldwide can be found under "**Research and Development**" in "**Fundamental Information about the Group**".

Risks and opportunities related to the quality and availability of products

Opportunities arising from capacity expansion

We make targeted investments worldwide to expand our regional capacities and drive sustainable growth in all three of our business sectors.

During the Covid-19 pandemic, supply chains experienced unprecedented disruption, with customers placing greater emphasis on supply security. In Life Science, we responded to this trend by actively diversifying our global presence by moving to a production network in the region and for the region to increase resiliency and meet the local needs of customers in North America, Europe and Asia-Pacific.

In fiscal 2023, we announced several new investments to expand capacity and product capabilities at facilities around the world. These include investments in biosafety testing, the expansion of our production for highly purified reagents and expanded lab space and production capability to manufacture cell culture media. Having the right capacity in the right place to ensure supply security, to bring new products to the market and to serve higher customer demand offers us the opportunity to capture higher market shares and can serve as a competitive advantage. However, market dynamics naturally influence our expansion activities as well as utilization. We therefore regularly review our expansion plans and adapt them accordingly.

Risks arising from project execution

In today's dynamic business environment, we prioritize innovation and growth. Projects are essential for achieving our strategic objectives, driving expansion, and promoting sustainable development. To effectively support further business growth and enhance efficiency, we continuously invest in projects, such as IT systems, distribution centers, office buildings and other projects. However, project execution involves significant capital expenditures, making effective project management crucial to avoid delays and higher spending. Inadequate planning, execution errors, and ineffective change management can lead to inefficiencies and disruptions, resulting in increased costs and lower sales.

In a rapidly evolving market, there is also a risk of missing out on market growth and development by delaying or deferring investments. To mitigate this risk, we actively monitor industry trends, conduct market research, and maintain a flexible project portfolio. By aligning our investment decisions with market dynamics, we aim to capture opportunities and minimize the risk of being left behind. This is particularly important in industries like semiconductors, where market cycles present substantial risks.

To proactively address project execution risks, we apply well-established project planning and internal control practices, collaborate closely with stakeholders, and conduct regular project reviews through teams and steering committees. This approach enables us to detect risks early on and implement corrective actions or discontinue projects that are unlikely to succeed. Through comprehensive planning, accurate cost estimations and re-evaluations, we monitor costs and ensure efficient resource allocation. Effective project governance and prioritization further contribute to desired project outcomes.

By employing these strategies, we mitigate project execution risks, ensuring successful project delivery, improved efficiency, and alignment with our strategic objectives. Overall, the possible risks could have a moderate to significant impact.

Risk of a temporary ban on products/production facilities or of non-registration of products due to non-compliance with quality standards

We are required to comply with the highest standards of quality in the manufacturing of pharmaceutical products (Good Manufacturing Practice or official pharmacopoeia). In this regard, we are subject to the supervision of the regulatory authorities. Conditions imposed by national regulatory authorities could result in a temporary ban on products/production facilities and possibly affect new registrations with the respective authority. We make the utmost effort to ensure compliance with regulations, regularly perform own internal audits, and carry out external inspections. Thanks to these quality assurance processes, the occurrence of a risk with a significant impact is improbable to possible; however, it cannot be entirely ruled out and depends on the product concerned and the severity of the objection.

Risks of production availability

Further risks include operational failures due to fire or force majeure, for example natural disasters such as floods, droughts or earthquakes, which could lead to a substantial interruption or restriction of business activities. As far as possible and economically viable, the Group limits its damage risks with insurance coverage, the nature and extent of which is constantly adapted to current requirements. Likewise, we are exposed to risks of production outages and the related supply bottlenecks that can be triggered by technical problems in production facilities with very high-capacity utilization. Furthermore, there are risks of supply bottlenecks due to a lack or disappearance of capacity. We work towards continual mitigation of such risks by making regular investments, setting up alternative sourcing options and maintaining sufficient inventory levels.

Although the occurrence of these risks is considered improbable, an individual event could have a critical negative effect.

Risks of dependency on suppliers and opportunities from supply reliability

Merck, like many other market players in other industries, has been exposed in the recent past to unprecedented events such as the Covid-19 pandemic and other geopolitical events. Throughout these challenging times, we have been able to avoid any major supply disruptions for our customers. A significant part of this success is rooted in our efforts to build resilient supply chains over the years with our strategic suppliers and reduce the probability of these risks. These strong and esteemed relationships have enabled Merck to respond to the changes in a difficult environment and adapt to the new circumstances quickly.

For example, the promise of our Healthcare business sector to reliably serve our patients is a top priority for us and requires a strong and resilient supply chain. In 2023, we proved that we could continue to reliably supply our patients with highly needed drugs while competitors in Fertility and Endocrinology ran out of stock. This stock-out situation faced by competitors could continue in the near future and would provide us with opportunities to gain additional market share by serving patient demand.

However, part of our supply chain remains vulnerable to certain events. Therefore, we continue to invest in the improvement of our supply chain, by for example, avoiding single-source situations wherever possible and economically sensible, and by increasing stock levels for essential materials in close collaboration with our suppliers. Through these measures we keep our dependencies on individual partnerships as low as possible within the highly regulatory environment we operate in. Overall, the likely risks might have a moderate to significant impact.

Risks due to product-related crime

As a leading global science and technology company and manufacturer of innovative products of the highest quality, we are exposed to various security- and crime-related risks. Due to the complexity of international trade and global supply chains, our products are at risk of being counterfeited, stolen, illegally diverted and misused. If left unaddressed, this would not only lead to financial loss, reputational damage and business disruption, but also compromise patient and customer safety. Consequently, we have implemented technical, operational and procedural measures aimed at protecting the integrity of our products and supply chains, while also ensuring that new threats are identified and managed appropriately.

Overall, the threat resulting from product-related crime is likely with a moderate impact.

Risks from the use of social media

We and our employees are active on numerous social media platforms. The consistent and legally compliant use of such platforms and their content is important in terms of increasing awareness of our brand, among other things. We take all necessary precautions and have implemented processes to ensure awareness regarding the proper handling of social media as well as actively manage and control our publications and communication.

Nevertheless, reputational risks could result, for instance through public dialogues on social media. On the qualitative rating scale, we thus rate this risk as significant.

Financial risks and opportunities

As we operate internationally, and due to our presence in the capital markets, we are exposed to various financial risks and opportunities. Above all, these are liquidity and counterparty risks, financial market risks and opportunities, and risks of fluctuations in the market values of operational tangible and intangible assets as well as risks and opportunities from pension obligations.

In the area of financial risks and opportunities, we use an active management strategy to reduce the effects of fluctuations in exchange and interest rates. The management of financial risks and opportunities by using derivatives is regulated through extensive guidelines. Speculation is prohibited, and derivative transactions are subject to constant risk controls. The strict separation of functions between trading, settlement, and control functions is ensured.

Liquidity risks

To ensure continued existence, we must be able to fulfill our commitments arising from operating and financial activities at any time. Therefore, to reduce potential liquidity risks, we have a central Group-wide liquidity management system in place, and a balanced maturity profile. The maturities of our financial liabilities are aligned with our planned free cash flow. Furthermore, we have a syndicated loan facility of € 2.5 billion with a term until 2028, which ensures continuing solvency if any liquidity bottlenecks occur. As our loan agreements do not contain any financial covenants, these agreed lines of credit can be accessed even if Merck's credit rating should deteriorate. Additionally, we have a commercial paper program with a maximum volume of € 2.5 billion.

Counterparty risks

Counterparty risks arise from the potential default by a partner in connection with financial investments, loans, and financing commitments on the one hand and receivables in operating business on the other.

As for counterparty risks from financial transactions, we review all central positions relating to trading partners and their credit ratings daily. We manage financial risks of default by diversifying our financial positions and through the related active management of our trading partners. Significant financial transactions involving credit risk are entered into with banks and industrial companies that have a good credit rating. Moreover, our large banking syndicate – the renewed syndicated loan facility of € 2.5 billion was syndicated among 15 banks in 2023 – reduces possible losses in the event of default.

The solvency and operational development of trading partners are regularly reviewed as part of the management of operational counterparty risks. Sovereign risks are also analyzed. The volume of receivables of each customer is capped in line with their credit ratings. Risk-mitigating measures, such as credit insurance, are utilized as appropriate. Nevertheless, defaults by isolated trading partners, even those with outstanding credit ratings, cannot be entirely ruled out, although rated as unlikely.

Counterparty risks are classified as possible risks and might have moderate effects.

Financial market risks and opportunities

As a result of our international business activities and global corporate structure, we are exposed to risks and opportunities from fluctuations in exchange rates. These result from financial transactions, operating receivables, and liabilities as well as future cash flows from sales and costs in foreign currency. We use derivatives to manage and reduce these risks and opportunities (further information can be found under "**Derivative financial instruments**" in the "**Notes to the Consolidated Financial Statements**"). Foreign exchange rate risks are rated as possible with a significant effect on EBITDA pre or operating cash flow.

Variable interest and current financial liabilities are exposed to the risks and opportunities of interest rate fluctuations. Interest rate risks have a negative impact, are considered possible, and pose a minor negative risk overall.

Risks of impairment of balance sheet items

The carrying amounts of individual balance sheet items are subject to the risk of changing market and business conditions and thus to changes in fair values as well. Necessary impairments could have a significant negative non-cash impact on earnings and affect the accounting ratios. This applies specifically to the high level of intangible assets including goodwill, which mainly derive from the purchase price allocations made in connection with past acquisitions (further information can be found under "**Goodwill**" and "**Other intangible assets**" in the "**Notes to the Consolidated Financial Statements**"). This qualitative risk might have a significant effect on reputation.

Risks and opportunities from pension obligations

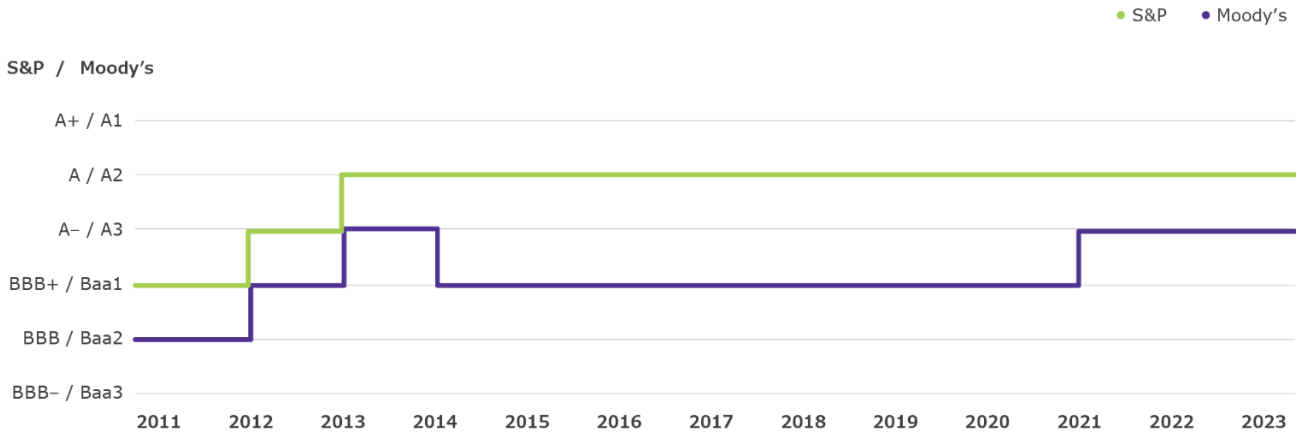
We have commitments in connection with pension obligations. The present value of defined benefit obligations can be significantly increased or reduced by changes in the relevant valuation parameters, for example the interest rate or future salary increases. Pension obligations are regularly assessed as part of annual actuarial reports. The obligations are covered by the pension provisions reported in the balance sheet based on the assumptions as of the balance sheet date. Some of these obligations are funded by plan assets (further information can be found under "**Provisions for pensions and other post-employment benefits**" in the "**Notes to the Consolidated Financial Statements**").

To the extent that pension obligations are covered by plan assets consisting of interest-bearing securities, shares, real estate, and other financial assets, decreasing or negative returns on these assets can adversely affect the fair value of plan assets and thus result in further additions to pension provisions. By contrast, rising returns increase the value of plan assets, thereby resulting in excess cover of plan liabilities. We increase the opportunities of fluctuations in the market value of plan assets on the one hand and reduce the risks on the other by using a diversified investment strategy. The possible risk due to pension obligations could have minor effects.

Assessment by independent rating agencies

The capital market uses the assessments published by rating agencies to help lenders assess the risks of financial instruments used by Merck. We are currently rated by Standard & Poor's and Moody's. Standard & Poor's has issued a long-term credit rating of A with a stable outlook and Moody's a rating of A3 with a stable outlook. In line with market procedures, our financing conditions are closely tied to our rating. The better the rating, the more favorably we can generally raise funds on the capital market or from banks.

Overview of Rating Development



Risks due to the divestment, acquisition and integration of companies and businesses

Successfully acquiring and subsequently integrating new businesses entails risks. These are primarily centered around the uncertainty of achieving business targets and synergy goals as well as remaining within the planned integration budget. Divestments, on the other hand, could lead to liabilities and additional expenses related to potential indemnifications and commitments guaranteed in the sale transaction. We leverage our solid acquisition track record to reduce the probability of any transaction-associated risks by integrating lessons learned from past transactions, strong due diligence, and closely managed integration processes. Currently, we are not aware of any significant risks in this area.

Tax risks

Merck and its subsidiaries operate worldwide and are consequently subject to different national tax laws and regulations. National tax audits of our entities are conducted on an ongoing basis by the tax authorities of the respective countries in which we operate. Tax risks originate particularly from the changes in national tax laws and regulations, and case laws and interpretations by national tax authorities as well as from significant transactions such as acquisitions, divestments and reorganizations.

Findings of the national audit authorities of the various countries may lead to higher tax expenses and payments and may also have an impact on the amount of tax receivables, and tax liabilities as well as on deferred tax assets and liabilities.

The tax function at Merck regularly and systematically assesses the relevant tax risks. Appropriate standards are put in place to identify tax risks at an early stage in order to review, assess and mitigate them effectively and efficiently. Group Tax coordinates mitigation measures with the subsidiaries. Risks in addition to those already accounted for in the balance sheet are classified as improbable to possible with moderate to significant impact.

Information on the accounting and measurement policies for income taxes can be found under "**Income tax**" in the "**Notes to the Consolidated Financial Statements**".

Legal risks

Generally, we strive to minimize and control our legal risks. To this end, we have taken the necessary precautions to identify threats and defend our rights where necessary. Nevertheless, we are still exposed to risks from litigations or legal proceedings. In particular, these include risks in the areas of product liability, competition and antitrust law, pharmaceutical law, patent law, trademark law, data protection law, tax law, and environmental protection. As a research-based company, we have a valuable portfolio of industrial property rights, patents, and brands that could become the target of attacks and infringements. The outcome of future proceedings or those currently pending is difficult to foresee. For instance, we are currently involved in litigation with Merck & Co. Inc., Rahway, New Jersey (USA) (outside the United States and Canada: MSD), against whom we have filed lawsuits in various countries. This company has also sued us in the United States for trademark infringement, among other things.

Due to long statutes of limitations or in some cases the absence thereof, it is not possible to rule out that we will face third-party claims arising from the same issue despite the conclusion of legal proceedings. Court or official rulings or settlements that we consider as "highly improbable" to "more likely than not" could lead to expenses with a significant to critical impact on our business and earnings. Despite extensive precautionary measures, non-compliance with laws and regulations leading to related consequences can never be completely excluded. In our opinion, the lawsuits described below constitute the most significant legal risks. This should not be seen as an exhaustive list of all legal disputes currently ongoing.

Risks in connection with a settlement agreement concluded by the divested Generics group

Citalopram: In connection with the generics business that was divested in 2007, Merck was accused of breaching EU antitrust law through agreements entered into by its former subsidiary Generics (UK) Ltd., United Kingdom, relating to the antidepressant Citalopram patented by Lundbeck A/S, Denmark. The European Commission imposed a fine in June 2013. Appeals against the decision were unsuccessful. Following the payment of the fine of around € 18 million, British health authorities brought legal claims for damages against Merck and other companies in a mid-triple-digit million-euro amount in fiscal 2023 due to alleged infringements of competition law. In addition, there were further claimants from various other jurisdictions who have not yet quantified their claims. In response to the latest developments in the proceedings, the provision was adjusted as of December 31, 2023, and is now recognized in a high single-digit million-euro amount. A cash outflow within the next twelve months is considered possible.

Product liability risks

Operating in the chemical and pharmaceutical industries, we are exposed to product liability risks. Product liability risks can lead to considerable claims for damages, costs to avert damages, and potentially loss of reputation. In view of this, we have taken out standard liability insurance to mitigate such risks. However, it could be that the insurance coverage available is insufficient for individual cases. Although the occurrence of product liability claims in excess of the existing insurance coverage is considered improbable, individual cases could still have a critical effect.

Human resources risks

Our future growth is highly dependent on our innovative strength. Therefore, the expertise and engagement of employees in all business sectors in which we operate are crucial to our success. The markets relevant to the company are characterized by intense competition to recruit qualified specialists and talents, and by the challenge of being perceived by the public as an attractive employer. Fluctuation risks specific to countries and industries have to be identified ahead of time and specifically addressed in order to keep the skills and expertise critical to success and business within the company.

Recruiting as well as retaining specialists and talent are therefore key priorities for the company and are managed through the targeted use of, for instance, employer branding initiatives, global talent, and succession management processes as well as competitive compensation packages. Nevertheless, employee-related risks that affect business activities are possible; even though their impact is difficult to assess we evaluated a potential impact on the qualitative rating scale as moderate.

Information technology risks

We use a variety of IT systems and processes to optimally support our globalization. Trends in information technology offer various opportunities but also harbor risks.

Risks due to cybercrime and the failure of business-critical applications

Increasing international networking and the related possibility of IT system abuse are resulting in cybercrime risks for us, such as the failure of central IT systems, the loss of the data integrity or the disclosure of confidential data from R&D as well as business activities, the manipulation of IT systems in process control, or an increased burden or adverse impact on IT systems as a result of virus attacks.

We maintain and operate an information protection management system based on ISO 27001. Our governance framework contains organizational, process-related, and technical information security countermeasures based on recognized international standards. In addition, we employ 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.

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 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 consists of internal audits.

Globally used IT applications form the basis for the contractual delivery of products and solutions. The failure of business-critical IT applications could therefore have a direct influence on our ability to deliver and on the quality of our products. This also applies to the failure of a data center. To achieve the required service quality, we use a quality management system certified to ISO 9001 that also applies to the provision of IT. In addition, to reduce the risk of failure, we operate several redundantly designed data centers. Furthermore, insurance solutions for cybercrime offenses are in place at Group level.

Likewise, complications with the changeover of IT systems could negatively impact the earnings situation. Close monitoring of critical IT projects serves to mitigate this risk.

Despite the mitigation measures applied and functional continuity plans, the effects of cybercrime or the failure of business-critical IT applications and their influence on EBITDA pre and operating cash flow are considered to be possible and with a significant impact.

Environmental, climate-related, and safety risks

Risks arising from environment, climate as well as plant and equipment

As a company with global production operations, we are exposed to risks of possible damage to personnel, goods and our reputation. These include physical risks stemming from exposure to droughts, storms, and floods. Mitigation measures such as audits, consultations and trainings on environmental protection, occupational health and safety minimize these risks to people as well as the environment. In order to ensure the continuity of plant and equipment, we monitor these risks both at our own sites as well as at suppliers and contract manufacturers. By adhering to high technical standards, our rules of conduct, and all legal requirements in environmental protection as well as occupational health and safety, we ensure the preservation of goods and assets.

We have taken sufficient appropriate accounting measures for the environmental risks known to us. We monitor regulatory risks in connection with the transition to a low-carbon economy, which could materialize in the mid- and long-term through rising carbon prices through emissions trading systems, taxes or energy legislation. We mitigate those risks with our energy and CO_2 management measures. Mainly, we classify these as possible risks with moderate impacts. However, a critical impact on EBITDA pre or operating cash flow cannot fully be ruled out.

Risks due to climate change

In 2022, we performed a qualitative climate risk and vulnerability assessment to identify transitional and physical climate-related risks that are material to our activities. In 2023, in accordance with TCFD recommendations, we conducted a quantitative climate scenario analysis to identify climate-related risks and opportunities. Consequently, we conducted an evaluation in relation to impacts of transition risks and the exposure related to physical hazards.

During this assessment, we utilized two climate pathways (1.5°C and 4°C) considering different time horizons (2030 and 2050) to identify climate-related risks and opportunities. Based on our findings, we determined the potential effects of physical risks on our key sites and evaluated the impact of transitional risks on our business.

In line with our ongoing dedication to risk mitigation, we continuously develop innovative and sustainable approaches. As a result, we foresee no significant deviations from our expectations regarding impacts on EBITDA pre or operating cash flow.

For further details on climate-related risks, please see "**Increased uncertainty due to climate risks**" in the "**Notes to the Consolidated Financial Statements**".

Overall view of the risk and opportunity situation and management assessment

The most significant individual risks or risk clusters have been outlined in this report, with business- and market-related risks being the most significant alongside IT and legal risks. Of particular significance are the still ongoing global macroeconomic and geopolitical developments, increasing existing risks related to more restrictive regulatory requirements regarding drug pricing and reimbursement, the demand for our products, business interruptions at our production sites, lack of availability of good quality materials or services, and risks related to R&D.

By implementing risk mitigation measures such as continually improving management actions (organizational responsibilities and process improvements), utilizing existing insurance coverage, and taking accounting precautions, we have successfully taken counteraction, particularly against significant individual risks.

The overall risk of the Group, which is derived from the probability-weighted aggregation of the identified risks, leads to the assessment that an existence-threatening risk-scenario, for which coverage and financing of the losses are questionable, is improbable. We are convinced that we will also successfully manage the aforementioned challenges in the future and benefit from diversification through our different products and markets.

Based on our assessment, we believe that the most promising opportunities arise from business-related opportunities. The activities described hold significant opportunities for us in the medium to long term, beyond the forecast period. We actively pursue the opportunities that arise and specify their expected effects in the forecast development of EBITDA pre and operating cash flow. Additionally, we proactively seek out new opportunities, assess their feasibility, and drive them forward where appropriate. If opportunities arise in addition to the forecast developments, or these occur more quickly than anticipated, this could have positive effects on our EBITDA pre or operating cash flow.

Report on Expected Developments

The following report provides a forecast for the development of net sales and EBITDA pre for the Merck Group and the individual business sectors Life Science, Healthcare and Electronics as well as a forecast for Group operating cash flow in 2024.

€ million	Net Sales	EBITDA pre[1]	Operating cash flow
Merck Group	• Slight to moderate organic growth • Negative foreign exchange effect 0% to -3%	• Slight to moderate organic growth • Negative foreign exchange effect -1% to -4%	• Moderate to strong growth
Life Science	• Slight organic decline to slight organic growth • About stable to slightly negative foreign exchange effect	• Moderate organic decline to slight organic growth • About stable to slightly negative foreign exchange effect	
Healthcare	• Moderate to solid organic growth • About stable to moderate negative foreign exchange effect	• Organic growth in the low teens percentage range • Slight to significant negative foreign exchange effect	
Electronics	• About stable organic development to moderate organic growth • About stable to slightly negative foreign exchange effect	• Moderate organic decline to moderate organic growth • About stable to moderate negative foreign exchange effect	
Corporate and Other		• Rise in costs due to lower currency hedging gains	

[1] Not defined by International Financial Reporting Standards (IFRS); EBITDA corresponds to operating result (EBIT) adjusted by depreciation, amortization, impairment losses, and reversals of impairment losses.

Fundamental assumptions

Against the backdrop of the ongoing highly dynamic development of macroeconomic, geopolitical and industry-specific conditions, the forecast is also subject to greater uncertainty and volatility in fiscal 2024 than is normally the case. In terms of expected inflation, we assume a slow normalization.

We also expect a persistently volatile environment as regards the development of foreign exchange rates. For 2024, we forecast an unfavorable foreign exchange development, albeit to a weaker extent than in fiscal 2023. The negative foreign exchange effects are expected to be primarily attributable to the development of the U.S. dollar as well as individual Asian currencies. For the average euro/U.S. dollar exchange rate, our full-year assumption ranges between 1.07 and 1.11 for 2024.

Net sales

For fiscal 2024, we expect to return to organic sales growth, which is likely to be slight to moderate. The Healthcare business sector is expected to be the strongest growth driver, with Mavenclad® and products from the Cardiovascular, Metabolism & Endocrinology franchise making the main contributions to growth. For Life Science, we assume that sales in the first half of the year will still be influenced by customer destocking of increased inventories and that the expected recovery will thus mainly set in during the second half of 2024. We do not expect any further significant contributions from demand for products in connection with Covid-19 in 2024. In the Electronics business sector, we forecast that the turnaround in the semiconductor materials market will come in the second half of the year, leading as expected to organic sales growth with products from the Semiconductor Materials business. The expected declining Display Solutions business will have a negative impact as will the project business within the Semiconductor Solutions business unit, which, as expected, is subject to stronger fluctuations owing to the dependency on major individual orders. Overall, we forecast foreign exchange effects of 0% to -3% for the Merck Group.

EBITDA pre[3]

For Group EBITDA pre, we also forecast a slight to moderate organic increase, which is expected to be driven primarily by the Healthcare business sector. Apart from the expected sales growth, the termination of the alliance with Pfizer Inc., USA, effective June 30, 2023 and the subsequent regain of the exclusive rights to develop, manufacture and commercialize Bavencio® had a positive effect on EBITDA pre as did lower costs, especially in research and development, as a result of the failure of evobrutinib to meet its primary endpoint as demonstrated by the results of the clinical trials published on December 6, 2023. EBITDA pre of the Life Science business sector is expected to be adversely impacted by negative mix effects, which we will mitigate as far as possible with corresponding cost savings. In the Electronics business sector, a favorable mix effect on sales as well as positive effects from active cost management are expected; however, the sale of a portfolio of licenses and patents in fiscal 2023 will have an opposing effect. The rise in costs in Corporate and Other will be mainly attributable to lower foreign currency hedging gains. The forecast foreign exchange development is likely to lower Group EBITDA pre by between -1% and -4%.

Operating cash flow

The forecast for operating cash flow is generally subject to a higher fluctuation corridor than the forecast for EBITDA pre. We provide an estimate of the development of operating cash flow only for the Group as a whole.

The development of operating cash flow will be in line with the expected positive performance of the operating business. In addition, we expect positive effects from stringent management of working capital. Foreign exchange is expected to have a negative effect. Accordingly, for the Merck Group, we forecast a moderate to strong increase in operating cash flow. As regards the composition of operating cash flow, we refer to the section entitled "**Internal Management System**" in the combined management report as well as the **Consolidated Cash Flow Statement** in the Consolidated Financial Statements.

[3] Not defined by International Financial Reporting Standards (IFRS); EBITDA corresponds to operating result (EBIT) adjusted by depreciation, amortization, impairment losses, and reversals of impairment losses.

Report in Accordance with Section 315a of the German Commercial Code (HGB)

The following information is provided in accordance with section 315a of the German Commercial Code (HGB) in connection with section 289a HGB and the explanatory report pursuant to section 176 (1) sentence 1 of the German Stock Corporation Act (AktG).

As of December 31, 2023, the company's subscribed capital is divided into 129,242,251 no-par value bearer shares plus one registered share. Each share therefore corresponds to € 1.30 of the share capital. The holder of the registered share is E. Merck Beteiligungen KG. It is entitled and obliged to appoint one-third of the members of the Supervisory Board representing the limited liability shareholders. If the holder of the registered share is a general partner, he or she has no such right of appointment. The transfer of the registered share requires the company's approval. The approval is granted at the sole discretion of the personally liable general partner with an equity interest, namely E. Merck KG.

Pursuant to the information on voting rights submitted to us in accordance with the German Securities Trading Act (WpHG), on December 31, 2023, no shareholders owned direct or indirect investments exceeding 10% of the voting rights.

According to the Articles of Association of Merck, the general partners not holding an equity interest who form the Executive Board are admitted by E. Merck KG with the consent of a simple majority of the other general partners. A person may be a general partner not holding an equity interest only if he or she is also a general partner of E. Merck KG. In addition, at the proposal of E. Merck KG and with the approval of all general partners not holding an equity interest, further persons who are not general partners not holding an equity interest may be appointed to the Executive Board.

The Articles of Association can be amended by a resolution at the Annual Meeting that requires the approval of the general partners. Notwithstanding any statutory provisions to the contrary, the resolutions of the Annual General Meeting are adopted by a simple majority of the votes cast. Where the law requires a capital majority in addition to the voting majority, resolutions are adopted by a simple majority of the share capital represented in the vote. The Articles of Association of the company encompass authorized and contingent capital.

The Executive Board is authorized to increase the company's share capital with the approval of the Supervisory Board and of E. Merck KG on one or more occasions, up to and including April 21, 2027, by a total of up to € 56,521,124.19 by issuing new no-par value bearer shares in exchange for cash and/or non-cash contributions (Authorized Capital 2022). Limited liability shareholders are generally granted statutory rights to subscribe to the new shares. However, the Executive Board is authorized, with the approval of the Supervisory Board, to exclude limited liability shareholders' subscription rights, either in full or in part, in the case of a capital increase in exchange for cash contributions pursuant to or by analogous application of section 186 (3) sentence 4 AktG, if the issue price of the new shares is not substantially lower than the stock exchange price of the company's shares already listed and if the new shares issued under exclusion of these subscription rights do not exceed a proportional amount of 10% of the share capital either at the time of Authorized Capital 2022 taking effect or being utilized.

This restriction to 10% of the share capital shall include the proportional amount of the share capital that is attributable to shares that are issued under exclusion of subscription rights or sold during the term of Authorized Capital 2022, based on an authorization to issue new shares or sell own shares by direct or analogous application of section 186 (3) sentence 4 AktG. This restriction shall also include the proportional amount of the share capital that is attributable to shares which may or must be issued in order to service bonds carrying a conversion or option right or a conversion or option obligation, if the bonds are issued during the term of Authorized Capital 2022 under exclusion of limited liability shareholders' subscription rights by analogous application of section 186 (3) sentence 4 AktG.

It is likewise possible to exclude the subscription rights of limited liability shareholders with the approval of the Supervisory Board in the case of capital increases in exchange for non-cash contributions, particularly for the purpose of acquiring enterprises, parts of enterprises, or interests in enterprises. In addition, with the approval of the Supervisory Board, limited liability shareholders' subscription rights can be excluded in order to enable E. Merck KG to exercise its right pursuant to article 32 (3) of the company's Articles of Association to participate in a capital increase by issuing shares or freely transferable share subscription rights.

It is likewise possible to exclude, with the approval of the Supervisory Board, the subscription rights of limited liability shareholders in order to enable E. Merck KG to exercise its right pursuant to article 33 of the Articles of Association to convert its equity interest into share capital, either in full or in part.

Moreover, with the approval of the Supervisory Board, the subscription rights of limited liability shareholders can be excluded if and to the extent this is necessary to grant the holders or creditors of conversion or option rights, and/or the holders or creditors of financing instruments carrying conversion or option obligations, which were or are issued by the company or by a domestic or foreign company in which the company directly or indirectly holds the majority of the votes and capital, subscription rights to the extent to which they would be entitled after the exercise of the conversion or option rights or after the performance of a conversion or option obligation.

Finally, with the approval of the Supervisory Board, the subscription rights of limited liability shareholders can be excluded in order to offset any fractional amounts resulting from a capital increase.

The sum of shares issued on the basis of Authorized Capital 2022 under exclusion of limited liability shareholders' subscription rights must not exceed a proportional amount of 10% of the share capital, taking into account other shares of the company which, during the term of Authorized Capital 2022, are sold or issued under exclusion of subscription rights or which are to be issued under bonds issued after April 22, 2022, under exclusion of subscription rights; this limitation shall apply both at the time of this authorization taking effect and at the time of this authorization being exercised.

To the extent that subscription rights are not excluded under the above provisions, they may also be granted to limited liability shareholders by way of indirect subscription rights pursuant to section 186 (5) AktG or, in part, by way of direct subscription rights, and otherwise by way of indirect subscription rights pursuant to section 186 (5) AktG. Furthermore, the Executive Board is authorized, with the approval of the Supervisory Board, to determine the additional details of the capital increase and its implementation, including the content of rights attached to the shares as well as the terms and conditions of the share issue.

The Articles of Association also encompass contingent capital. The share capital is contingently increased by up to € 66,406,298.40 composed of 51,081,768 shares (Contingent Capital I). The contingent capital increase serves to grant exchange rights to E. Merck KG in accordance with article 33 of the Articles of Association to enable the conversion of its equity interest. The shares carry dividend rights from the beginning of the fiscal year following the year in which the conversion option is exercised.

Moreover, the share capital is contingently increased by up to € 16,801,491.20 composed of up to 12,924,224 no par value bearer shares (Contingent Capital II). This contingent capital increase is only to be implemented insofar as the bearers or creditors of option or conversion rights, or with an obligation to convert or exercise options on warrant bonds, option participation certificates, option participation bonds, convertible bonds, convertible participation certificates, or convertible participation bonds that are issued or guaranteed by the company or a subordinate Group company on the basis of the authorization resolution of the Annual General Meeting of April 28, 2023, to April 27, 2028, utilize their option or conversion rights, or to fulfill their conversion obligation or obligation to exercise options insofar as they are obliged to fulfill their conversion or option exercise obligation, or insofar as the company exercises an option, in full or in part, to grant shares in the company instead of paying the sum of money due, and to the extent that in each case a cash settlement is not granted, or own shares or other forms of fulfillment are used. Each issue of new shares shall take place at the determined option or conversion price, pursuant to the aforementioned authorization resolution. The new shares participate in the profit from the beginning of the fiscal year in which they are created; insofar as this is legally permissible, the Executive Board may, with the approval of the Supervisory Board, and in deviation from section 60 (2) AktG, stipulate that the new shares also participate in the profit for a past fiscal year. The Executive Board is authorized, with the approval of the Supervisory Board and of E. Merck KG, to stipulate the further details of the implementation of the increase in contingent capital.

The company is not authorized to acquire its own shares.

The company has not entered into any material agreements subject to a change of control pursuant to a takeover offer, nor has it entered into any compensation agreements with the members of the Executive Board or employees in the event of a takeover offer.

Non-financial statement**

The combined management report of Merck KGaA and the Merck Group for the fiscal year 2023 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 scope of consolidation of this non-financial statement corresponds to that of the Annual Report for 2023. The concepts and results presented relate to both Merck KGaA and the Merck Group. We explicitly state when, in individual cases, the information provided deviates from this. Our non-financial statement orients towards the requirements of the Global Reporting Initiative (GRI) standards. It also includes our reporting in accordance with the EU taxonomy regulation.

Deloitte GmbH Wirtschaftsprüfungsgesellschaft conducted a **limited assurance engagement** of the combined non-financial statement. References to information not included in the management report are not part of the non-financial statement. The additional content provided on both the company's websites as well as external websites that are linked in this report are not part of the information assured by Deloitte. Our Sustainability Report 2023 is produced in accordance with GRI Standards. It will be available **online** as of April 11, 2024 and will also be subject to a separate limited assurance engagement by Deloitte. With this, we also disclose topics set forth by the Sustainability Accounting Standards Board (SASB) and the Task Force on Climate-related Financial Disclosures (TCFD).

Description of our business model

Our business model as well as our Group structure, governance and strategy are described under "**Fundamental Information about the Group**".

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 have integrated these requirements 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 compliance with the pertinent chemical and product safety regulations.

We endeavor to 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.

** The summarized non-financial statement was not subject to a content review as part of the audit of the financial statements but was subject to a separate limited assurance audit by Deloitte.

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 employ management systems to steer processes and 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 are conducted by an independent auditing firm. We hold group certificates for both standards.

We support the following responsible governance initiatives:

- United Nations **Global Compact**,
- Chemical industry's **Responsible Care® Global Charter**,
- Company network Together for Sustainability (**TfS**),
- Pharmaceutical Supply Chain Initiative (**PSCI**),
- **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**).

Strategic and organizational approach to sustainability

The world is facing numerous challenges that also affect us as a company. 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.

We pursue three overarching sustainability goals. In 2023, we revised our sustainability strategy, which we had communicated in 2020. In particular, we sharpened the second goal.

- In 2030, we will achieve human progress for more than one billion people through sustainable science and technology.
- By 2030, we will fully integrate sustainability into our value chains.
- By 2040, we will achieve climate neutrality and reduce our resource consumption.

We describe our sustainability strategy in the "**Strategy**" section of the combined management report within this Annual Report for 2023 and, in more detail, in the Sustainability Report for 2023 in the chapter entitled "**Sustainability Strategy**".

Measuring progress made with the sustainability strategy

We use 14 key indicators to record and assess our progress towards achieving our sustainability goals. We defined these indicators back in 2021 and did not identify any significant non-financial performance indicators. The key indicator "Percentage of employees trained in sustainability" was dropped in 2023 because we had achieved the associated target. Instead, as of 2023, we began using several questions in our annual Employee Engagement Survey to measure how mature the sustainability culture is within our organization.

Moreover, our annual Long-Term Incentive Plan (LTIP) for Executive Board members and senior executives contains a sustainability factor. We use it to measure performance over a period of three years based on selected key indicators for each of our three sustainability goals. Consequently, target achievement based on the key financial performance indicators can increase or decrease by up to 20%. Details on how this sustainability factor is calculated can be found in the "**Compensation Report**", which is subject to both a formal audit and a separate content audit performed by Deloitte. In 2023 and for the first time, the company tied 15% of variable employee compensation to sustainability parameters. Details on this can be found under "**Sustainable innovation and technology**" within this non-financial statement.

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 indicator	Further details
Sustainability innovation and technologies	• Percentage of newly published patent families with positive sustainability impact	**Sustainable innovation and technology**
Impact of our products on health and wellbeing	• People treated with our Healthcare products and pharma products enabled by our Life Science business sector[1]	Will be published in the SASB index within the Sustainability Report 2023 as of April 11, 2024

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

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

Focus area	Sustainability key indicator	Further details
Sustainability in our ways of working & decision making	• Result of the employee engagement survey on sustainability culture[2]	**Attracting and retaining talent**
Our people and communities; providing a diverse and inclusive environment	• Percentage of women in leadership positions	**Diversity, equity and inclusion**
	• Environment, Health and Safety (EHS) Incident Rate	**Plant, process and transport safety**
	• Lost Time Injury Rate (LTIR)	**Health and safety**
Sustainable and transparent supply chain	• Percentage of relevant suppliers (in terms of number and supplier spend) that are covered by a valid sustainability assessment[1]	**Responsible supply chain**
	• Violations of Global Social and Labor Standards Policy	**Human rights**

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

[2] The key indicator "Percentage of employees trained on sustainability" is no longer applicable in 2023, as the target was achieved.

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

Focus area	Sustainability key indicator	Further details
Climate change and emissions	• Greenhouse gas emissions (Scope 1+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[2]	Will be published in the Sustainability Report 2023 as of April 11, 2024
	• Water Intensity Score[2]	**Water management**
	• Wastewater quality	Will be published in the Sustainability Report 2023 as of April 11, 2024

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

[2] A new key figure will replace this key figure from the 2024 reporting year.

Roles and responsibilities

Our Executive Board has Group-wide responsibility for our sustainability strategy. It has adopted our three strategic goals (details can be found under "**Strategy**").

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. At Executive Board level, 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, which is chaired by the Head of SQ, who simultaneously serves as Chief Sustainability Officer. The committee consists of representatives from our business sectors and from key Group functions, such as Procurement, Communications and Controlling.

The Sustainability Board steers and monitors the Group-wide implementation of the sustainability strategy, defines priorities and stipulates globally applicable sustainability policies. 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 2023, the Sustainability Board met 11 times by video conference. In addition to climate-related issues and new sustainability reporting requirements, it also addressed the adaptation of the strategy and new objectives for circular economy and water management.

The Merck Sustainability Advisory Panel (MSAP) supports our company as an external expert committee for sustainability. The panel is chaired by the Head of SQ. It comprises independent experts on sustainability-related topics from various institutions worldwide whom we invite on an ad hoc basis. The MSAP advises our company on selected issues and assesses planned activities. Moreover, the members apply their knowledge to help address societal and political challenges and developments that could be strategically relevant for our businesses.

Topics for the non-financial statement

Pursuant to section 289c (3) and section 315c (2) of the German Commercial Code (HGB), we are obligated to review topics for their double materiality. The principle of double materiality requires companies to disclose non-financial information as soon as the following two criteria are met: Firstly, the information makes it possible to understand how the company's activities affect non-financial aspects. And secondly, the information is necessary to understand the course of business, results of operations and economic position of Merck KGaA and the Merck Group. In 2023, we examined the topics identified within the scope of a materiality analysis in accordance with the Global Reporting Initiative standards (GRI) for their double materiality.

The following topics achieved the relevance threshold for double materiality in 2023. They cover fiscal year 2023 and pertain to our entire Group. Any deviations from the reporting framework are indicated on a case-by-case basis.

Aspect	Topic
Environmental matters	• Environmental management • Climate action • Water management • Plant, process and transport safety • Chemical product safety
Employee-related matters	• Attracting and retaining talent • Diversity, equity and inclusion • Health and safety
Social matters	• Responsible supply chain (including the mica supply chain) • Patient safety • Prices of medicines • Clinical studies • Bioethics • Digital ethics • Data protection and cyber security
Respect for human rights	• Human rights
Anti-corruption and anti-bribery	• Governance and compliance (including anti-corruption anti-competitive behavior) • Interactions with health systems (including responsible marketing)
Other topics	• Sustainable innovation and research & development

As part of our approach to comprehensive risk and opportunity management, we also identify current and potential risks and opportunities resulting from environmental, social and governance aspects. This includes tracking information on the gross risks in terms of potential damage and probability, as well as the residual net risks remaining after mitigation measures have been executed. As of the reporting date and pursuant to the risk analysis of the material non-financial topics, no significant risks within the meaning of section 289c (3) sentence 1 no. 3 and 4 of the German Commercial Code (HGB) from the company's own business activities or from business relationships are known that are very likely to have or will have serious negative effects on non-financial aspects. Additional risks are described in the "**Report on Risks and Opportunities**" in the combined management report.

Environmental Matters

Environmental protection

Minimizing negative environmental impacts and taking meaningful climate action require a holistic approach while also constantly monitoring practices and performance. Our goal is to decouple business growth from negative environmental impacts wherever possible. Our production sites are located in established industrial and commercial zones. Before acquiring a company – and thus its facilities – we first conduct an environmental risk assessment.

Roles and responsibilities

The Chair of the Executive Board and CEO of our company is responsible for environmental protection, which also covers climate action, water management, waste and recycling, air emissions, biodiversity, and plant and process safety. Her duties include approving overarching Group-wide guidelines such as our Environment, Health and Safety (EHS) Policy. Furthermore, 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 Merck Sustainability Board. Every year, SQ prepares a comprehensive environment, health and safety report covering topics such as climate action, water management and waste and recycling as well as plant and process safety. The Merck Sustainability Board uses this report to steer the strategic direction and provide verification for our ISO 14001 and ISO 45001 certifications.

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

Our commitment: Standards and standard operating procedure

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

Material investments in environmental impact mitigation

Efforts to prevent and monitor air, water and soil emissions entail significant expense on our part, as does proper waste disposal. Moreover, we set up provisions for groundwater and soil remediation to ensure that we can execute all the necessary measures. As of December 31, 2022, our provisions for environmental protection totaled € 149 million (2022: € 148 million), 96% (2022: 94%) of which was attributable to Merck KGaA, Darmstadt, Germany. For details see Notes to the Consolidated Financial Statements under (27) "**Other provisions**".

Assessing environmental impacts

As a matter of principle, we conduct risk-based assessments along with audits of all our production facilities every three years with the goal of analyzing and minimizing our environmental footprint. Conducted by SQ, these assessments serve to ensure that our requirements are being met, with appropriate corrective measures being implemented as needed. In our Group EHS audits, we assess our sites' performance on a five-tier scale ("excellent", "good", "fair", "poor", and "critical"), which in turn determines how frequently audits are conducted. If the findings are deemed to be good, we audit the facility less often, while incompliances can increase the frequency. In 2023, we commissioned a total of 34 audits (2022: 41), one of them "excellent", 23 of them "good" and 10 of them "fair".

Reporting incidents and violations

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

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

In 2023, we recorded no (2022: two) significant incident-related releases of substances.

ISO 14001:2015 Group certificate

Since 2009, our company has held an ISO 14001 Group certificate that requires all production sites with more than 50 employees to implement an environmental management system with predefined indicators such as greenhouse gas emissions and water consumption. Other facilities are not obligated to undergo certification. The annual internal audit reports and management reviews carried out under the Group certificate give us a better overview of how all our sites are performing. As in the previous year, 95 of our sites worldwide were covered by the ISO 14001 certificate in 2023.

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

Climate action

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

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

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

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

Moreover, we aim to reduce our Scope 3 emissions across the entire value chain by 52% compared with 2020 (per euro of gross profit) by 2030. This target was also approved by SBTi.

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

Roles and responsibilities

Corporate Sustainability, Quality and Trade Compliance is responsible for overseeing all climate action efforts throughout the Group, with our individual sites and business sectors worldwide implementing the necessary measures at the local level. More information can be found under "**Environmental protection**".

Our commitment: Standards and legal frameworks

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

Emissions reduced further

In 2023, we reduced our greenhouse gas emissions by nearly 17% compared with the previous year, emitting a total of approximately 1,463,000 metric tons of CO_2 equivalents (CO_2eq) (2022: 1,760,000).

Our direct emissions (Scope 1) totaled 1,236,000 metric tons of CO_2eq (2022: 1,518,000), with process-related emissions accounting for 990.000 metric tons of CO_2eq and fuel use accounting for the remainder. Indirect emissions (Scope 2) totaled roughly 227,000 metric tons of CO_2eq (2022: 242,000) calculated according to the market-based method (approximately 381,000 metric tons of CO_2eq according to the location-based method). Greenhouse gas emission intensity (Scope 1 and 2) amounted to 0.07 Kg of CO_2eq per € of net sales in this period (2022: 0.08).

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

Total greenhouse gas emissions (Scope 1 and 2 of the GHG Protocol)[1,2]

metric kilotons	2020[3]	2021	2022	2023 Merck Group	2023 thereof: Merck KGaA
Total CO_2eq[3] emissions[4]	**2,152**	**1,951**	**1,760**	**1,463**	**22**
thereof:					
direct CO_2eq emissions (Scope 1)[5]	1,827	1,626	1,518	1,236	15
indirect CO_2eq emissions (Scope 2)[6]	325	325	242	227	7
Biogenic CO_2 emissions[7]	**14**	**15**	**14**	**14**	**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] eq = equivalent.

[4] In 2023, we adjusted our Scope 1 and Scope 2 calculations to reflect minor data corrections.

[5] In 2023, we adapted the Scope 1 calculations to the modified global warming potentials of the IPCC 6th assessment report (previously IPCC 5th assessment report) and restated previous years accordingly.

[6] The figures presented here have been calculated in accordance with the market-based method.

[7] We adapted the calculations to the complete Greenhouse Gas Protocol requirements.

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.

Other relevant indirect greenhouse gas emissions (Scope 3 of the GHG Protocol)[1]

	2020	2021	2022	2023
Total gross other indirect emissions (metric kilotons CO_2 equivalents)	**5,103**	**5,799**	**6,680**	**4,594**
Purchased goods & services (category 1)[2]	3,040	3,572	4,200	2,517[3]
Capital goods (Category 2)[2]	293	291	388	340[3]
Fuel- and energy-related emissions, not included in Scope 1 or 2 (category 3)	102	143	121	115
Upstream transportation & distribution (category 4)	264	264[4]	319	236[5]
Waste generated in operations (category 5)	85	79	57[6]	32[6]
Business travel (category 6)	32	26	78	86
Employee commuting (category 7)	90	94	99	76[7]
Upstream leased assets (category 8)[8]	-	-	-	-
Downstream transportation & distribution (category 9)	8	8[4]	6	10[5]
Processing of sold products (category 10)[9]	-	-	-	-
Use of sold products (category 11)[10]	1,164	1,296	1382[11]	1,137
End-of-life treatment of sold products (category 12)	23	23[4]	26[11]	42
Downstream leased assets (category 13)	2	2	2	2
Franchises (category 14)[12]	-	-	-	-
Investments (category 15)	0	1	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 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.

[3] We updated environmentally extended input-output analysis (EEIO) factors, and we adjusted our emission calculation approach for service categories using primary supplier data.

[4] Due to high efforts for data preparation, we reference 2020 data for 2021.

[5] In 2023, we introduced a new and improved calculation methodology based on primary data from suppliers/logistics service providers and an energy-based bottom-up calculation approach.

[6] We adjusted our calculation methodology to remove non-GHG relevant waste streams.

[7] We adjusted our calculation methodology to take into account the results of an internal employee survey on home office use.

[8] Already covered under Scope 1 and 2 emissions.

[9] 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.

[10] In 2023, we adapted the Category 11 calculations to the modified global warming potentials of the IPCC 6th assessment report (previously IPCC 5th assessment report) and restated previous years accordingly.

[11] Due to high efforts for data preparation, we partly use 2020 data for 2022.

[12] 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.

Biogenic emissions (Scope 3), if present, are not being recorded.

Transparency on CO_2 emissions and energy consumption

We report to **CDP** on an annual basis. This organization assesses the ways in which companies are working to lower greenhouse gas emissions and minimize the risks and consequences of climate change, along with their strategy for doing so. Companies are rated from A to D-, with A being the top score. In 2023, we scored A- (2022: B) for climate change.

Energy consumption and renewable energy

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

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

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

Energy consumption[1]

In GWh	2020	2021	2022	2023 Merck Group	2023 thereof: Merck KGaA
Total energy consumption	**2,382**	**2,463**	**2,432**	**2,337**	**78**
Direct energy consumption	**1,269**	**1,321**	**1,294**	**1,245**	**68**
Natural gas	1,182	1,235	1,188	1,164	59
Liquid fossil fuels[2]	52	48	70	43	9
Biomass and self-generated renewable energy	35	38	36	38	0
Indirect energy consumption	**1,113**	**1,142**	**1,138**	**1,092**	**10**
Electricity	950	964	984	982	10
Steam, heat, cold	163	178	154	110	0
Total energy sold	**0.2**	**0.1**	**0.01**	**0.00**	**0.0**
Electricity	0.2	0.1	0.01	0.00	0.0
Steam, heat, cold	0.0	0.0	0.00	0.00	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 and 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.

Water management

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

To this end, we have defined two targets: Firstly, we originally aimed to achieve a 10% reduction in our Merck Water Intensity Score by 2025 compared with the baseline of 2020. In 2023, we met and surpassed this target, successfully lowering the Merck Water Intensity Score by 25% in comparison with the baseline year 2020. Consequently, we have set a new target based on a new and more transparent calculation. By 2030, we strive to achieve a 50% reduction in our water efficiency ratio of water intake per revenues compared with the 2020 baseline. The new target covers the complete water intake of our company. Our 2020 baseline year was chosen to align this new target with other existing environmental goals. Our second objective focuses on mitigating our environmental impact. Specifically, we are committed to reducing potentially harmful residues in our wastewater to levels below the established no-effect threshold.

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

Roles and responsibilities

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

Our commitment: Standards and procedures

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

Our Wastewater Standard defines criteria for assessing our wastewater discharges into ecosystems. It also helps us achieve our targets regarding trace substances in wastewater from our operations. The Water Use Standard sets out mandatory Group-wide requirements for the responsible 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 covers risks such as contaminated rainwater and flooding. We perform internal EHS audits to verify that our sites comply with our three standards. All sites are required to measure and assess the risks and impacts of the hazardous substances in their wastewater. Moreover, they must also analyze withdrawal and wastewater risks and comply with the respective requirements of the local authorities.

Water withdrawals from our own wells and local suppliers

For the most part, we draw water used for our production processes from our own wells and source drinking water from local suppliers. In doing so, we do not want water extraction to impair any protected areas, sensitive ecosystems or habitats. We extract less water from our own wells than the amounts permitted. We simultaneously monitor potential trends that could lead to the reclassification of water sources, which involves assigning heightened levels of protection to specific regions.

The cooling water used in our production processes generally runs in a circular system. Depending on regulatory standards and the energy footprint, we sometimes use freshwater for cooling in a once-through system. However, this is only done in regions with high freshwater availability. For certain applications, we treat production wastewater and reuse it. In 2023, we recycled a total of 20.5 million m^3 of water (2022: 20.7).

Water withdrawal

millions of m^3	2020	2021	2022	2023 Merck Group	2023 Water stress areas
Total water withdrawal	**14.0**	**13.5**	**13.2**	**12.1**	**0.162**
Surface water (rivers, lakes)	1.8	1.9	1.8	1.4	0.002
Groundwater	6.7	6.3	6.3	5.8	0.002
Drinking water (from local suppliers)	5.4	5.2	5.0	4.8	0.156
Rain water and other sources	0.06	0.06	0.06	0.06	0.002

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.

Using water more efficiently

We seek to minimize our impact on water availability in the vicinity of our sites. In 2023, we withdrew 12.1 million m^3 of water in total (2022: 13.2). We assess local conditions to determine whether a sufficient water supply is available. In our water conservation efforts, we pay particular attention to sites in water-scarce areas. To measure how we improve our water efficiency, we have defined the Merck Water Intensity Score, which relates the amount of water either purchased or withdrawn from our own wells at a site to the number of hours worked, taking local water availability into account.

In 2023, we already exceeded our target set for 2025 to lower the Merck Water Intensity Score by 10% (baseline year 2020). Initiatives that helped us reach our original goal include effects from shifts in product mix as well as initiatives such as recycling of wastewater in Rio de Janeiro (Brazil), St. Louis (USA) and Mollet del Valles (Spain).

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

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

Our wastewater

In 2023, we generated a total of 11.1 million m^3 of wastewater (2022: 12.4). This comprised around 7.6 million m^3 of “direct discharge” water (2022: 8.6) into surface waters. 3.4 million m^3 was classified as “indirect discharge” (2022: 3.8) water and treated at external treatment plants.

Wastewater volume

	2020	2021	2022	2023 Merck Group	2023 Water stress areas
Total wastewater volume (millions of m^3)	**13.4**	**13.3**	**12.4**	**11.1**	**0.110**
Wastewater discharged directly	9.2	9.5	8.6	7.6	0.000
Wastewater discharged to third parties	4.1	3.8	3.8	3.4	0.100

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

Assessing our water management practices

In addition to reporting on our climate action efforts, we also report water-related data to the CDP, which collects environmental data from companies once a year and evaluates their processes and performance on a scale from A to D-. As in the previous year, we were awarded a B for our water management practices in 2023.

Plant, process and transport safety

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

Moreover, all our shipments are to reach our customers and sites safely, undamaged and with the required safety information. Several of the materials we store and transport are classified as hazardous. The storage of such dangerous goods and the transport thereof – whether by road, rail, air, or water – are governed by global regulations. To minimize risks to people and the environment, we apply strict safety requirements across the Group that also comply with applicable laws. We conduct regular reviews to ensure our own warehouses as well as those of third parties comply with these regulations.

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.

Our commitment: Internal standards and international rules

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

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

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

Assessing potential risks

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

We use internal EHS audits to complement the inspections conducted by our EHS and dangerous goods managers in order to ensure that our sites comply with process, plant, transport, and storage safety regulations. Normally, these audits are conducted every three years at production sites and every four years at warehouse and distribution sites. If major shortcomings are identified, we re-audit the respective site the following year. Conversely, we may decide to extend the period between audits at facilities where, based on the findings from previous audits, we deem the potential risk to be low. Our sites are required to rectify any deficiencies discovered during the audit, with the auditor subsequently checking whether the specified corrective actions have been taken. In 2023, we conducted 34 EHS audits (2022: 41) in accordance with our Group-wide EHS standards.

Keeping a close eye on safety

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

- Under our EHS Incident Rate (EHS IR), we track and evaluate all major and minor accidents and incidents as well as further EHS-relevant incidents. The EHS IR covers both our own employees as well as those of contractors. To calculate it, we state the number of incidents and the severity of the event in relation to the number of hours worked. The lower the EHS Incident Rate, the safer the site is. In 2023, the ratio was 2.4 (2022: 2.8).
- The EHS IR also contains our Loss of Primary Containment (LoPC) indicator. In 2023, we did not record any significant incident-related releases of substances (2022: two).
- The EHS Leading Rate (EHS LR) reflects the number and the results of the analyses of near misses and hazardous conditions or behaviors, as well as other proactive safety activities such as risk assessments.
- For the **Lost Time Injury Rate (LTIR)** we set ourselves the goal of lowering our Group-wide LTIR to under 1.0 by 2025 (number of accidents Group-wide resulting in at least one missed day of work per million hours worked). In 2023, our LTIR was 1.3 (2022: 1.2).

Chemical product safety

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 pertinent 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.

Roles and responsibilities

Our Life Science, Healthcare and Electronics business sectors have organizational structures in place 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 standard provides a framework for governing the setup of effective operational processes for product safety, hazard communication and chemical 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 standard defines 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**.

Using the Globally Harmonized System for Classification and Labelling of Chemicals (**GHS**) for hazard communication enables us to streamline our internal processes and provide consistent, harmonized and high-quality information to our customers.

In 2023, there was one incident of non-compliance with regulations concerning potential health and safety impacts and the labeling of our chemical products. Some information and the REACH registration number was missing on a safety data sheet which resulted in a fine in Italy. In this regard, to the best of our knowledge, there were no negative impacts on human health or the environment.

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 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 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 the relevant information on hazard profiles, we employ industry-standard digital tools through which we gather information available on the substances we use.

Employee-Related Matters

Attracting and retaining talent

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 2023, we continued to enhance our talent acquisition strategy with a more personal, employee-focused approach. Our talent sourcing approach aims to build inclusive pipelines and effectively recruit diverse talent with the needed competencies and capabilities to our organization. In addition, our talent retention approach is inclusive in targeting various employee groups. In 2023, we intensified our efforts to support internal mobility. For example, we launched a dedicated project to improve organizational agility, up-skilling and re-skilling, retention, and engagement. Specific modules went live in 2023, and we will roll out the complete platform with all functionalities during the course of 2024.

We have designed our compensation structure to provide valuable benefits to our employees and their families. Our benefits offerings recognize the diversity and uniqueness of our employees while providing flexibility wherever possible. Additionally, our international employee mobility programs create an environment suited to the needs of a rapidly evolving workforce.

Total number of employees

As of Dec. 31	2020	2021	2022	**2023 Merck Group[1]**	**2023 thereof: Merck KGaA[2]**
Total number of employees	58,127	60,348	64,243	62,908	3,924
Men	33,204	34,274	36,452	35,499	2,387
Women	24,923	26,074	27,791	27,409	1,537

[1] Our company also employs people at sites of subsidiaries that are not fully consolidated. For the 2023 reporting year, we have aligned the scope of consolidation also for the employee data in the non-financial reporting with the financial reporting. As of now, the figures relate to all employees who are employed in fully consolidated subsidiaries that manage personnel.

[2] The sharp decline in comparison with the previous year (8,485 employees) is attributable to the fact that in addition to Healthcare KGaA, which was hived off in 2019, the two other business sectors, namely Life Science und Electronics, have now also been transferred to separate legal entities.

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)
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**
2023							
Up to 29 years old	8,743	2,233	3,294	535	2,634	440	142
thereof: women	4,150	995	1,521	213	1,323	224	87
30 to 49 years old	38,006	7,352	16,304	2,085	11,218	2,301	831
thereof: women	16,798	3,084	7,565	857	4,562	1,203	384
50 or older	16,159	5,133	8,706	1,304	1,407	717	196
thereof: women	6,461	2,034	3,595	467	472	266	94
Average age	**41.5**	**43.5**	**42.9**	**43.0**	**37.4**	**40.8**	**40.5**
Total employees	**62,908**	**14,718**	**28,304**	**3,924**	**15,259**	**3,458**	**1,169**

Internationality of employees

As of Dec. 31	2020	2021	2022	2023 Merck Group	2023 thereof: Merck KGaA
Number of nationalities	141	142	139	141	70
Number of nationalities in management positions (Role 4 or above)	75	79	78	77	30
% of non-Germans in management positions (Role 4 or above)	66	66	66	66	12

New employees

As of Dec. 31	2020	2021	2022	2023 Merck Group	2023 thereof: Merck KGaA
Total number of new employee hires	**6,669**	**8,960**	**10,682**	**5,490**	**220**
by age group					
up to 29 years old	2,889	3,679	4,314	2,156	170
30 to 49 years old	3,347	4,610	5,397	2,944	45
50 or older	433	671	971	390	5
by gender					
Women	3,016	4,101	4,569	2,493	89
Men	3,653	4,859	6,113	2,997	131
by region					
Europe	2,160	2,567	3,015	2,028	220
North America	1,789	2,855	3,971	1,181	not applicable
Asia-Pacific (APAC)	2,206	2,803	3,071	1,710	not applicable
Latin America	396	579	460	445	not applicable
Middle East and Africa (MEA)	118	156	165	126	not applicable
Rate of new employee hires[1] (%)	**11**	**15**	**17**	**9**	**6**
by age group[2]					
up to 29 years old	43	41	40	39	77
30 to 49 years old	50	51	51	54	21
50 or older	7	8	9	7	2
by gender[2]					
Women	45	46	43	45	40
Men	55	54	57	55	60
by region[2]					
Europe	32	29	28	37	100
North America	27	32	37	22	not applicable
Asia-Pacific (APAC)	33	31	29	31	not applicable
Latin America	6	6	4	8	not applicable
Middle East and Africa (MEA)	2	2	2	2	not applicable

[1] 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.

[2] 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]

	2020[3]	2021	2022	2023 Merck Group	2023 thereof: Merck KGaA
Total turnover rate	**8.22**	**10.82**	**10.16**	**9.96**	**3.48**
Turnover rate by gender					
Men	8.22	10.69	10.40	10.11	3.24
Women	8.22	11.00	9.93	9.76	3.87
Turnover rate by age group					
Up to 29 years old	11.30	16.64	15.91	14.39	5.79
30 to 49 years old	7.74	10.05	9.55	9.48	3.41
50 or older	7.52	9.22	8.05	8.49	2.62
Turnover rate by region					
Europe	5.64	6.00	5.91	5.52	3.48
North America	9.79	15.44	14.33	15.02	not applicable
Asia-Pacific (APAC)	10.60	14.66	12.84	11.90	not applicable
Latin America	11.40	12.95	13.38	13.19	not applicable
Middle East and Africa (MEA)	11.80	16.57	13.04	15.63	not applicable
Total number of leavers	**4,721**	**6,354**	**6,358**	**6,336**	**152**
by gender					
Men	2,697	3,575	3,673	3,639	87
Women	2,024	2,779	2,685	2,697	65
by age group					
Up to 29 years old	974	1,451	1,542	1,358	32
30 to 49 years old	2,677	3,545	3,569	3,624	82
50 or older	1,070	1,358	1,247	1,354	38
by region					
Europe	1,490	1,601	1,640	1,560	152
North America	1,281	2,078	2,182	2,305	not applicable
Asia-Pacific (APAC)	1,394	2,015	1,905	1,824	not applicable
Latin America	398	449	467	460	not applicable
Middle East and Africa (MEA)	158	211	164	187	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 2023, the average length of service for employees Group-wide was 9.7 years (2022: 9.2 years), with 15.2 years (2022: 15.4 years) for Merck KGaA employees.

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. In accordance with the audit plan, we conduct internal audits every two to three years 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 the Chair of the Executive Board and CEO. 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.

Our commitment: Group-wide policies and guidelines

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.

Our High-Impact Culture is founded on six behaviors: obsessed with customers and patients; act as the owner; be curious and innovate boldly; simplify and act with urgency; raise the bar; disagree openly, decide and deliver. We regularly inform managers 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.

A competitive compensation structure

We reward the performance of our employees in order to maintain a competitive edge in attracting and retaining the best talent. 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, as applicable.

In addition to individual performance, our annual incentive plan also measures company performance based on financial and non-financial key indicators in our scorecard. The non-financial key indicators focus on the company's priorities and are designed to support our High-Impact Culture as well as our sustainability strategy and progress in terms of diversity, equality and inclusion. Furthermore, since 2022, we have included a sustainability factor in our Long-Term Incentive Plan (LTIP). More information on the LTIP can be found in the **Notes of our Annual Report**.

Strengthening our sustainability culture

Since 2021, e-Learnings on our sustainability strategy are a mandatory training component for existing and new employees. While this was the first step of our upskilling journey, we have extended our offer with function- and hierarchy-specific educational activities. Furthermore, from 2023 on, we use the sustainability questions from our annual employee engagement survey to measure the impact of our activities. The survey results are only used internally. They help us to understand the maturity of a sustainability mindset in the company and to detect and address functional, regional or hierarchical differences. The corresponding key indicator "Result of the employee engagement survey on sustainability culture" replaces the previous year's achieved key indicator "Percentage of employees trained on sustainability".

Diversity, equity and inclusion

We are committed to promoting a strong sense of inclusion and belonging among our employees. Therefore, we approach diversity, equity and 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 65 countries and have about 63,000 employees from 141 nationalities – we recognize that our success depends on our ability to foster 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.

Number of employees by hierarchical level

As of Dec. 31	2020	2021	2022	**2023 Merck Group[1]**	**2023 thereof: Merck KGaA**
Total employees	**58,127**	**60,348**	**64,243**	**62,908**	**3,924**
Senior management (Role 6+)	193	194	191	200	48
Middle management (Role 4 & 5)	3,637	3,831	4,018	4,139	600
Low management (Role 3)	10,286	10,880	11,877	11,907	1,275
Other employees (below Role 3)	44,011	45,443	48,157	46,662	2,001
% of women (total)	**43**	**43**	**43**	**44**	**39**
thereof: number of women in senior management (Role 6+)	42	49	51	58	15
thereof: number of women in middle management (Role 4 & 5)	1,284	1,413	1,550	1,622	214
thereof: number of women in low management (Role 3)	4,352	4,669	5,123	5,150	475
thereof: number of women in "other employees (below Role 3)"	19,245	19,943	21,067	20,579	833
% of men (total)	**57**	**57**	**57**	**56**	**61**
thereof: number of men in senior management (Role 6+)	151	145	140	142	33
thereof: number of men in middle management (Role 4 & 5)	2,353	2,418	2,468	2,517	386
thereof: number of men in low management (Role 3)	5,934	6,211	6,754	6,757	800
thereof: number of men in "other employees (below Role 3)"	24,766	25,500	27,090	26,083	1,168

Footnotes follow at the end of the table.

As of Dec. 31	2020	2021	2022	2023 Merck Group[1]	2023 thereof: Merck KGaA
by age group					
Up to 29 years old (%)	**15**	**15**	**15**	**14**	**14**
thereof: number of employees in senior management (Role 6+)	0	0	0	0	0
thereof: number of employees in middle management (Role 4 & 5)	6	8	12	8	2
thereof: number of employees in low management (Role 3)	199	241	263	249	39
thereof: number of employees in "other employees (below Role 3)"	8,365	8,880	9,651	8,484	494
30 to 49 years old (%)	**60**	**60**	**60**	**60**	**53**
thereof: number of employees in senior management (Role 6+)	68	63	58	65	19
thereof: number of employees in middle management (Role 4 & 5)	2,032	2,172	2,235	2,283	367
thereof: number of employees in low management (Role 3)	6,926	7,298	8,007	7,963	805
thereof: number of employees in "other employees (below Role 3)"	25,948	26,624	28,124	27,697	894
50 years or older (%)	**25**	**25**	**25**	**26**	**33**
thereof: number of employees in senior management (Role 6+)	125	131	133	135	29
thereof: number of employees in middle management (Role 4 & 5)	1,599	1,651	1,771	1,848	231
thereof: number of employees in low management (Role 3)	3,161	3,341	3,607	3,695	431
thereof: number of employees in "other employees (below Role 3)"	9,698	9,939	10,382	10,481	613

[1] Merck also employs people at sites of subsidiaries that are not fully consolidated. For the 2023 reporting year, we have aligned the scope of consolidation also for the employee data in the non-financial reporting with the financial reporting. As of now, the figures relate to all employees who are employed in fully consolidated subsidiaries that manage personnel.

[2] The sharp decline in comparison with the previous year (8,485 employees) is attributable to the fact that in addition to Healthcare KGaA, which was hived off in 2019, the two other business sectors, namely Life Science und Electronics, have now also been transferred to separate legal entities.

Roles and responsibilities

The Chief Diversity, Equity and Inclusion Officer is responsible for our global DE&I strategy and for 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 comprising high-ranking executives from all our business sectors and selected Group functions.

Our commitment: Industry-wide initiatives and regulations

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:

- **Women's Empowerment Principles**
- Inclusion Action Plan of the German Mining, Chemical and Energy Industrial Union (IG BCE)
- Equal Opportunity Charter
- **German Diversity Charter association** (signatory of the Charter and member of the association)
- **CEO Letter on Disability Inclusion**

Strategy implementation

In 2023, we continued driving our global DE&I strategy. We accelerated the impact of our national DE&I advocates in our 18 major countries and developed tailored roadmaps for each market. We also published our **Premier DE&I Report**, providing detailed evidence of our strategy implementation and initiatives.

In 2021, we pledged to our people, partners, patients, and industry to intensify our DE&I efforts and set robust aspirations. In 2023, we demonstrated that we are on track to meeting our 2030 goals.

Gender equity

We developed measures to achieve a more balanced gender structure at various hierarchical levels of our business. We are making consistent progress and have increased the share of women in leadership (roles 4+) to 39% (2022: 38%) and senior management positions (roles 6+) to 29% (2022: 27%) while maintaining a 44% proportion of women in our global workforce (2022: 43%). This means our share of women in leadership has increased by 12 percentage points since 2015. Building on these efforts, we aim to achieve gender parity in leadership positions by 2030. Moreover, we are committed to fair and equitable pay for all employees. Our Executive Board comprises two female members (our CEO and CFO) and three male members, bringing the share of women to 40% (2022: 20%).

Culture and ethnicity

With 23% (2022: 24%) of our employees based in the United States and 27% (2022: 27%) of net sales coming from 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 23% (2022: 21%) to 30% by 2030.

Additionally, due to our current performance in Asia, Latin America and the Middle East and Africa (MEA), accounting for 39% (2022: 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 17% (2022: 16%) to 30% by 2030.

In 2023, we developed an Action Plan on Culture, Nationality and Ethnicity as well as a toolkit for leaders and HR to accelerate our progress as regards these aspects.

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 2023, 92% (2022: 64%) of our leaders had participated in this training program.

Committed to fair and equitable pay

Our commitment to pay equity is a crucial aspect of our DE&I strategy. To create transparency around unexplained pay gaps and identify their underlying root causes, we started a gender pay equity analysis in 2021. In the first step, we analyzed ten of our largest countries, covering approximately 80% of our total workforce. In 2023, we extended the analysis to all countries, except North America which is planned in 2024. The identified adjusted gender pay gap continues to be less than 1.5%, which is below benchmarks in the industry. We have developed a plan for a recurring analysis to continuously monitor pay data and to take effective actions as needed. These include individual adjustments based on the results of the analysis, as well as educating our HR community on the topic and taking other steps to ensure we make equitable and unbiased pay decisions.

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 January 2024, we published a new **position paper on disability inclusion** to complement our existing papers on **DE&I**, **non-discrimination** and **non-harassment**. 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, and they can also make anonymous calls to our **compliance hotline**. In the reporting year, our HR Business Partners involved in HR-related compliance case investigations participated in a training and upskilling program to equip them with enhanced employee relations and investigation skills. In 2023, 30 (2022: 20) alleged cases of discrimination or harassment were reported via the compliance hotline and other channels, seven (2022: seven) of which were confirmed on our global reporting platform and appropriate action was taken.

Health and safety

We seek to promote the health 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 an important indicator used to gauge the success of our occupational safety efforts. It comprises all accidents worldwide that have resulted 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 the LTIR to below 1.0 by 2025.

Generally, before starting any activity, 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.

In October 2023, we launched BeHealthy, our global employee health strategy, to our workforce. It is designed to further strengthen the physical, mental, social, and workplace health of our employees. Moreover, in 2023, we introduced a key indicator for health, planned to comprise our health index on the one hand and the implementation status of the BeHealthy strategy on the other hand.

Roles and responsibilities

Our 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**.

Our commitment: Standards and policies

Our Corporate **EHS Policy** (Corporate Environment, Health and Safety Policy) describes our fundamental approach to occupational health and safety, among other things. It is part of our EHS management system and undergoes an external ISO 45001 audit every year. As part of a Group certificate, our occupational health and safety management system was ISO 45001-certified at 66 sites at the end of 2023.

Together with the Group-wide health strategy BeHealthy, we launched the newly developed Merck Group Employee Health Standard in October 2023. It describes the fundamental requirements that a site must fulfill as regards employee health. In addition, the standard specifies our approach to ensuring workplace safety for our employees while also promoting their health and well-being. Furthermore, we set out our Group-wide approach to health and safety management, which is aimed at preventing workplace accidents and occupational illnesses.

We expect our contractors to comply with environmental as well as health and safety requirements throughout the entire process, from starting a job to completion. This objective is reflected in our Group-wide Contractor EHS Management Standard.

Accident rates

Our employees are required to immediately report any relevant occupational accidents to Corporate Sustainability, Quality and Trade Compliance, where these accidents are assessed. If necessary, we then implement additional safety measures. This procedure is common practice across all production facilities around the world. We document 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 comparison with the previous year, our LTIR increased slightly to 1.3 (2022: 1.2). 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 2023, we recorded no fatal accidents.
- We use our EHS Incident Rate (EHS IR) to document **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.

Work-related accidents[1]

	2020	2021	2022	2023 Merck Group	2023 thereof: Merck KGaA
Lost Time Injury Rate (LTIR = workplace accidents resulting in missed days of work per one million hours worked)	**1.3**	**1.2**	**1.2**	**1.3**	**1.6**
by region					
Europe	2.4	2.1	1.7	2.2	1.6
North America	0.8	1.2	1.7	1.4	not applicable
Asia-Pacific (APAC)	0.1	0.1	0.3	0.1	not applicable
Latin America	0.8	0.4	0.6	0.6	not applicable
Middle East and Africa (MEA)	0.4	0.0	1.1	0.4	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.

Clear rules of conduct

Group-wide, all newly appointed site EHS managers must complete an EHS onboarding training that covers the topics of occupational health and safety as well as our “BeSafe!” safety culture program. Through the “BeSafe!” program, 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 and the specific risks.

Social Matters and Respect for Human Rights

Responsible supply chain

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 tier-1 suppliers, i.e. direct suppliers. Furthermore, our supplier management activities include special measures particularly for tier-n suppliers, i.e. indirect suppliers, working in the area of conflict minerals.

To achieve our sustainability goals, our 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 reviewing the sustainability performance of our relevant suppliers based on 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. In accordance with our risk management approach, we define relevant suppliers as suppliers, which either indicate a specific country and/or industry risk or contribute to a significant percentage of our supplier spend (at least 50%). For the country risk evaluation, we have developed our own comprehensive country risk score.

In 2023, 66% (2022: 46%) of our relevant suppliers were covered by a valid sustainability assessment; 94% (2022: 82%) of our spend attributable to these suppliers was covered by suppliers with a valid sustainability assessment.

We consider all applicable legal requirements, such as the German Supply Chain Due Diligence Act, and initiate corresponding measures where necessary. Among other things and in conjunction with the implementation of the German Supply Chain Due Diligence Act, we have implemented a risk management approach focusing on human rights and environmental risks along our supply chain. This risk assessment is conducted annually and ad-hoc when required.

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 Category Sourcing teams to identify potential mitigation actions with relevant suppliers and supports them in making improvements. Our risk management approach comprises four main elements:

- Supplier Risk Assessments: to capture the overarching risks at the supplier level we consider 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. This element focuses on our business sector Life Science. In 2023 we conducted assessments for more than 2,500 of our critical materials.
- 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 according to current human rights risk standards. We also include criteria for identifying supplier relationships impacted by key sustainability risks, such as mineral sourcing and animal welfare.

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 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 takes into account applicable laws and international standards. Additionally, we have engaged an external auditing firm to carry out an independent assessment in 2023 in order to **verify** our compliance with regard to the requirements of the EU Conflict Minerals Regulation (EU) 2017/821.

As part of our continuous improvement efforts, we worked on the recommendations from the audit and refined our procedures. Additionally, we established a supply chain traceability system that further increases our supply chain transparency. For our tin imports, which make up the majority of our conflict minerals imports, additional control mechanisms were implemented. These mechanisms include supply chain mapping, information on the country of origin of the mineral, request of audit reports from smelters and refiners, and the revision of agreements, including audit rights, with our suppliers. After careful analysis of the potential risks, no specific risks could be identified that would have required the development of an action plan. We remain in constant contact with our suppliers, industry colleagues and cross-company collaborations to improve the transparency and effectiveness of the framework.

Roles and responsibilities

Procurement is responsible for integrating sustainability requirements into the relevant stages of our sourcing and supplier management processes. Our Center of Excellence for Sustainability coordinates the relevant measures, such as updating our guidelines where necessary, examining processes and coordinating our participation in external initiatives.

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. For this purpose, our **Supplier Code of Conduct** 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.

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 on the basis of 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 allow us or trusted partners to conduct assessments or audits to increase the transparency of our supply chain and identify fields of activity to improve sustainability performance or mitigate infringement risks.

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 175 countries and more than 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 1,860 valid scorecards on the assessment of our suppliers (2022: 1,700), almost 1,790 of which completed a new assessment or re-assessment in 2023 (2022: 1,100). In some cases, these were initiated by us and in other cases by other TfS members.

Supplier Decarbonization Program

Our Supplier Decarbonization Program is a key element of achieving our **Science Based Target**. Through this ten-year program that was defined as part of the decarbonization strategy in 2021, we aim to reduce greenhouse gas emissions associated with purchased goods and services as well as capital goods.

In order to manage the large quantities of data on the CO_2 emissions of our suppliers, we have an automated carbon accounting tool in place to which we continuously add new functionalities. We offer our suppliers access to solutions to reduce their Scope 2 emissions. In addition, we joined the **Energize program** as a new sponsor. Energize is a collective initiative by a group of industry-leading pharmaceutical and fine chemical companies that have committed themselves to engaging their suppliers to support the adoption of renewable energy and reduce greenhouse gas emissions within their common supply chains. We offer all our suppliers the opportunity to join the program for free and to find out more about renewable electricity options leading to reduced Scope 2 emissions.

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 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**. 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. For example, we have contractually agreed with our suppliers to pay at least a living wage to mine workers and workers in the processing units. Furthermore, we continuously review our monitoring processes to improve their effectiveness.

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 monitoring.

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 safety of electrical installations and installing proper emergency exit signs 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.

Since 2013, IGEP Consult, an Indian non-governmental organization, has conducted regular unannounced monitoring to review labor standards throughout our supply chain. During these visits, IGEP officials monitor occupational safety and compliance with laws preventing child labor. In 2023, 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 the 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, we source a considerable amount of mica from Brazil. To monitor our suppliers' adherence to these standards, we have conducted an audit through a third party.

Human rights

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.

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 such as 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 comply with human rights.

Our Human Rights Officer from the Group function Corporate Sustainability, Quality and Trade Compliance (SQ) is responsible for monitoring due diligence obligations concerning human rights and environmental matters. The Executive Board is informed at least once a year of the work of the Human Rights Officer and the implementation status of risk management and of the due diligence processes.

Those responsible for the issue in the Group functions, business sectors and local units are tasked with implementing our human rights due diligence processes in operations by integrating human rights due diligence into existing processes, for instance.

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 directive and defines the relevant requirements for our company. We expect our employees as well as our suppliers and all companies with which we have business ties to comply with this charter.

In 2023, our Executive Board approved our Group Policy Statement on Compliance with Human Rights and Environmental Due Diligence Obligations in accordance with the German Supply Chain Due Diligence Act. It applies to our own business operations, in other words to our entire workforces, as well as to our suppliers. The statement describes how we undertake to comply with our human rights and environmental due diligence obligations and provides information on the risks identified.

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 "**Responsible supply chain**".

Risk analyses to determine human rights and environmental risks

We conduct special analyses to identify human rights and certain environmental risks. This enables us to identify potential risks, weight them appropriately and prioritize them. These risk analyses are carried out annually and on an ad hoc basis for our own business operations.

Our **Social and Labor Standards Policy** defines the corresponding commitments and principles as they relate to specific topics and 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.

We also assess human rights aspects at our sites through security audits and as part of the risk analysis. The audits are one control mechanism of our security governance framework. Through increased risk transparency and central follow-up of corrective and preventive actions (CAPA) we help ensure that our sites comply with safety-related human rights aspects. Through the Together for Sustainability (**TfS**) initiative, we determine whether our strategically important suppliers comply with human rights standards.

Creating awareness among our employees

An online course trains our Managing Directors and senior management in how to meet the requirements of our **Social and Labor Standards Policy** in their area of responsibility.

Our reporting practices

We inform the public about our approaches and measures as well as the results of our human rights due diligence. We provide information on this annually in our Sustainability Report. Under laws in Australia, the United Kingdom and Norway, we are additionally required to publish information in these countries on our measures to combat forced labor and human trafficking. Apart from the **UK Modern Slavery Statement** and the **Merck Australia Modern Slavery Statement**, we also published the **Norway Transparency Statement** for the first time in 2023.

Our complaint mechanisms

We have set up a Group-wide whistleblowing and complaints system that can be used to report potential violations of human rights, legal provisions and environmental issues, among other things. Our compliance hotline is a central element of this. 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 are committed to 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 addition, we published **Rules of Procedure**. These apply to tips or complaints that refer to human rights and certain environmental risks or violations at our company and along the supply chain in line with the German Supply Chain Due Diligence Act. In the reporting year, 184 violations of the **Social and Labor Standards Policy** were reported to us in our own business operations, 60 of which were confirmed. Furthermore, based on the complaint channels specified in the Rules of Procedure, there were no indications of child or forced labor or violations of the right to collective bargaining or freedom of association in our own business operations or in the supply chain in 2023.

Human rights violations

	2020	2021	2022	**2023**
Number of reported violations of Social and Labor Standards Policy	108	121	136	184
Number of confirmed Violations of Social and Labor Standards Policy	29	41	68	60
thereof: number of incidents of discrimination	2	6	7	7[1]

[1] As of 2023, the incidents of discrimination also include cases of harassment as a specific form of discrimination.

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. 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 help to 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 provide healthcare professionals and patients with the latest information on the safety of our marketed medicinal products. The scope of continuous safety monitoring covers the entire life cycle of a product, ranging from development, market launch and commercialization to the expiration or cancellation of its marketing authorization.

By 2025, we aim to deliver product specific safety and benefit-risk strategies to support the execution of all key priority programs in line with internal and external stakeholders' expectations. These strategies will enable us to understand in greater detail the benefit-risk profiles at each stage of product development and post-marketing. During the reporting year, we worked toward achieving this goal by providing high-level safety and benefit-risk contributions for development programs with priority in oncology, neurology and immunology.

Roles and responsibilities

Our Global Patient Safety unit is responsible for drug safety. 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 are 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. We convey this information through stipulated regulatory reports, safety communications (as applicable) and corresponding product label updates.

Our Global Patient Safety unit hosts a Pharmacovigilance Intelligence Council that focuses on changes in pharmacovigilance legislation and their impacts on our global and local pharmacovigilance systems. This council 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) is the governance board that 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 also assess human-related bioethical matters as appropriate and is accountable for the use of our medicinal products in early and post-study access.

Our commitment: Guidelines and statutory requirements

We rigorously aim to follow international guidance and standard procedures. These include the International Council for Harmonisation (ICH) guidelines, the Good Pharmacovigilance Practices (GVP) established by the European Medicines Agency (EMA), Title 21 of the Code of Federal Regulations governed by the U.S. Food and Drug Administration (FDA), and other pharmacovigilance regulations issued by national health authorities. We also aim to comply with relevant 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 2023, we had five pharmacovigilance inspections (2022: four).

We also perform audits to our systems and processes to ensure that all our units and subsidiaries involved in pharmacovigilance consistently meet all global requirements. In 2023, we conducted a total of seven pharmacovigilance audits (2022: 19) and found no significant deviations in our pharmacovigilance systems from these requirements and standards. We also conducted twelve external audits (2022: 16) at our vendors and licensing partners involved in pharmacovigilance, helping us to improve our pharmacovigilance processes and to comply with regulatory requirements.

Applying our proactive safety strategy to benefit-risk assessments

Regarding product safety risk assessments, we have successfully implemented in the past years an improved benefit-risk management strategy to become a more proactive and benefit-risk-focused organization. This strategy firmly establishes the concepts and principles for conducting benefit-risk assessments at each stage of product development and post-marketing. In addition, our Benefit-Risk Action Team co-leadership model, created in 2022, enables us to understand in even greater detail the benefit-risk profiles of our products and enable early decision-making within our organization to protect patient safety. Ultimately, we aim to provide the right medicine to the right patient at the right time.

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. We review and update product information documents, such as package leaflets, thereby, we want to ensure our medicinal products contain the latest information on safety, efficacy and pharmaceutical formulation. In accordance with regulatory requirements, we submit modifications to our leaflets to the respective regulatory authorities for approval. In 2023, there were no 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 25,000 internal and external 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 medicinal products.

Prices of medicines

The prices of our products reflect the value they deliver to patients as well as broader society. We price our products responsibly and work to prevent costs from becoming a barrier to treatment. In doing so, we strive to deliver on our steadfast commitment to providing the broadest possible patient access. We also continue to invest in meaningful scientific innovation to address the high number of unmet medical needs still faced by many patients and their caregivers. Therefore, we adapt the prices of our medicines in different geographic and socioeconomic segments according to people's ability to pay.

We acknowledge the affordability challenges many healthcare systems face amid growing financial pressures. We recognize the unique characteristics of each health system and adapt our pricing based on local market considerations, including unmet medical and treatment needs, health system capacity, infrastructure, socioeconomic standards as well as affordability within the respective healthcare system and the ability of patients to pay. We apply intra-country and inter-country equitable pricing approaches to all our brands.

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 annual price analyses to validate price thresholds and provide guidance on local pricing to our subsidiaries for the following year. We aim to ensure that they meet patient access needs by taking a consistent, data-driven approach.

To increase the availability, accessibility and affordability of our medicines in Africa, Asia, Latin America, and the Middle East, we have adopted a new systematic approach known as the SHAPE program. This will enable us to address these access barriers for underserved patient populations in low- and middle-income countries.

Additionally, we support innovative risk-sharing agreements and are working to improve data efficiency in health systems to help distribute funds and resources more optimally.

Roles and responsibilities

Our Global Value Demonstration, Market Access & Pricing (GVAP) unit, formerly called GMAP, reporting directly to a member of our Healthcare Executive Committee, evaluates market launch prices in coordination with the respective franchises. In addition, the GVAP 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 **Charter on Access to Health in Developing Countries** 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 comply with 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 2023, we continued to implement and maintain innovative risk-sharing agreements (RSAs) that provide immediate access to Mavenclad® for patients with multiple sclerosis (MS). We broadened access to this medicine through specific agreements in eligible countries across Europe, Latin America and the Middle East including Argentina, Hungary, Kuwait, South Africa and the United Arab Emirates.

Programs for low- and middle-income countries

We have set ambitious goals for our SHAPE program to improve access to our medicines for underserved patient populations in low- and middle-income countries. The program covers both existing and upcoming products, focusing on therapeutic areas such as head and neck, colorectal and bladder cancers as well as thyroid disorders.

In 2023 we served more than 57 million patients in low- and middle-income countries with our healthcare portfolio. Boosted by our SHAPE program, we aim to reach 80 million patients per year by 2030. As of 2023, 15 pilots have been initiated in countries such as Argentina, Brazil, Egypt, Indonesia, and Mexico as well as several countries of Central America.

Tenders constitute a significant percentage of our global sales and are a crucial growth driver for our established portfolio. We participate in government tenders for products used in public hospitals serving low-income patients, often in low- and middle-income countries.

For some of our existing high-quality products, we offer second brands at affordable prices, particularly in countries with a large percentage of low-income patients.

Patient access programs (PAPs) are self-sustaining commercial programs that provide registered medicinal products for underserved populations. They primarily seek to address affordability challenges. We operate PAPs in several countries.

Clinical studies

Our aim is to conduct high-caliber clinical research that is in compliance with applicable laws and regulations. We set Group-wide requirements that aim to ensure that high ethical and scientific standards are met when conducting clinical trials.

We only conduct clinical studies to investigate issues relevant to patients, healthcare professionals or society, and only when our established methodology finds the given medicines show significant therapeutic promise and a positive benefit-risk ratio. Accordingly, to ensure patient safety and avoid interrupting the development of promising products, we carefully select patients based on known risk factors. These include age and comorbidities, which we reflect in the design of our clinical studies. Notably, we only enroll the specific number of patients needed to answer the posed scientific and medical questions. We reconcile and review the safety reports from our clinical studies and marketed products and immediately address any unforeseen risks. Senior boards such as the Pharmacovigilance Advisory Board and the Medical Safety and Ethics Board maintain oversight of any emerging safety concerns. In addition, cross-functional Benefit Risk Assessment teams adapt the benefit-risk assessment and development strategy of each product to ensure it delivers maximum safety and efficacy to our patients. In addition, a sound, established scientific methodology must be available to investigate these scientific or medical 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. Data privacy is also very important to us, and we maintain a strong focus on data protection and confidentiality in compliance with statutory regulations.

Diversity, equity and inclusion in clinical trials

Based on our Standard on Human Research, we aim to conduct clinical studies that adequately represent the diverse patient populations expected to use our products once they are approved. To ensure fair, balanced and scientifically justified study representation, we cemented our commitment to Diversity, Equity and Inclusion in clinical trials by collaborating with healthcare providers and community advocates to eliminate common barriers to clinical trial participation.

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 and based on the function, we are additionally either offering or mandating to educate staff about the value of a close, more consistent patient interaction and the requirements to protect our patients' independence and privacy.

Roles and responsibilities

Clinical development, including clinical studies and their related governance processes, 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 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 products that are under clinical development, while the Global Medical Decision Board is responsible for our own studies with approved products 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.

Before administering a new product 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 products.

Our commitment: International guidelines and requirements

Our Quality Policy defines the strategic framework that ensures our products, services and systems deliver high quality, safety and efficacy to our patients. It details the most relevant laws and codes, criteria and guidance (e.g. for product development and manufacturing), and our senior management's responsibility to ensure quality is embedded in everything we do.

Our Standard on Human Research provides the framework for conducting clinical studies and helps ensure we adhere to all applicable legal, ethical and scientific standards. Further quality documents detail for instance the strategic direction of all quality related activities or disclose our position on data privacy. In addition to the relevant national laws and regulations, these documents 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,
- 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**), 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 and Risk Management (RDQRM) 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 (e.g. investigator sites and vendor audits). We respond immediately to observations made 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. As planned, in 2023, RDQRM concluded most of the audits of the Annual Audit Plan.

Conducting clinical studies responsibly

Every clinical study follows defined procedures to ensure it is conducted to high 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. As in the previous year, in 2023, none of the regulatory inspections conducted on our clinical research activities resulted in regulatory action.

Disclosure of clinical studies and publication of results

We are obligated to disclose findings from our clinical studies. We strive to do this publicly in a complete, accurate, balanced, transparent, and timely manner as laid out in our Standard on Clinical Trial Data Transparency. We publish results from our clinical studies in medical journals in line with applicable laws and industry codes. In particular, we adhere to the current version of the Good Publication Practice (**GPP3**) and align with the recommendations of the International Committee of Medical Journal Editors (**ICMJE**). Our **Standard on Clinical Trial Data Transparency** underscores our strong commitment in this area.

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 products. 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 products 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.

Bioethics

Our goal is to conduct research in a responsible manner, which is why we develop ethical guidelines – also in close collaboration with external experts – in order to make well-founded decisions for responsible research. Moreover, we discuss in our committees the ethical aspects of providing products such as organoids for both academic research purposes and the biopharmaceutical industry. We carefully evaluate our position when it comes to controversial topics. We always prioritize the well-being of and benefit for various groups of patients, whether in clinical studies or during treatment with our medicines.

Roles and responsibilities

Since 2010, the Merck Ethics Advisory Panel for Science and Technology (MEAP) has been making clear recommendations on ethical questions in science and technology as well as on questions extending beyond the field of traditional bioethics, in line with our transformation into a science and technology company. The recommendations of the MEAP guide our actions and business activities.

The members of the MEAP are renowned international experts from the fields of bioethics, medicine, philosophy, law, and the natural sciences as well as technology and sustainability. The MEAP has its mandate from the Executive Board and is chaired jointly by the two members of the Executive Board with responsibility for the Healthcare and Life Science business sectors.

All employees may address their concerns to the Bioethics team via our **compliance hotline** and a dedicated e-mail address (accessible via the intranet).

A further board, the Stem Cell Oversight Committee (SCROC), reviews and decides on all planned in-house research activities involving the use of human embryonal or pluripotent stem cells, ensuring compliance with legal requirements as well as our ethical guidelines. This also applies to joint projects with external partners. Up until the end of 2022, the SCROC consisted of internal experts from our business sectors as well as external advisors from the fields of bioethics, medicine, and law. In 2023 and in line with a resolution by the MEAP, we transformed the SCROC into a primarily internal board. The reason for this is that research plans that call for separate committee approval pursuant to the SCROC charter are currently not being carried out within the company.

Furthermore, for ethical questions arising for instance in the context of forward-looking business decisions, targeted Ethics Foresight projects can be initiated. We specifically engage external experts to work on these projects. No Ethics Foresight projects were commissioned in 2023.

Our commitment to policies and standards

Our **Genome Editing Principle** provides a binding ethical and operational framework for our employees. Apart from our position on genome editing, it includes information on human germline editing. It sets clear boundaries for us both as a supplier of customized CRISPR/Cas nucleases and genetically modified cell lines and as a company that uses genome editing technologies in our research.

This is complemented by further guidelines that form the ethical framework of our research and business activities. Our **Stem Cell Principle** sets the ethical boundaries for the use of human stem cells in our research. Our **Fertility Principle** regulates our fertility treatment and in-vitro fertilization research activities.

Using genome-editing techniques

CRISPR/Cas 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 allow the use of human embryonic stem cells only 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 fiscal 2023, no projects required the approval of the SCROC (2022: one project). 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

As it is our aim is to develop and use new digital technologies responsibly, we evaluate ethical issues that may arise from algorithms, artificial intelligence (AI) and data-based business models in an early stage. Since 2021, the Merck Digital Ethics Advisory Panel (DEAP) has been focusing on complex ethical issues surrounding digital technologies.

Roles and responsibilities

One of the main tasks of the DEAP is to support us in developing digital applications responsibly while addressing ethics questions that could result from collecting and processing data as well as from the use of these innovative technologies. It issues recommendations for our entrepreneurial activities.

The panel comprises 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 has its mandate from the Executive Board; our employees may submit topics for the panel to discuss. As in the previous year, the panel held four meetings in 2023. These focused on issues concerning the use of generative AI. Summary minutes of the DEAP meetings have been accessible on our intranet since 2023 insofar as they do not contain any business secrets. They also document the recommendations issued.

Our commitment: Guidelines and standards

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

Together with the DEAP, we apply our Code of Digital Ethics (**CoDE**) in order to address questions pertaining to the ethical use of data and algorithms. The CoDE serves as a guideline for our digital business models, as a tool for analyzing ethical challenges, and a basis for practical DEAP recommendations. As one of our overarching governance documents, it applies to all employees and is publicly accessible as well.

Developments in the field of generative AI, for instance ChatGPT, are growing in importance. All our business sectors are developing applications based on generative AI. To apply these innovative technologies responsibly and to the benefit of all, an ethical framework is currently being developed. The DEAP is intensively evaluating the guidelines. The aim is to roll out this framework company-wide in 2024.

Ethical use of data and algorithms

In June 2023, online training on the CoDE was assigned to approximately 12,000 managers with personnel responsibility who can access the training in eight languages via our internal training platform. In addition, an advanced training course is available specifically for employees working in the fields of data science, AI and other digital areas of specialization. The course serves to illustrate the importance of the CoDE and empowers participants to make responsible decisions concerning the ethical aspects of data use and algorithms in digital products and business models.

Since 2022, we have been looking at potential ethical risks that could result from projects by the Life Science Data Intelligence and Analytics unit of our Life Science business sector with the aim of developing suitable processes. The unit analyzes data from the business sector in order to obtain insights for our business.

Data privacy and cyber security

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 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.

It is of critical importance to our business to 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 and Group functions who hold risk ownership, act as our first line of cyber security defense and are supported by dedicated networks. 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 consists of internal audits.

Our Cyber Security organization strengthens resilience against cyberattacks and data breaches. It 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 organization is also responsible for providing cyber security monitoring and incident response capabilities across the entire company. Additionally, we train our employees on how to protect data properly.

Our commitment: Guidelines and standards

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.

Our Group cyber security governance framework contains 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 controls and security monitoring) to bolster our ability to securely handle sensitive data, such as trade secrets.

Training and IT tools

In line with the EU GDPR and our global approach to data privacy, we regularly conduct e-learning training courses in ten languages. In 2023, the completion rate for our e-learning courses was 99%.

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 2023, we reported seven cases of minor personal data breaches to the supervisory authority. One of them related to identified data leaks, theft, or loss of customer data. However, none of these cases were sanctioned.

Data Privacy

	2020	2021	2022	**2023 Merck Group**	**2023 thereof: Merck KGaA**
Reported violations of Data Privacy Guidelines	3	3	4	7	0
Customer Privacy[1]					
Total number of substantiated complaints received from outside parties	0	0	0	0	0
Total number of complaints from regulatory bodies	0	0	0	0	0
Total number of identified leaks, thefts, or losses of customer data	0	0	0	1	0

[1] These data only reflect incidents classified as significant.

Anti-Corruption and Anti-Bribery

Compliance management

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, 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
- 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

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 subordinate 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.

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:

- **Merck Code of Conduct**
- **Human Rights Charter**
- Anti-Corruption Standard
- Anti-Money Laundering Group Standard
- Conflict of Interest Policy
- Antitrust and Competition Law Policy
- Whistleblowing and Investigations Standard
- **Supplier Code of Conduct**

Risk assessment

Proper compliance risk management is crucial to identify undetected risks and ensure our company remains protected. For this purpose, we have a compliance risk assessment process covering all of our business sectors. The assessment is based on a comprehensive risk matrix that improves objectivity and enables a data-driven risk approach. It focuses on bribery and corruption risks, illustrated through in-depth risk categorization and risk scenarios. It also utilizes country risk segmentation, classifying countries where we actively operate in terms of their risk exposure regarding bribery and corruption by applying objective and consistent criteria. We use the outcome as a model to prioritize initiatives and intensify activities in countries with higher risk levels.

Conflicts of interest

We take all potential conflicts of interest seriously. Employees must avoid situations where their professional judgment could 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.

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, dealers, and high-risk vendors. 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 training (both classroom and online) on our Code of Conduct and critical compliance topics such as anti-corruption, conflict of interest, 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. In 2023, we launched a new Anti-Corruption, Anti-Bribery and Anti-Money Laundering e-learning course based on the updated Global Anti-Corruption and Anti-Money Laundering standards introduced in 2022.

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 and any high-risk transactions. Suspicious transactions are reported to the German Financial Intelligence Unit or other authorities as required. We continuously work to improve our AML program. Following in-depth AML risk assessments of jurisdictions with stricter regulatory frameworks than our AML program, we implemented additional local AML programs where required.

Reporting potential compliance violations

We encourage all employees worldwide to report potential compliance violations. Depending on the type of misconduct and the reporting person's preference, they can choose from various reporting channels. We recommend using one of our central channels that are directly received and reviewed by a dedicated, independent and qualified team within Group Compliance. Depending on the nature, content and type of report, Compliance may investigate a submission directly or assign it to another responsible function for further investigation. One central reporting channel is our global whistleblowing compliance hotline, which can be used free of charge and anonymously to report violations. It is available in several languages by telephone or as a web-based application. The compliance hotline is also available to external stakeholders. The relevant information can be found in the "contact us" and the Compliance and Ethics section of our **website**.

Compliance-relevant cases with a particular risk profile are presented to the Compliance Case Committee, comprising senior members of our Compliance, Legal, Data Privacy, Internal Auditing, and Human Resources departments. The Committee's duties include assessing and classifying specific compliance issues and addressing identified issues using appropriate measures.

In all Compliance-relevant cases, based on the investigation outcome and recommendations from Compliance or the Compliance Case Committee, we aim to take appropriate remediation measures. These can include disciplinary actions against employees who have committed a compliance violation. If the investigation identifies a root cause that could lead to the risk of further compliance violations, we take additional preventive and corrective actions.

Both the number of new Compliance-relevant cases and the number of cases with confirmed compliance violations increased compared with the previous year. In 2023, 106 Compliance-relevant new cases with reports via the compliance hotline and other channels were created. In 32 concluded cases, it was confirmed that the principles of the Code of Conduct or other internal or external guidelines had been violated.

Reported compliance violations

	2020	2021	2022	2023 Merck Group	2023 thereof: Merck KGaA
Total number of reported compliance violations					
Number of reported compliance incidents	81	79	79	106	9
Number of confirmed cases	41	42	28	32	1
Confirmed cases by category					
Bribery and corruption	6	1	2	1	0
Violation of cartel laws and fair competition rules	0	0	1	0	0
Fraudulent actions against Merck	11	6	11	3	0
Other violations of the Merck Compliance Principles for the relations with business partners	0	0	2	3	0
Other violations of Merck values, internal guidelines or legal requirements	24	35	12	25	1

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, Anti-Corruption Standard, Anti-Money Laundering Group Standard, and Antitrust and Competition Law Policy.

Our audit planning aims to provide comprehensive risk assurance through the best possible audit coverage of our processes, countries and projects. 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 2023, Group Internal Auditing conducted 80 internal audits involving bribery and corruption-related risks (2022: 79), including 52 operational and 27 IT audits and 1 special audit which may be conducted to meet legal requirements.

Interactions with health systems

We support health systems by collaborating with our healthcare stakeholders, such as professional medical associations, patient and carer organizations, 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.

In some countries we inform consumers directly. For example, in the United States direct-to-consumer (DTC) advertising for prescription medicines is permitted. 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.

Roles and responsibilities

For all interactions with healthcare stakeholders, we have established internal policies and review processes and tools, such as record-keeping systems. Thereby, we want 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.

Our commitment: Group-wide guidelines and industry standards

In addition to applicable laws and our own internal standards, we also strive to 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**) or the regulations of the U.S. Pharmaceutical Research and Manufacturers of America **(PhRMA)**.

Moreover, we apply various specific internal rules and regulations:

- Pharma Code for Conducting Pharmaceutical Business and Pharmaceutical Operations (Pharma Code)
- Healthcare Ethical Guiding Principles
- Standard on Medical Activities

For the collaboration with patient organizations:

- Policy on Interactions with Patients, Patient Opinion Leaders, and Patient Organizations
- Guideline Good Practice and Process Guidance: Engagement with Patients, Patient Opinion Leaders, and Patient Organizations

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.

Regular employee training

In 2023, we continued our Code of Conduct training curriculum on managing dilemmas in sector-specific situations. Moreover, employees who are responsible for the promotion of our pharmaceutical products receive regular training on current guidelines. Depending on their roles and responsibilities, new employees participate in onboarding training dealing with the review and approval of promotional materials. Based on their roles and responsibilities and in order 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.

Other Topics

Sustainable innovation and technology

The sustainable innovation that we envision and 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 are already having 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 to upcoming regulations and integrating quantitative sustainability criteria into our product development processes across all business sectors.

In 2023, we continued our partnership with the patent information platform LexisNexis® PatentSight® and evaluated the sustainability impact of our intellectual property. In the reporting year, 29% (2022: 40%) of our patent families published had a positive sustainability impact. However, this key indicator is not comparable with the previous year's figure as LexisNexis® PatentSight® updated the underlying **evaluation methodology**.

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 in independent R&D units that pursue their own innovation strategies. Group Corporate Sustainability supports our business sectors and Group functions to advance sustainability within the R&D and innovation processes. This includes the coordination and alignment of common core sustainability criteria in line with our shared goals as well as quality and quantification requirements. In 2022, we created a Group-wide dashboard, showing the potential contribution of our R&D portfolio to sustainable solutions. In 2023, we integrated a procedure describing the global sustainability evaluation in our R&D process.

Our Group Science & Technology Office leads the implementation of our combined strategy for innovation as well as 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 and strategically relevant technology trends into our business sectors while maintaining a Group-wide overview of our technology 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, enabling us to create more sustainable products for our customers and society. We have integrated and tailored Design for Sustainability (DfS) across all business sectors and use our overarching dashboard to monitor progress on key sustainability criteria. In 2023, we assessed almost all relevant R&D projects and thus enhanced transparency around the sustainability performance of our global R&D portfolio. We integrated a sustainability in R&D key indicator to track progress and continued advancing the use of evaluation tools such as **DOZN™** and GreenSpeed. We aim to combine the insights from the R&D dashboard with those gained from our commercial portfolio evaluation to steer our future R&D activities.

We have dedicated corporate resources for our circular economy strategy and we are driving several circular economy pilots and initiatives throughout the organization. In addition, we held a global circular economy summit to provide a platform for best practice sharing with internal and external participants.

Reporting in accordance with the EU Taxonomy Regulation

Fundamentals

The EU taxonomy for sustainable activities (hereinafter "EU Taxonomy") is a classification system that translates the climate and environmental objectives of the European Union (EU) into criteria for sustainable economic activities. For this purpose, the EU Taxonomy defines various key performance indicators and qualitative information that Merck must disclose. The introduction of the disclosure obligation under Article 8 of Regulation (EU) 2020/852 of the European Parliament and of the European Council dated June 18, 2020 on establishing a framework to facilitate sustainable investment and amending Regulation (EU) 2019/2088 (hereinafter "EU Taxonomy Regulation") and the Delegated Acts adopted in this regard is being carried out in multiple phases:

- For the 2021 reporting period, key performance indicators were stated only for so-called taxonomy-eligible economic activities and were limited to those that make a substantial contribution to climate change mitigation or climate change adaptation as defined by the EU Taxonomy Regulation. An economic activity qualifies as taxonomy-eligible if it is within the scope of the EU Taxonomy.
- For the 2022 reporting period, apart from the degree of taxonomy-eligible economic activities making a substantial contribution to climate change mitigation or climate change adaptation within the meaning of the EU Taxonomy Regulation, it is also necessary to report the taxonomy-aligned share of the identified economic activities. According to the EU Taxonomy, an economic activity qualifies as taxonomy-aligned if it is taxonomy-eligible and makes a substantial contribution to one or more of the environmental objectives without doing significant harm to the other objectives or failing to fulfill minimum social standards.
- As well as the aforementioned information, the degree of taxonomy-eligible economic activities making a substantial contribution to the following four additional environmental objectives of the EU will be included in the disclosure obligation from the 2023 reporting period: 1) sustainable use and protection of water and marine resources, 2) transition to a circular economy, 3) pollution prevention and control, and 4) protection and restoration of biodiversity and ecosystems. Furthermore, new economic activities for the environmental objectives of climate change mitigation and climate change adaptation have been added for which the degree of taxonomy eligibility will be required to be disclosed in the 2023 reporting year. Reporting on the degree of taxonomy alignment for the newly added environmental objectives is not planned for the time being.
- From the 2024 reporting year, the degree of taxonomy eligibility and the degree of taxonomy alignment will have to be reported for all six environmental objectives.

Approach

To ensure the legally compliant fulfillment of its disclosure obligations, Merck has established an interdisciplinary project team that is continuously analyzing the existence of taxonomy-eligible and taxonomy-aligned activities in close coordination with the representatives of the business sectors and various Group functions.

Identification of taxonomy-eligible economic activities

In the course of implementing the EU Taxonomy requirements, the business model of Merck underwent a comprehensive analysis. Taxonomy-eligible economic activities were identified in line with a top-down approach using structured inquiries submitted to the relevant specialist departments. For the environmental objectives of climate change mitigation and climate change adaptation, the results of this analysis were supplemented by big data-supported analyses as part of a bottom-up approach. Among other things, information was used that can also be found in connection with the requirements of the REACH regulation as well as in the context of customs declarations. The economic activities for the other four environmental objectives were also identified by reference to existing reporting structures and hierarchies.

As a result of this process, taxonomy-eligible activities generating net sales were identified only in conjunction with the following economic activities:

- Manufacture of energy-efficient building equipment in the Electronics business sector (environmental objective “climate change mitigation”),
- Manufacture of active pharmaceutical ingredients in the Healthcare and Life Science business sectors (environmental objective “pollution prevention and control”),
- Manufacture of medical products in the Healthcare business sector (environmental objective “pollution prevention and control”), and
- Manufacture of electrical and electronic equipment in the Life Science business sector (environmental objective “transition to a circular economy”).

With respect to capital expenditure, the EU Taxonomy Regulation differentiates between three categories of capital expenditure:

- Capital expenditure that relates to assets or processes associated with taxonomy-aligned economic activities (category A),
- Capital expenditure that is part of a plan to expand taxonomy-aligned economic activities or to transform taxonomy-eligible economic activities into taxonomy-aligned economic activities (category B), and
- Capital expenditure related to the acquisition of products from taxonomy-eligible economic activities and individual measures that carry out the target activities in a low-carbon manner or reduce greenhouse gas emissions (category C).

As Merck, owing to its business model, only engages in taxonomy-eligible economic activities in conjunction with the manufacture of active pharmaceutical ingredients, manufacture of medical products, the manufacture of electrical and electronic equipment and, to a small extent, the manufacture of energy-efficient building equipment, it has only limited taxonomy-eligible capital expenditure in category A. There is no capital expenditure in category B to date as Merck does not prepare any capital spending plans to transform taxonomy-eligible economic activities into taxonomy-aligned economic activities. Furthermore, Merck has capital expenditure resulting from the acquisition of products classified as taxonomy-eligible economic activities or attributable to qualifying individual measures (category C). In order to be taxonomy-eligible, this capital expenditure must correspond to one of the economic activities named in the Delegated Acts and be implemented and operational within 18 months.

At Merck, such capital expenditure exists especially in connection with the environmental objective of climate change mitigation in the following areas:

- Electricity generation using solar photovoltaic technology (activity 4.1 of the Delegated Act on the “climate change mitigation” environmental objective),
- Transport by motorbikes, passenger cars and light commercial vehicles (activity 6.5 of the Delegated Act on the “climate change mitigation” environmental objective), and
- Renovation of existing buildings (activity 7.2 of the Delegated Act on the “climate change mitigation” environmental objective and activity 3.2 of the Delegated Act on the “circular economy” environmental objective).

Determination of taxonomy alignment

Technical screening criteria

In order to check the taxonomy alignment of the taxonomy-eligible economic activities, the relevant regulations for the technical screening criteria under which certain economic activities qualify as contributing substantially to the environmental objective as well as for determining whether the activity causes no significant harm to any of the other environmental objectives were systematically analyzed. The basis for this was the Delegated Acts on the EU Taxonomy, which were used for the identification of taxonomy-eligible economic activities. In these, corresponding requirements are defined for the respective economic activities, which must be fulfilled for a classification as taxonomy-aligned. For this purpose, interviews were conducted with business and project managers and the physical climate risks at the sites were analyzed. Furthermore, operating permits, product data sheets, environmental product declarations, energy performance certificates and internal training documents were inspected, among other things.

Net sales, capital expenditure and operating expenditure in connection with the “climate change mitigation” environmental objective were identified as taxonomy-aligned economic activities to a very small extent only. No additional taxonomy-eligible and taxonomy-aligned net sales, capital expenditure or operating expenditure were identified for the “climate change adaptation” environmental objective. From 2024, the degree of taxonomy alignment will have to be reported for the other four environmental objectives in addition to the degree of taxonomy eligibility. Based on the information currently available, the degree of taxonomy alignment for the other four environmental objectives will also be very low. A more accurate statement is not yet possible owing to the uncertain questions regarding the interpretation of the regulations and the current progress of the project.

Minimum safeguards

The minimum safeguard frameworks include the OECD Guidelines for Multinational Enterprises, the United Nations Guiding Principles on Business and Human Rights, the fundamental conventions of the International Labour Organization, and the International Bill of Human Rights. The requirements profile of the frameworks was systematized and compared with internal documents. This included an analysis of the Code of Conduct, work instructions, guidelines and training documents. Compliance with the due diligence process required by the framework in the area of human rights is ensured with respect to the individual business activities. Risk analyses are carried out with regard to the minimum safeguard requirements and appropriate measures are derived from these.

Determination of the taxonomy KPIs

The three key performance indicators (KPIs), namely net sales, capital expenditure and operating expenditure, were mainly derived from existing financial reporting systems; for capital expenditure inquiries were made to the Investment Controlling unit in some instances. The principle of materiality was applied.

Accounting and measurement policies

The EU Taxonomy Regulation and the corresponding Delegated Acts contain wording and requirements which, even taking into account the supplementary publications of the EU Commission and the "EU Platform on Sustainable Finance", are subject to interpretation and/or for which clarifications have not yet been published in every case. The most significant interpretive issues and Merck's approach are presented below.

Taxonomy eligibility

Ancillary activities that are operationally necessary for our core business do not qualify as independent taxonomy-eligible economic activities. This applies, for example, to the transport of our products to our customers, research and development activities, and the acquisition or construction of production buildings in areas that cannot be allocated to a taxonomy-eligible target activity.

To check the taxonomy eligibility of an economic activity, Merck applies an end-product oriented approach for manufacturing-related activities. This means that the end product must result from one of the economic activities specified in the Delegated Act in order to qualify as being taxonomy-eligible. In the case of organic basic chemicals, the corresponding economic activities qualify as taxonomy-eligible in the interpretation of Merck only if the manufacturing activities of the named chemical products involve a significant transformation process. In our interpretation, products that are merely passed on for sale, repackaged or mixed do not qualify as taxonomy-eligible within the meaning of the EU Taxonomy Regulation.

The purchase or performance of contract manufacturing services for active pharmaceutical ingredients or medical products in the Healthcare and Life Science business sectors typically does not give rise to a taxonomy-eligible economic activity, as Merck does not control the circumstances under which the contract manufacturing is performed in many cases.

In the area of fossil gas, Merck operates a gas turbine and a co-generation facility to generate electricity and heat from fossil gaseous fuels. The facilities serve to generate our own power and heat. These activities in the area of electricity generation from fossil gaseous fuels as well as the operation of co-generation units with fossil gaseous fuels have been classified as not material. Additional activities in the field of nuclear energy and fossil gas are not performed or are performed to an insignificant extent only.

Net sales

The net sales KPI represents the ratio of net sales from taxonomy-eligible or taxonomy-aligned economic activities in a fiscal year to the total net sales of the same fiscal year. The definition of relevant net sales for the purposes of the EU Taxonomy Regulation corresponds to the definition of net sales in the consolidated financial statements (see Note (9) "**Net sales**" in the Notes to the Consolidated Financial Statements).

Capital expenditure

The share of capital expenditure on assets or processes associated with economic activities classified as taxonomy-eligible or taxonomy-aligned is determined as follows: Share of total capital expenditure that is taxonomy-eligible or taxonomy-aligned divided by total capital expenditure according to the EU Taxonomy Regulation. At Merck and within the meaning of the EU Taxonomy Regulation, capital expenditure in the reporting period comprises additions to property, plant and equipment (IAS 16), rights of use from leases (IFRS 16), and intangible assets (IAS 38) with the exception of goodwill. Apart from the additions, advance payments for the named assets are also included. The denominator also includes additions to property, plant and equipment and intangible assets resulting from business combinations. The additions can be seen in the

changes in property, plant and equipment and intangible assets disclosed in the consolidated financial statements (see Note (20) "**Property, Plant and Equipment**" and Note (19) "**Other Intangible Assets**" in the Notes to the Consolidated Financial Statements).

In order to exclude double counting, capital expenditure on products from taxonomy-aligned economic activities and individual measures that have already been checked under category A (i.e. capital expenditure that relates to assets or processes associated with taxonomy-aligned economic activities) are included under this category only. Against this background, capital expenditure for production buildings, for example, is subject to a taxonomy-eligibility check under category A only, while capital expenditure for administrative buildings is included under category C.

Operating expenditure

The share of operating expenditure for assets or processes associated with economic activities classified as taxonomy-eligible or taxonomy-aligned is determined as follows: Share of total operating expenditure that is taxonomy-eligible or taxonomy-aligned divided by total operating expenditure according to the EU Taxonomy Regulation. Operating expenditure relevant within the scope of reporting under the EU Taxonomy Regulation includes direct, non-capitalized research and development costs, low-value leases, building renovations, maintenance and repair, and all other direct internal and external expenses related to the day-to-day maintenance of property, plant and equipment that are necessary to ensure the continuous and effective functioning of these assets. During the clinical and preclinical development phases in the Healthcare business sector, it is unclear as to whether the activities will ever lead to regulatory approval and hence to marketable products. Accordingly, the corresponding research and development activities have not been included as taxonomy-eligible operating expenditure in the numerator for the economic activities of pharmaceutical ingredients and medical products.

Taxonomy KPIs

The following tables present the share of sales, capital expenditure and operating expenditure attributable to taxonomy-eligible and taxonomy-aligned economic activities in respect of the environmental objective "climate change mitigation". The tables also contain information on the share of taxonomy-eligible economic activities for the four additional environmental objectives:

Economic activities	Code	Turnover 2023	Proportion of Turnover 2023	Criteria for a substantial contribution: Climate change mitigation	Climate change adaptation	Water	Pollution	Circular Economy	Biodiversity	DNSH criteria ("Do no significant harm"): Climate change mitigation	Climate change adaptation	Water	Pollution	Circular Economy	Biodiversity	Minimum safeguards	Proportion of Taxonomy-aligned or eligible turnover 2022	Category enabling activity	Category transitional activity
	(a)	€ million	%	Y; N; N/EL (b)	Y; N; N/EL (b)	Y; N; N/EL (b)	Y; N; N/EL (b)	Y; N; N/EL (b)	Y; N; N/EL (b)	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	%	E	T
A. TAXONOMY-ELIGIBLE ACTIVITIES																			
A.1. Environmentally sustainable activities (taxonomy-aligned)																			
Manufacture of energy efficiency equipment for buildings (A1)	CCM 3.5	7	0.03	Y	N/EL	N/EL	N/EL	N/EL	N/EL		Y	Y	Y	Y	Y	Y	0.03	E	
Turnover of environmentally sustainable activities (taxonomy-aligned) (A.1)																			
Of which enabling		7	0.03	0.03	-	-	-	-	-								0.03	E	
Of which transitional		-	-	-													-		T
A.2 Taxonomy-eligible, but not environmentally sustainable activities (not taxonomy-aligned activities)				EL; N/EL	EL; N/EL	EL; N/EL	EL; N/EL	EL; N/EL	EL; N/EL										
Manufacture of active pharmaceutical ingredients (API) or active substances	PPC 1.1	99	0.47	N/EL	N/EL	N/EL	EL	N/EL	N/EL								0.00		
Manufacture of medicinal products	PPC 1.2	5,778	27.52	N/EL	N/EL	N/EL	EL	N/EL	N/EL								0.00		
Manufacture of electrical and electronic equipment	CE 1.2	98	0.47	N/EL	N/EL	N/EL	N/EL	EL	N/EL								0.00		
Turnover of taxonomy-eligible but not environmentally sustainable activities (not taxonomy-aligned activities) (A.2)		**5,975**	**28.46**	**-**	**-**	**-**	**27.99**	**0.47**	**-**								0.00		
A. Turnover of taxonomy eligible activities (A.1 + A.2)		**5,982**	**28.49**	**0.03**	**-**	**-**	**27.99**	**0.47**	**-**										
B. TAXONOMY-NON-ELIGIBLE ACTIVITIES																			
Turnover of taxonomy-non-eligible activities (B)		**15,011**	**71.51**																
Total (A + B)		**20,993**	**100.00**																

Economic activities	Code	CapEx 2023	Proportion of CapEx 2023	Criteria for a substantial contribution: Climate change mitigation	Climate change adaptation	Water	Pollution	Circular Economy	Biodiversity	DNSH criteria ("Do no significant harm"): Climate change mitigation	Climate change adaptation	Water	Pollution	Circular economy	Biodiversity	Minimum safeguards	Proportion of taxonomy aligned or eligible CapEx 2022	Category enabling activity	Category transition-al activity
	(a)	€ million	%	Y; N; N/EL (b)	Y; N; N/EL (b)	Y; N; N/EL (b)	Y; N; N/EL (b)	Y; N; N/EL (b)	Y; N; N/EL (b)	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	%	E	T
A. TAXONOMY-ELIGIBLE ACTIVITIES																			
A.1 Environemtally sustainable activities (taxonomy-aligned)																			
Manufacture of energy efficiency equipment for buildings	CCM 3.5	1	0.06	Y	N/EL	N/EL	N/EL	N/EL	N/EL		Y	Y	Y	Y	Y	Y	0.06	E	
Electricity generation using solar photovoltaic technology	CCM 4.1	4	0.17	Y	N/EL	N/EL	N/EL	N/EL	N/EL		Y	Y	Y	Y	Y	Y	0.00	E	
Renovation of existing buildings	CCM 7.2	10	0.43	Y	N/EL	N/EL	N/EL	N	N/EL		Y	Y	Y	Y	Y	Y	0.51		T
CapEx of environmentally sustainable activities (taxonomy aligned) (A.1)		**16**	**0.66**	**0.66**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**								**0.58**		
Of which enabling		5	0.23	0.23	0.00	0.00	0.00	0.00	0.00									E	
Of which transitional		10	0.43	0.43															T
A.2 Taxonomy-eligible, but not environmentally sustainable activities (not taxonomy-aligned activities)				EL; N/EL	EL; N/EL	EL; N/EL	EL; N/EL	EL; N/EL	EL; N/EL										
Transport by motorbikes, passenger cars and light commercial vehicles (A.2)	CCM 6.5	32	1.35	EL	N/EL	N/EL	N/EL	N/EL	N/EL								1,26		
Manufacture of active pharmaceutical ingredients (API) or active substances	PPC 1.1	1	0.04	N/EL	N/EL	N/EL	EL	N/EL	N/EL								0.00		
Manufacture of medicinal products	PPC 1.2	101	4.27	N/EL	N/EL	N/EL	EL	N/EL	N/EL								0.00		
CapEx of taxonomy-eligible but not environmentally sustainable activities (not taxonomy-aligned activities) (A.2)		**135**	**5.67**	**1.35**	**0.00**	**0.00**	**4.31**	**0.00**	**0.00**								1,26		
A. CapEx of taxonomy eligible activities (A.1 + A.2)		**150**	**6.33**	2.02	0.00	0.00	4.31	0.00	0.00										
B. TAXONOMY-NON-ELIGIBLE ACTIVITIES																			
CapEx of taxonomy-non-eligible activities (B)		**2,226**	**93.67**																
Total (A + B)		**2,377**	**100.00**																

Economic activities	Code	OpEx 2023	Proportion of OpEx 2023	Criteria for a substantial contribution: Climate change	Climate change	Climate change	Water	Pollution	Circular Economy	Biodiversity	DNSH criteria ("Do no significant harm"): Climate change	Climate change	Climate change	Water	Pollution	Circular economy	Biodiversity	Minimum safeguards	Proportion of taxonomy aligned or eligible OpEx 2022	Category enabling activity	Category transition-al activity
	(a)	€ million	%	Y; N; N/EL (b)	Y; N; N/EL (b)	Y; N; N/EL (b)	Y; N; N/EL (b)	Y; N; N/EL (b)	Y; N; N/EL (b)	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	%	E	T
A. TAXONOMY-ELIGIBLE ACTIVITIES																					
A.1 Environemtally sustainable activities (taxonomy-aligned)																					
Manufacture of energy efficiency equipment for buildings	CCM 3.5	1	0.02	Y	N/EL	N/EL	N/EL	N/EL	N/EL		Y	Y	Y	Y	Y	Y	0.00	E	
Renovation of existing buildings	CCM 7.2	0	0.00	Y	N/EL	N/EL	N/EL	N	N/EL		Y	Y	Y	Y	Y	Y	0.00		T
OpEx of environmentally sustainable activities (taxonomy aligned) (A.1)		**1**	**0.02**	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**								**0.00**		
Of which enabling		1	0.02	0.02	-	-	-	-	-								0.00	E	
Of which transitional		0	0.00	0.00	-	-	-	-	-								0.00		T
A.2 Taxonomy-eligible, but not environmentally sustainable activities (not taxonomy-aligned activities)				EL; N/EL	EL; N/EL	EL; N/EL	EL; N/EL	EL; N/EL	EL; N/EL										
Manufacture of active pharmaceutical ingredients (API) or active substances	PPC 1.1	3	0.11	N/EL	N/EL	N/EL	EL	N/EL	N/EL								0.00		
Manufacture of medicinal products	PPC 1.2	49	1.73	N/EL	N/EL	N/EL	EL	N/EL	N/EL								0.00		
Manufacture of electrical and electronic equipment	CE 1.2	4	0.16	N/EL	N/EL	N/EL	N/EL	EL	N/EL								0.00		
OpEx of taxonomy-eligible but not environmentally sustainable activities (not taxonomy-aligned activities) (A.2)		**56**	**1.99**	**0.00**	**0.00**	**0.00**	**1.83**	**0.16**	**0.00**								0.00		
A. OpEx of taxonomy eligible activities (A.1 + A.2)		**57**	**2.02**	0.02	0.00	0.00	1.83	0.16	0.00										
B. TAXONOMY-NON-ELIGIBLE ACTIVITIES																			
OpEx of taxonomy-non-eligible activities (B)		**2,761**	**97.98**																
Total (A + B)		**2,817**	**100.00**																

(a) The Code constitutes the abbreviation of the relevant objective to which the economic activity is eligible to make a substantial contribution, as well as the section number of the activity in the relevant Annex covering the objective, i.e.:
Climate Change Mitigation: CCM
Climate Change Adaptation: CCA
Water and Marine Resources: WTR
Circular Economy: CE
Pollution Prevention and Control: PPC
Biodiversity and ecosystems: BIO

(b) Y – Yes, Taxonomy-eligible and Taxonomy-aligned activity with the relevant environmental objective
N – No, Taxonomy-eligible but not Taxonomy-aligned activity with the relevant environmental objective
N/EL – not eligible, Taxonomy-non-eligible activity for the relevant environmental objective.

Research and development expenses accounted for 2,445 Mio. € (2022:2,521 Mio. €) of the reported operating expenditure, with 1,657 Mio. € (2022: 1,694 Mio. €) of this being attributable to the Healthcare business sector.

Additional Information on Merck KGaA in Accordance with the German Commercial Code (HGB)

The Management Report of Merck KGaA has been combined with the Group Management Report. The Annual Financial Statements and the Combined Management Report of the Group and Merck KGaA for fiscal 2023 are filed with the electronic German company register and are available on its website.

Merck KGaA, headquartered in Darmstadt, Germany, is the parent company of the Group.

Following the transfer of the Life Science, Healthcare and Electronics business sectors into separate legal entities, Merck KGaA primarily performs a holding company function for the Merck Group. As part of the strategic management of the Group, this function makes strategically important decisions and ensures that compliance provisions are observed by the central enabling Group Functions on a Group-wide basis. It also performs Group-wide services for Group companies in the areas of information technology, strategic management and site management, especially at the Darmstadt site. Merck KGaA employs around 4,000 of the more than 11,000 employees at the Darmstadt site.

The financial statements of Merck KGaA have been prepared in accordance with the provisions of the German Commercial Code (HGB), the German Stock Corporation Act (AktG), and the supplementary requirements of the Articles of Association. The full version of the Annual Financial Statements of Merck KGaA together with the unqualified auditor's opinion has been submitted to the electronic company register and published there.

Effects of material company agreements on the net assets, financial position, and results of operations

Hive-down of the operating activities of the business sectors

As part of the strategic further development of Merck KGaA, the existing operating activities of the Life Science, Healthcare, and Electronics business sectors within Merck KGaA, together with the relevant assets and liabilities (hereinafter: "operating units"), were hived down at their carrying amounts into three separate legal entities (hereinafter: "OpCo" or plural "OpCos") with the legal form of a GmbH or German limited liability corporation and with economic effect from January 1, 2018 (operating hive-down).

Since the technical system requirements for the rollout of the business sector-specific enterprise resource planning systems (hereinafter "ERP") were not in place at the OpCos at the time of the hive-down, the business activities hived down to the OpCos have been temporarily leased back by the relevant OpCos to Merck KGaA. Under the terms of a business lease agreement, Merck KGaA leased the entire operations from each of the three OpCos with economic effect from January 1, 2018. In this context, it also leased all fixed assets and acquired the current assets as well as certain liabilities and provisions at their carrying amounts under German commercial law.

The business lease agreement under which the Healthcare business sector was leased back to Merck KGaA was terminated with economic effect from March 31, 2019. Merck Healthcare KGaA (formerly the Healthcare OpCo) assumed the power of operational management for the Healthcare business sector from Merck KGaA with effect from April 1, 2019. As a result of the termination of the business lease agreement, the leased objects allocated to the Healthcare business sector at the end of the lease were transferred to Merck Healthcare KGaA.

The business lease agreement for the Electronics business sector (EL business lease agreement) was terminated with economic effect from December 31, 2019 for the part of the distribution and sales function belonging to the Electronics business sector. Accordingly, these functions were transferred from Merck KGaA to the EL OpCo (then Merck Performance Materials Germany GmbH) with economic effect from January 1, 2020. The contractual, process, procedural, and working relationships and leased objects allocated to the function were transferred to the EL OpCo as a result. The EL business lease agreement for the other functions of the Electronics business sector remained in place until December 31, 2022.

To facilitate the implementation and operation of the new ERP systems for the LS OpCo (then Merck Life Science Germany GmbH) and the EL OpCo, the EL OpCo transferred the Darmstadt-based “Organics” and “OLED” production operations, including the production-related Electronics shared functions (EL Production, hereinafter: “ELP”), to the LS OpCo by way of a chain transformation in multiple steps on August 31, 2022. The function that was spun off from the EL business lease agreement via EL Production (the ELP business lease agreement) had been in place between Merck KGaA as the lessee and the LS OpCo as the lessor since this date.

By way of entries in the commercial register on November 1, 2022 (LS OpCo) and December 29, 2022 (EL OpCo), the LS OpCo and the EL OpCo changed their legal form to that of a German corporation with general partners (Kommanditgesellschaft auf Aktien) and have since been operating under the names Merck Life Science KGaA, Darmstadt, and Merck Electronics KGaA, Darmstadt.

As a result of the aforementioned hive-down and restructuring measures and the existing EL and ELP business lease agreements, Merck KGaA continued to manage the operating business of the Electronics business sector with the exception of part of the distribution and sales function until December 31, 2022. Furthermore, as a result of the Life Science business lease agreement, Merck KGaA also ran the operating business of the Life Science business sector.

Termination of the temporary business lease of the Life Science and Electronics business sectors

Merck Life Science KGaA went live on January 1, 2023. It assumed the power of operational management for the Life Science operating business and ELP from Merck KGaA at this date. Merck KGaA therefore terminated the LS and ELP business lease agreements with effect from January 1, 2023.

Merck KGaA also terminated the EL business lease agreement with effect from January 1, 2023. The power of operational management for the Electronics business sector, with the exception of EL Production, was therefore transferred from Merck KGaA to Merck Electronics KGaA at this date. As a result of the termination of the business lease agreements, the leased objects allocated to the Life Science and Electronics business sectors and EL Production – comprising current and non-current assets as well as certain liabilities and provisions – were transferred to Merck Life Science KGaA and Merck Electronics KGaA respectively. In exchange, Merck Life Science KGaA and Merck Electronics KGaA paid compensation in the amount of the balance of the transferred carrying amounts under German commercial law. In addition, around 3,400 employees were transferred from Merck KGaA to Merck Life Science KGaA and around 1,000 employees were transferred to Merck Electronics KGaA. The remaining around 4,000 employees in Group functions remained with Merck KGaA.

Additional transfers involving the Life Science business sector

By way of a contribution agreement dated December 2, 2022, Merck KGaA also transferred the assets and liabilities allocated to the Life Science business sector that were not previously included in the operating hive-down of the Life Science business sector or the LS business lease agreement to Merck Life Science KGaA with effect from January 1, 2023. This related to the “Packaging & Container” functional unit and the assets and

liabilities of the Hohenbrunn site. The assets and liabilities mainly included property, plant, and equipment, cash and cash equivalents, pension provisions and other provisions and were contributed at their carrying amounts under German commercial law in exchange for the grant of new shares in Merck Life Science KGaA.

Due to the hive-downs and transfers described above in connection with the termination of the business lease agreements (collectively referred to hereinafter as the "transfer of operating activities"), some balance sheet items for 2023 are only comparable with the prior-year figures to a limited extent. To improve comparability, additional information on the impact of the transfer of operating activities to Merck Life Science KGaA and Merck Electronics KGaA on individual balance sheet items of Merck KGaA is provided. The following table shows the balance sheet of Merck KGaA before (December 31, 2022) and after (January 1, 2023) the transfer of operating activities. In terms of Merck KGaA's income statement for fiscal 2023, the transfer of operating activities resulted in lower net sales, material costs, personnel expenses and other operating expenses in particular (for details see the disclosures on the income statement in the "**Business development and results of operations**" section.

			Change	
€ million	**Merck KGaA 01.01.2023**	Merck KGaA 31.12.2022	€ million	%
Assets				
A. Fixed assets				
Intangible assets	192	192	–	0.0%
Tangible assets	961	969	-8	-0.8%
Financial assets	22,809	22,804	5	0.0%
	23,962	**23,965**	**-3**	**0.0%**
B. Current assets				
Inventories	25	546	-521	-95.4%
Trade accounts receivable	76	126	-50	-39.8%
Other receivables and other assets	1,347	968	379	39.2%
Cash and cash equivalents	0	0	–	0.0%
	1,448	**1,641**	**-192**	**-11.7%**
C. Prepaid expenses	74	74	–	0.0%
Total assets	**25,485**	**25,680**	**-195**	**-0.8%**
Equity and liabilities				
A. Net equity				
Subscribed capital	168	168	–	0.0%
General partner's equity	397	397	–	0.0%
Capital reserves	3,814	3,814	–	0.0%
Retained earnings	702	702	–	0.0%
Profit carried forward E. Merck KG	80	80	–	0.0%
Net retained profit: shareholders	318	318	–	0.0%
	5,479	**5,479**	**–**	**0.0%**
B. Provisions				
Provisions for pensions and other post-employment benefits	1,487	1,509	-22	-1.5%
Other provisions	688	774	-86	-11.1%
	2,175	**2,283**	**-108**	**-4.7%**
C. Liabilities				
Financial liabilities	2,751	2,751	–	0.0%
Trade accounts payable	222	308	-86	-28.0%
Other liabilities	14,847	14,848	-1	0.0%
	17,819	**17,907**	**-87**	**-0.5%**
D. Deferred income	11	11	–	-1.7%
Total equity and liabilities	**25,485**	**25,680**	**-195**	**-0.8%**

Business development and results of operations

Merck KGaA's net sales decreased to € 1,628 million in fiscal 2023. The € 1,552 million reduction was mainly due to the transfer of operating activities of the Life Science and Electronics business sectors into separate legal entities with effect from January 1, 2023 (see "**Effects of material company agreements on the net assets, financial position, and results of operations**"). Following the transfer, Merck KGaA no longer generates any income from operating product and service business (2022: € 1,813 million).

In the past fiscal year, Merck KGaA's net sales exclusively comprised income from the intragroup on-charging of services. This primarily related to site management services, IT services, strategic management costs and license fees for the "Merck" umbrella brand. All in all, the intragroup on-charging of services was higher than in the previous year due to the increase in on-charged site and administrative services in particular.

Results of operations

			Change	
€ million	**2023**	2022	€ million	%
Net sales	1,628	3,180	-1,552	-48.8
Other income	105	184	-79	-43.0
Cost of materials	-721	-1,269	548	-43.2
Personnel expenses	-581	-1,256	675	-53.7
Depreciation, amortization, and write-downs	-132	-142	11	-7.5
Other operating expenses	-821	-1,150	329	-28.6
Investment result	2,203	2,015	188	9.3
Other financial result	-685	-414	-272	65.7
Profit before profit transfers and taxes	**996**	**1,148**	**-152**	**-13.2**
Profit transfers	-696	-677	-18	2.7
Taxes	-16	-228	213	-93.1
Profit after profit transfers and taxes	**285**	**242**	**43**	**17.7**

The year-on-year change in individual items of Merck KGaA's income statement was substantially impacted by the transfer of operating activities. These effects are discussed below and above in the "**Effects of material company agreements on the net assets, financial position, and results of operations**" section. As a result, the income statement for fiscal 2023 mainly saw a decline in expense and income items relating to operating activities, such as net sales, material costs, personnel expenses and other operating expenses.

In addition to the effects of the transfer of operating activities, higher profit transfers from subsidiaries and lower tax expense in particular more than offset the higher level of other financial expenses, resulting in an increase in total profit after taxes and profit transfers.

The reduction in **other income** primarily resulted from the fact that the prior-year figure included changes relating to certain inventory items that were transferred as of January 1, 2023, as well as from the lower level of insurance compensation payments.

The transfer of operating activities meant the total **cost of materials** decreased in line with net sales. By contrast, the cost of materials in relation to sales increased to 44.3% (2022: 39.9%), as net sales in the past fiscal year resulted solely from the intragroup oncharging of services whose performance involves a proportionally higher level of material costs (see "**Effects of material company agreements on the net assets, financial position, and results of operations**").

The lower level of **personnel expenses** was due in particular to the transfer of around 4,400 employees to different legal entities as the result of the transfer of operating activities (see "**Effects of material company agreements on the net assets, financial position, and results of operations**"). The level of additions to pension provisions was also lower. This was offset by salary increases for employees covered by and exempt from collective agreements, as well as the collectively agreed inflation allowance.

Depreciation, amortization, and adjustments remained essentially unchanged as against the previous year. The transfer of operating activities did not have a material impact on the amount of fixed assets (see "**Effects of material company agreements on the net assets, financial position, and results of operations**").

The reduction in other **operating expenses** was due to the transfer of operating activities (see "**Effects of material company agreements on the net assets, financial position, and results of operations**") and mainly resulted from the lower level of external services for sales and advertising as well as other external services and procurements.

Following the transfer of operating activities, the relevance of **investment income** as the largest income item is increasing. It increased by € 188 million to € 2,203 million (2022: € 2,015 million) on the back of higher income from profit and loss transfer agreements with subsidiaries in the Healthcare business sector. The general rise in interest rates also led to an increase in the profit transfer from the Group financing company, Merck Financial Services GmbH, Darmstadt. This was offset by lower dividends from other subsidiaries and higher expenses from profit and loss transfer agreements.

The increased interest expense in the **other financial result** was primarily due to higher interest expenses in respect of the Group financing company, Merck Financial Services GmbH, Darmstadt, as a result of rising interest rates; this was offset by positive adjustments to the fair value of the plan assets in connection with pension provisions.

Additions to provisions for uncertain tax obligations in particular led to a higher **tax** expense in the previous year, whereas these did not occur to the same extent in 2023.

Net assets and financial position

Assets

€ million	Dec. 31, 2023	Dec. 31, 2022	Change € million	Change %
Fixed assets	**24,065**	**23,965**	**99**	**0.4**
Intangible assets	181	192	-11	-5.6
Tangible assets	1,076	969	107	11.0
Financial assets	22,808	22,804	3	0.0
Current assets	**1,708**	**1,641**	**68**	**4.1**
Inventories	29	546	-517	-94.7
Trade accounts receivable	62	126	-64	-50.9
Other receivables and other assets	1,617	968	649	67.1
Cash and cash equivalents	0	0	–	–
Prepaid expenses	**78**	**74**	**4**	**5.5**
	25,851	**25,680**	**171**	**0.7**

Equity and liabilities

€ million	Dec. 31, 2023	Dec. 31, 2022	Change € million	Change %
Net equity	**5,481**	**5,479**	**2**	**0.0**
Provisions	**2,198**	**2,283**	**-85**	**-3.7**
Provisions for pensions and other post-employment benefits	1,415	1,509	-94	-6.2
Other provisions	783	774	9	1.2
Liabilities	**18,162**	**17,907**	**256**	**1.4**
Financial liabilities	2,476	2,751	-275	-10.0
Trade accounts payable	152	308	-156	-50.5
Other liabilities	15,534	14,848	686	4.6
Deferred income	**10**	**11**	**-1**	**-12.1**
	25,851	**25,680**	**171**	**0.7**

The year-on-year change in individual items of Merck KGaA's balance sheet was substantially impacted by the transfer of operating activities. These effects are discussed below and above in the "**Effects of material company agreements on the net assets, financial position, and results of operations**" section. In terms of the balance sheet for fiscal 2023, this primarily resulted in a reduction in inventories and trade accounts receivable on the asset side of the balance sheet and in trade payables on the equity and liabilities side, while other receivables increased.

Largely irrespective of the transfer of operating assets, one notable increase on the asset side of the balance sheet related to fixed assets (€ +99 million). This was mainly due to the investments in property, plant and equipment at the Darmstadt site.

The higher level of income from profit and loss transfers meant that other receivables and other assets also increased (€ +649 million). On the equity and liabilities side, the biggest increase related to other liabilities (€ +686 million), whereas financial liabilities decreased (€ -275 million). All in all, net assets rose slightly by 0.7%.

Inventories declined as a result of the transfer of operating activities (see "**Effects of material company agreements on the net assets, financial position, and results of operations**"). At the balance sheet date, they comprised the consumables and supplies required for site operations.

Merck KGaA was financed by equity in the amount of € 5,481 million (2022: € 5,479 million). This corresponds to an equity ratio of 21.2% (2022: 21.3%). Equity increased in particular as a result of the net income generated in fiscal 2023, which offset the dividend payments made during the year.

Merck KGaA is also financed via the Group financing company, Merck Financial Services GmbH, Darmstadt, which provides Merck KGaA with sufficient financial resources and hence ensures liquidity. Other liabilities rose by € 686 million and primarily relate to current loans and clearing account liabilities in respect of Merck Financial Services GmbH, Darmstadt, in the amount of € 14,476 million (2022: € 13,963 million). Financial liabilities of € 2,476 million relate to bonds issued in previous years to finance the acquisitions of Sigma-Aldrich and Versum Materials, Inc., United States, in particular. The € -275 million reduction in financial liabilities was attributable to the repayment of bonds, which resulted in an increase in other liabilities from intragroup financing. Additional information on the financing conditions and maturity structure of the bonds can be found in Note (21) "**Financial liabilities**" of the Notes to the Financial Statements in accordance with HGB.

The reduction in provisions was due in particular to the lower level of pension provisions, which primarily resulted from pension payments and employees being transferred to other legal entities within the Merck Group.

Research and development

Research and development (R&D) expenditure declined to € 69 million in fiscal 2023 (2022: € 289 million), largely as a result of the transfer of operating activities (see "**Effects of material company agreements on the net assets, financial position, and results of operations**"). Merck KGaA continues to recognize expenses for global R&D services.

Dividend

For fiscal 2023, we are proposing to the Annual General Meeting the payment of a dividend of € 2.20 per share.

Personnel

Merck KGaA had 3,924 employees as of December 31, 2023 (2022: 8,485). The year-on-year decline of 4,561 employees was largely attributable to the transfer of operating activities (see "**Effects of material company agreements on the net assets, financial position, and results of operations**").

The average number of employees by functional area:

Personnel

Average number of employees during the year	**2023**	2022
Administration	2,615	3,085
Production and site operations	869	2,940
Research	341	1,091
Logistics	66	614
Marketing and sales	43	523
Other	74	122
Total	**4,008**	**8,375**

Risks and opportunities

As the parent of the Merck KGaA Group, Merck KGaA is largely subject to the same opportunities and risks as the Group. Merck KGaA participates in these risks and opportunities via its equity investments and subsidiaries. This can have consequences for its investment income or the valuation of shares in subsidiaries. More information can be found in the Group "**Report on Risks and Opportunities**".

Forecast for Merck KGaA

Deviations of actual business development in fiscal 2022 from the previously reported guidance

The Combined Management Report for 2022 initially forecast a downturn in net sales in fiscal 2023 due to the transfer of operating activities and the fact that the product-related sales of the transferred business sectors are no longer recognized. The remaining business sector was expected to see a similar level of sales to 2022. Net income was forecast to be slightly higher than in 2022.

Net sales declined from € 3,180 million in the previous year to € 1,628 million, largely as a result of the € 1,813 million in sales from operating product and service business that were no longer recognized as anticipated following the transfer of operating activities. Sales in the reporting year relate solely to the intragroup on-charging of services. The increase in on-charged site and administrative services in particular meant that these were higher than the prior-year forecast of € 1,366 million.

Net income was above the forecast level due to higher investment income and lower taxes in particular. Taken together, these more than offset the higher level of other financial expenses.

Forecast for 2024

Following the transfer of operating activities, net sales are becoming less relevant for Merck KGaA, while the relevance of investment income as the largest income item is increasing. With this in mind, investment income is replacing net sales as a key financial performance indicator starting from fiscal 2023, and a forecast for the next fiscal year is provided below.

In line with the Group’s development, we expect investment income to see moderate growth compared with the figure recorded in fiscal 2023. Accordingly, net income is forecast to be slightly higher than in 2023 overall.

Merck Financial Services GmbH, Darmstadt, will provide the company with sufficient financial resources as needed and thus ensure liquidity.

No risks that could jeopardize the continued existence of the company have been identified.

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Compensation Report

This Compensation Report describes the structure and application of the compensation system for the Executive Board of Merck KGaA, Darmstadt, Germany, in fiscal 2023. It provides a transparent overview of the relationship between compensation and performance, and presents the compensation awarded or due to the members of the Executive Board and the Supervisory Board in fiscal 2023. Both, the Supervisory Board and the Executive Board have jointly prepared the Compensation Report in accordance with section 162 of the German Stock Corporation Act (AktG) as well as the German Corporate Governance Code in the version dated April 28, 2022. It is formally audited in accordance with section 162 (3) AktG as well as materially audited by Deloitte Wirtschaftsprüfungsgesellschaft GmbH. The Compensation Report and the corresponding audit opinion can be found on our website.

The legislation and regulations relating to the Compensation Report are geared toward the situation at a German stock corporation ("Aktiengesellschaft" or "AG") and do not take into consideration the special characteristics of a corporation with general partners ("Kommanditgesellschaft auf Aktien" or "KGaA"), such as our company. Major differences between the two legal forms exist in terms of liability and management. In the case of an AG, only the AG is liable as a legal entity, whereas the general partners of a KGaA also have unlimited personal liability for the company's obligations (section 278 (1) AktG). Unlike the management board members of an AG, the members of the Executive Board of our company are personally liable partners of both Merck KGaA, Darmstadt, Germany, and the general partner E. Merck KG, Darmstadt, Germany, and not merely employed members of a corporate board. Given the structural differences between an AG and a KGaA, several recommendations of the German Corporate Governance Code apply to a KGaA only in a modified form.

Review of fiscal 2023

Fiscal 2023 was a challenging year, which ended with a satisfactory business result despite difficult macroeconomic conditions. These challenging conditions were also evident in the share price development.

Ultimately, the diversified business model had a positive impact on our business results. The Life Science business sector faced a noticeable decline in demand for products and services related to the Covid-19 pandemic and the destocking of our Process Solutions customers, which lasted longer than expected. At the same time, the Electronics business sector was impacted by a prolonged downcycle in Semiconductor Solutions and low customer utilization in Display Solutions. The Healthcare business sector made a positive contribution to the company's success in fiscal 2023. Our new healthcare products led to robust growth. In particular, sales of multiple sclerosis drugs and oncology drugs achieved good sales in our opinion.

In fiscal 2023, we continued to focus on achieving our three core sustainability targets. In the long term, we want to fully integrate sustainability into our value chains, contribute to human progress for more than one billion people through sustainable science and technology, continue to reduce our resource consumption, and achieve climate neutrality. To encourage the implementation of our long-term sustainability targets, corresponding key sustainability indicators and targets were also integrated in the sustainability factor of the Long-term Incentive Plan granted in 2023 (LTIP 2023).

For the members of the Executive Board, the contractually agreed compensation remained unchanged and there were no increases in fiscal 2023. In 2021, the LTIP was revised with a term of four years (previously three years). This extension of the performance cycle results in a one-time payout gap. As a consequence, the members of the Executive Board will not receive any payout from the Long-Term Incentive Plan for fiscal 2023 and there will also be no other payment to bridge the gap. We will report on the target achievement and payout of the LTIP tranche 2021, which runs until December 31, 2024, in the next Compensation Report.

The profit sharing ensures that the Members of the Executive Board act in line with the interests of both the shareholders and owners. It is based on the average of the profit after tax of E. Merck Group, Darmstadt, Germany, of the current year and the two previous years, to ensure a long-term orientation. Thus, the profit sharing for the 2023 financial year considers the very successful years 2021, 2022 as well as the current challenging year 2023.

In fiscal 2023, Marcus Kuhnert stepped down as Chief Financial Officer and Member of the Executive Board of Merck as of June 30, 2023. On July 1, 2023, Helene von Roeder took over the position of Chief Financial Officer. Since 2019, she had been a member of both the Supervisory Board of Merck KGaA, Darmstadt, Germany, and the Board of Partners of E. Merck KG, Darmstadt, Germany. During that time, she was also Chair of the Audit and Finance Committee. She has resigned from these mandates and left the Supervisory Board effective April 17, 2023. Barbara Lambert was appointed to the Supervisory Board with effect from August 11, 2023.

Approval of the Compensation Report 2022

At the Annual General Meeting 2023, the Compensation Report 2022 was approved with a voting result of 84.63% in accordance with section 120a (4) AktG. Only shareholders of Merck KGaA are entitled to vote at the Annual General Meeting.

In the course of the Annual General Meeting 2023 and in numerous discussions thereafter, Merck received feedback from investors, all relevant shareholder associations and proxy advisors on the compensation of the Executive Board as well as the presentation of the Compensation Report.

As in the previous year, we are following suggestions from our investors, we are publishing the target corridor of the respective key performance indicators of the sustainability factor for the second time at the beginning of the performance cycle of the Long-Term Incentive Plan (LTIP).

To provide a complete overview of the compensation system, we continue to describe the most important components of the Compensation Report in detail and at the same time have improved the presentation. In addition, we have further clarified the description of the maximum compensation, illustrating how the different compensation components are limited.

Some discussions with investors focused on the level of the compensation of the Executive Board compared with other companies. In this context, it should be noted that the position of the members of the Executive Board as personally liable partners does explain a different level and structure of compensation. On a regular basis, we initiate a compensation benchmark to assess the level of our compensation. To consider, the criteria of country, size and industry as well as Merck's global business activities and the various business sectors, two peer groups were used for comparison: the DAX® companies and a peer group of international competitors. The latter peer group of international competitors represents our three business sectors (Life Science, Healthcare and Electronics) and includes companies which are headquartered in Europe as well as in the USA.

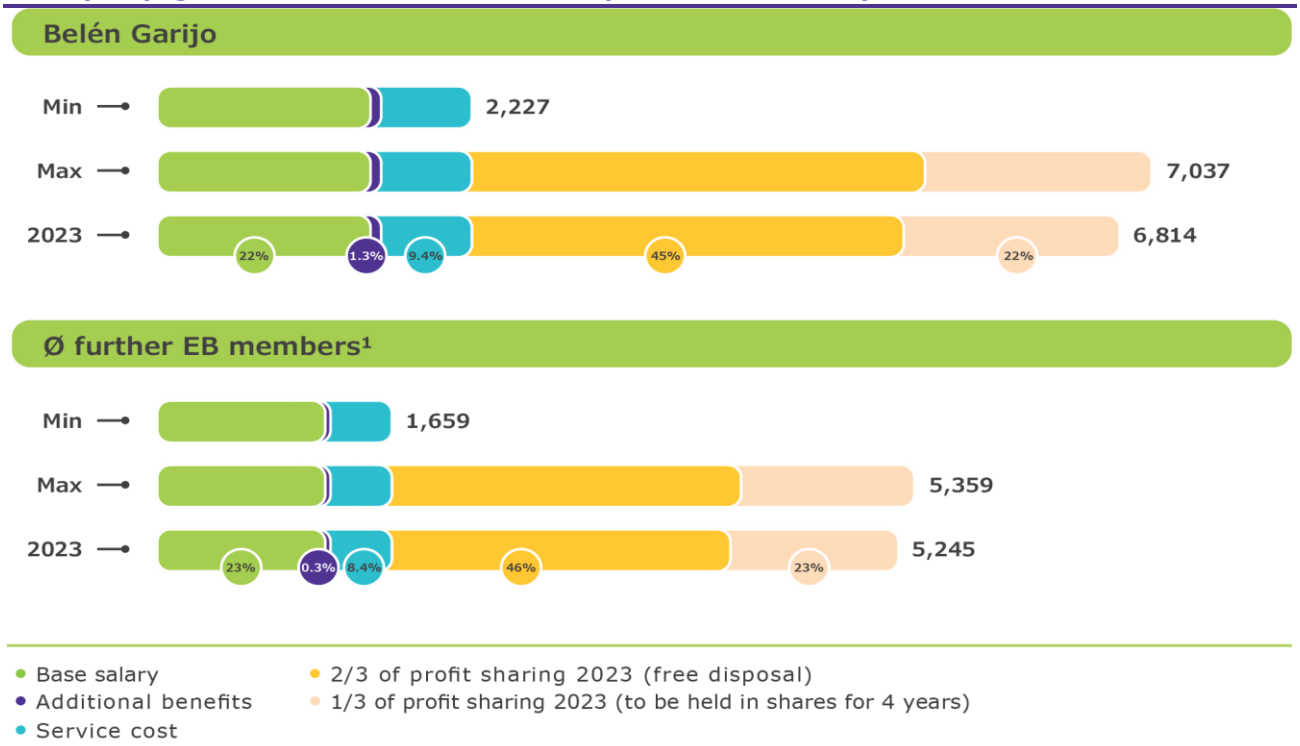
In addition, we have again decided to follow the presentation and interpretation of section 162 (1) of the German Stock Corporation Act (AktG) chosen last year for the compensation tables. In this context, we also monitor the practices of other companies to align with common market practice where necessary.

The exchange with our investors is an important and continuous process. During the Annual General Meeting 2024 and also as part of the review of the compensation system for the Annual General Meeting 2025, we will regularly continue to obtain feedback and stay in dialogue with investors. In this way, we can ensure that we receive constructive and valuable feedback, which can be considered in the upcoming review and potential adjustment to the compensation system and decisions of the Personnel Committee. Accordingly, we will report on the feedback received in the next compensation report.

Compensation for fiscal 2023 – Summary

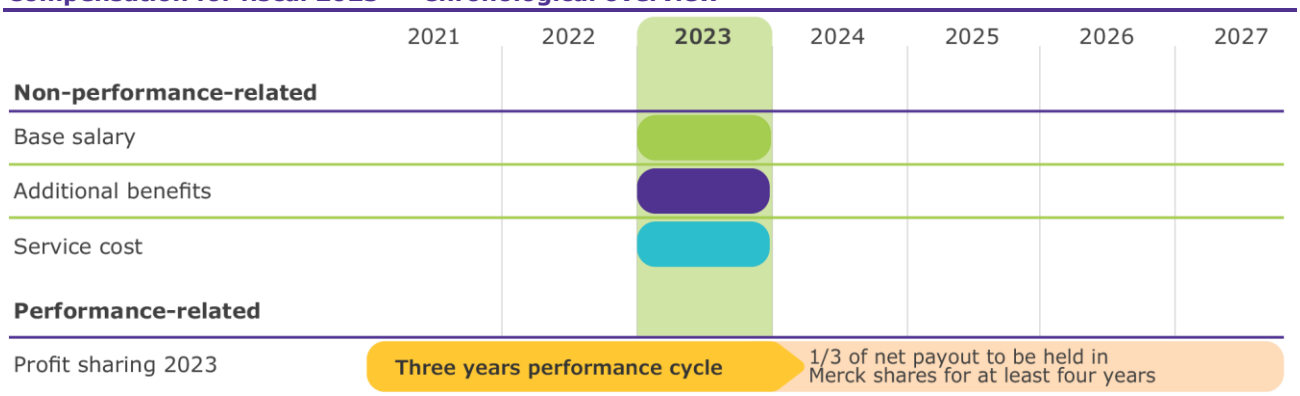
For fiscal 2023, no payment will be made from the LTIP. In 2021, an LTIP was introduced, with a performance period of four years in total (previously three years). As a result, there is a one-time payout gap without bridging payments. The LTIP is therefore not considered in the following graphics below. As a result, the maximum values represent the sum of the base salary, additional benefits and service costs for fiscal 2023 as well as the maximum amount of profit sharing.

Summary of the compensation for the Executive Board members' performance up to December 31, 2023 (see page 8 below "Executive Board Compensation for 2023")



[1] The average calculation includes the compensation of Kai Beckmann, Peter Guenter and Matthias Heinzel. Peter Guenter's compensation payment is not illustrated. Since Marcus Kuhnert left the Executive Board and Helene von Roeder became a member of the Executive Board during the year, their pro-rated compensation would distort the illustration and have therefore not been considered.

Compensation for fiscal 2023[1] – Chronological overview



[1] In 2021, the revised LTIP with a performance cycle of four years (previously three years) was introduced which resulted in a one-time payout gap without bridging payments. The LTIP tranche 2021 runs until December 31, 2024, and will be paid out in April 2025 due to the one-year holding period. That is the reason why the LTIP tranche 2021 is not included in the chronological overview.

Determining the compensation of the Executive Board

At our company, unlike at publicly listed German stock corporations, it is not the Supervisory Board but the Board of Partners of E. Merck KG, Darmstadt, Germany, that is responsible for designing and reviewing the compensation system and deciding on the amount and composition of compensation paid to Executive Board members. The Board of Partners has assigned this task to its Personnel Committee. As a result, the Personnel Committee is responsible for the development and regular review of the compensation system, i.e. structuring and examining of the performance-independent and performance-related compensation elements. The Personnel Committee also takes into account the compensation system for managers and employees below Executive Board level to ensure consistency and a uniform steering effect between the compensation systems. Furthermore, the Personnel Committee is responsible for defining the annual targets and thresholds of the key performance indicators for the performance-related compensation elements.

In addition to structuring the Executive Board compensation system, the Personnel Committee is responsible for defining the specific amounts of compensation paid to the members of the Executive Board. The compensation paid to the members of the Executive Board considers the responsibilities and duties of the individual Executive Board members and in particular, their status as personally liable partners, their individual performance and the economic situation as well as the performance and future prospects of the company.

Furthermore, Executive Board compensation is oriented toward the external peer environment of our company, which comprises the DAX® companies as well as a group of selected international competitors:

German peer group

DAX®

+

International peer group

- Agilent
- Air Liquide
- AstraZeneca
- Bayer
- Biogen
- Bio-Rad
- Danaher
- DuPont
- Entegris
- GlaxoSmithKline
- Infineon
- Lonza
- MSD
- Novartis
- Philips
- Roche
- Sanofi
- Sartorius
- Thermo Fisher
- UCB

The international peer group was defined considering the size, business area and geographic location of the headquarters of the respective competitors. Overall, the peer group offers an appropriate ratio of companies headquartered in Europe and the United States as well as a balanced coverage of the Life Science, Healthcare and Electronics business sectors. Based on the size criteria of sales, number of employees and market capitalization, Merck positions itself around the median of this international peer group.

Moreover, for the determination of the specific compensation amounts, the relations between Executive Board compensation, top management compensation and workforce compensation will be considered also based on a multi-year assessment. Top management is defined as senior levels of management below the Executive Board in Germany. The average compensation of an employee in full-time employment in Germany is considered in the determination of the compensation of the remaining staff.

The Personnel Committee regularly reviews the amount and structure of the Executive Board compensation by referring to the peer groups described and with the assistance of an independent compensation consultant.

Overview of the structure of the compensation system

Compensation components

Executive Board compensation includes three main components: base salary, profit sharing and the Long-Term Incentive Plan. It is complemented by contributions to the company pension plan as well as additional benefits. Additional compensation arrangements also exist for the members of the Executive Board, in particular malus and clawback provisions and a Share Ownership Guideline.

The performance-related compensation elements – profit sharing and the Long-Term Incentive Plan – are based on a multi-year performance period and as such are fully oriented toward the company's long-term development. In addition, there is a strong reference to the company's share price, to provide for special focus on our shareholders' interests. The key performance indicators selected for variable compensation are derived from the corporate strategy and form part of our central controlling system. In this way, the variable compensation of the Executive Board members is used as a strong steering tool to ensure a focus on our objective of long-term profitable growth accompanied by strong cost discipline.

The following diagram provides an overview of all the elements of the compensation system for Executive Board members:

Non-performance-related compensation

Base salary

Additional benefits

Pension entitlement

Performance-related compensation

Profit sharing

- Key performance indicator: Three-year average of the profit after tax of the E. Merck Group
- Consideration of individual performance and individual contribution to achieving the sustainability goals via the adjustment factor in a range from 0.8 to 1.2 based on the defined criteria set
- Individual, absolute capped amount

Merck Long-Term Incentive Plan

- Performance Share Plan based on virtual shares (Merck Share Units)
- Key performance indicators: share price performance relative to the DAX® (50%), EBITDA pre margin (25%), organic sales growth (25%)
- Sustainability factor ranging from 0.8 to 1.2 based on the sustainability goals "Dedicated to human progress", "Partnering for sustainable business impact" and "Reducing our ecological footprint"
- Absolute capped amount totaling 250% of the individual grant
- Four-year performance period with three-year achievement period and subsequent one-year holding period

Other components

Malus & Clawback

Potential applications:

- Violation of internal regulations and guidelines (Merck Code of Conduct), laws or other binding external specifications in the area of responsibility or considerable violations of due diligence within the meaning of section 93 of the German Stock Corporation Act
- In the event of other grossly non-compliant or unethical behavior or behavior or actions that are contrary to our corporate values.

Share Ownership Guidelines

- Mandatory personal investment amounting to one third of the net payment of the profit sharing in Merck shares
- Four-year holding period

Executive Board compensation for 2023

The performance-related and performance-independent components of the compensation system for the Executive Board in fiscal 2023 are fully consistent with the Executive Board compensation system approved by the Annual General Meeting 2021 with a voting result of 87.08%. The compensation system for the Executive Board is published on our **Website** and applies to all members of the Executive Board since January 1, 2021. The Personnel Committee ensures compliance with the compensation system by deciding by resolution on the parameters of the compensation elements (e.g. target setting, determination of target achievement, etc.) as well as on the amounts to be paid out.

The following section reports on the compensation awarded or due in accordance with section 162 (1) AktG. Accordingly, the following sections contain all amounts paid to individual members of the Executive Board (active and former members) in fiscal 2023 (compensation awarded) as well as all amounts legally due but not yet received (compensation due).

In addition, the compensation for which the members of the Executive Board have provided the underlying service in full by December 31, 2023, but whose payment will be made in the following year, is disclosed on a voluntary basis. This enables transparent information and ensures the link between performance and compensation in the fiscal year. This year, the voluntary reporting only concerns profit sharing for 2023. The Personnel Committee has provisionally determined the payout amounts of the profit-sharing by resolution and informed the members of the Executive Board accordingly. The final amount will be paid to the members of the Executive Board after the consolidated financial statements of E. Merck KG have been released. After amending the compensation system of the Executive Board effective January 1, 2021, an additional one-year holding period was introduced for the LTIP, which applies for the first time to the LTIP Tranche 2021. Therefore, the performance period of the LTIP tranche 2021 will run until the end of fiscal 2024 and payout will be made in April 2025. The LTIP tranche 2020, however, ran until the end of fiscal 2022 and was paid out in April 2023. As a result, payout of the LTIP tranche 2021 can only be reported on a voluntary basis in the Compensation Report 2024. The obligation to report on the LTIP tranche 2021 applies for the first time in the Compensation Report 2025.

Performance-independent compensation

Base salary

As base salary, the members of the Executive Board receive contractually fixed performance-independent amounts that are paid in the form of 12 equal monthly installments. There was no increase of the base salary in fiscal 2023.

Additional benefits

The additional benefits mainly include company cars for personal use, contributions to insurance policies and expenses for personal protection.

In addition, as compensation for the loss of entitlements to variable compensation from his previous employment relationship, Peter Guenter received upon the initial appointment in fiscal 2021 a commitment to compensation totaling € 1,500,000.00. The entitlement has been verified in the context of his initial appointment based on supporting documents and the amount has been determined accordingly. The compensation is to be paid in cash in four equal installments. The first installment was paid on July 1, 2021, the second installment was paid on July 1, 2022, and the third installment was paid on July 1, 2023. The final installment will be paid out on July 1, 2024, provided the employment relationship continues.

As part of the initial appointment as a member of the Executive Board, compensation commitments were agreed with Helene von Roeder to compensate for the loss of entitlements to both short-term and long-term variable compensation from her previous position on the Management Board at Vonovia SE. The loss of variable compensation claims against Vonovia SE were proven on the basis of corresponding supporting documents. The compensation for the loss of the short-term incentive for the year 2023 covers the period until her appointment to the Executive Board of Merck KGaA (January 1, 2023 to June 30, 2023) and amounts to € 257,125. The amount will be paid out in fiscal 2024. The compensation for the loss of long-term incentive fiscal 2023 covers the period until her appointment to the Executive Board of Merck KGaA (January 1, 2023 to June 30, 2023) and is based on the Long-Term Incentive Plan Rules of Vonovia SE for the year 2023, whose performance period runs from the beginning of 2023 to the end of 2026. As a corresponding compensation payment, 50% of the gross amount that would have resulted from Helene von Roeder's complete entitlement to the long-term incentive for the year 2023 is to be reimbursed. However, the maximum payout amount according to Vonovia's Long-Term Incentive Plan Rules will be considered. Therefore, the amount can only be calculated after the publication of the 2026 annual financial statements of Vonovia SE and will be paid out in 2027. Should it not be possible to calculate the payout amount, 50% of the allocation value of Vonovia's long-term incentive for 2023 will be paid out (€ 618,750). In this way, it is ensured that Helene von Roeder is only compensated for the actual loss of long-term incentive. The entitlement to the compensation payment has arisen in full. In fiscal 2023, provisions of € 695,549 were made regarding this compensation.

Pension entitlement

The members of the Executive Board are granted a pension obligation as a direct commitment. A fixed amount is paid into a benefit account every year and interest is paid at the applicable statutory maximum technical interest rate for the life insurance industry in accordance with section 2 (1) of the German Regulation on the Principles Underlying the Calculation of the Premium Reserve (DeckRV). Once the pension event occurs, the amount in the benefit account is paid out either in ten annual installments or as a one-time payment. The pension event occurs upon retirement, in the event of occupational disability or death.

After leaving the Executive Board, Marcus Kuhnert retains a vested entitlement to the pension account, which will be granted to him upon the occurrence of the pension event. In fiscal 2023, no pension contributions were increased.

Pension obligations

		IAS 19			
		Service cost		Present value of the pension obligation as of December 31	
€ thousand	Contribution level	**2023**	2022	**2023**	2022
Belén Garijo	650	638	638	7,858	7,057
Kai Beckmann	450	435	439	6,875	6,309
Peter Guenter	450	435	437	1,357	893
Matthias Heinzel	450	454	462	1,405	832
Marcus Kuhnert (Left: June 30, 2023)[1]	400	396	401	5,197	4,717
Helene von Roeder (Entry: July 1, 2023)	225	268	–	268	–
Total	**2,625**	**2,626**	**2,377**	**22,960**	**19,808**

[1] The pension contribution for 2023 has been fully paid out into the pension account.

Performance-related compensation

Performance-related compensation comprises profit sharing as well as the Long-Term Incentive Plan (LTIP).

Profit sharing

As regards profit sharing, an individual profit-sharing rate is contractually defined for the members of the Executive Board as a per mille rate of the three-year average of the consolidated profit after tax of E. Merck KG, Darmstadt, Germany. Fiscal 2023 and the two preceding fiscal years are included in the calculation.

The use of profit after tax as the key performance indicator, which also serves as the basis for dividend payments, ensures very close alignment with shareholder interests.

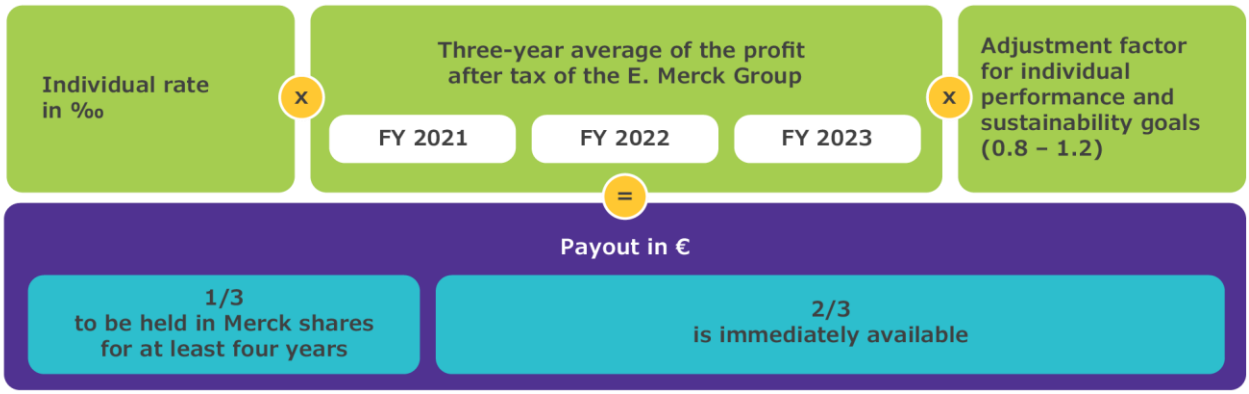
To appropriately consider the individual performance of the Executive Board members, the Personnel Committee may modify the payment by applying a factor ranging from 0.8 to 1.2. In determining the level of this factor, the Personnel Committee applies the following criteria, which also include sustainability goals.

Bonus criteria for increasing profit sharing	Malus criteria for decreasing profit sharing
• Extraordinary contributions to the sustainability goals and performance criteria “Dedicated to human progress”, “Partnering for sustainable business impact” and “Reducing our ecological footprint” (e.g. CO_2 reduction, employee satisfaction, customer satisfaction, Corporate Social Responsibility, diversity)	• Significantly failing to meet the sustainability goals and performance criteria “Dedicated to human progress”, “Partnering for sustainable business impact” and “Reducing our ecological footprint” (e.g. CO_2 reduction, employee satisfaction, customer satisfaction, Corporate Social Responsibility, diversity)
• Extraordinary success in connection with M&A activities of the Merck Group	• Violations of internal rules and regulations (for instance the Merck Code of Conduct), laws or other binding external requirements in the area of responsibility
• Extraordinary success in the sustainable strategic, technical, product-related or structural further development or reorganization of the Merck Group	• Significant breaches of duty of care within the meaning of section 93 of the German Stock Corporation Act or other grossly non-compliant or unethical behavior
• Extraordinary performance in the execution of especially important projects or the achievement of other exceptionally important objectives in the area of responsibility	• Behaviors or actions that are contradictory to our company values
• Extraordinary performance leading to a clear overachievement of targets for relevant key performance indicators in the area of responsibility	• Failure to execute especially important projects or failing to achieve other exceptionally important objectives in the area of responsibility
	• Clear failure to achieve targets for relevant key performance indicators in the area of responsibility

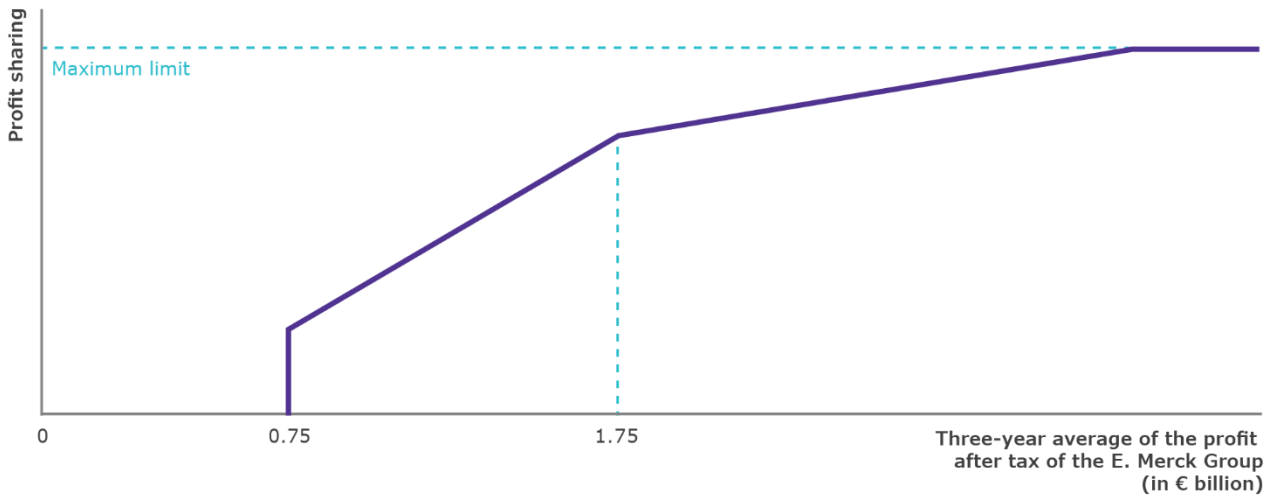
The performance factor makes it possible to recognize outstanding performance by a member of the Executive Board by multiplying profit sharing by a value greater than 1.0 up to 1.2. Similarly, multiplying by a value less than 1.0 down to 0.8 can reduce profit sharing if the circumstances call for it.

The members of the Executive Board are obligated to hold one-third of the payout of the profit sharing in shares of Merck KGaA, Darmstadt, Germany, for at least four years. Further details are provided under the heading “**Share Ownership Guideline**”.

The following illustration shows the profit sharing for fiscal 2023:



An average profit after tax of at least € 0.75 billion must be generated for the profit-sharing payment to be made. This minimum threshold reflects the "pay-for-performance" approach of the compensation system. If the profit exceeds this threshold, the individual profit-sharing rates are staggered as illustrated in the following graphic:



The maximum profit-sharing payment is capped individually. It amounts to € 4,810 thousand for Belén Garijo, € 3,500 thousand for Kai Beckmann, € 3,900 thousand for Peter Guenter, € 3,900 thousand for Matthias Heinzel and € 3,300 thousand for both Marcus Kuhnert and Helene von Roeder. In fiscal 2023, the maximum payout for Marcus Kuhnert is € 1,650 thousand due to leaving the Executive Board on June 30, 2023, and for Helene von Roeder it amounts also to € 1,650 thousand due to her entry on July 1, 2023.

The three-year average that is relevant for fiscal 2023 was based on the profit after tax generated by the E. Merck Group in 2021, 2022 and 2023 as illustrated in the following graphic and table:

Profit after tax of the E. Merck Group

€ million	2020	2021	2022	**2023**
Profit after tax of the E. Merck Group	1,915	3,003	3,288	2,760
Three-year average profit after tax of the E. Merck Group (2020–2022)		2,735		
Three-year average profit after tax of the E. Merck Group (2021–2023)			3,017	

The Personnel Committee has set the adjustment factor at 1.0 for all members of the Executive Board, taking into account individual performance and contribution to the sustainability targets against the background of the agreed criteria. This is in recognition of the achievements of the members of the Executive Board for fiscal 2023. The Executive Board faced many challenges as a result of difficult macroeconomic conditions, headwinds from competitors, and the fact that studies with Evobrutinib did not achieve the desired success in a late test phase. The Personnel Committee acknowledges that, thanks to the commitment of the members of the Executive Board, fiscal 2023 could be closed satisfactorily under the given conditions. In addition to the economic aspect, the members of the Executive Board continued to focus on our three key sustainability targets. Sustainable leadership and well-thought-out decisions by the Executive Board have ensured that the Merck Group remains focused on long-term growth.

Considering the relevant three-year average of the E. Merck Group's profit after tax, the individual sharing rates and the performance factor, the profit sharing and the shareholding obligation for fiscal 2023 are as follows:

Profit sharing 2023 summary

	Three-year average profit after tax of the E. Merck Group (€ million)	Average individual profit-sharing rate 2023 (in per mill)[1]	Performance factor for individual performance	Payout amount (€ thousand)	thereof shareholding obligation (1/3) (€ thousand)[2]
Belén Garijo	3,017	1.52	1.0	4,587	1,529
Kai Beckmann		1.10	1.0	3,333	1,111
Peter Guenter		1.23	1.0	3,712	1,237
Matthias Heinzel		1.23	1.0	3,712	1,237
Marcus Kuhnert (until June 30, 2023)[3]		0.52	1.0	1,567	522
Helene von Roeder (since July 1, 2023)[4]		0.52	1.0	1,567	522

[1] Payout amount of profit sharing in relation to the three-year average after tax.
[2] Gross amount - investment is based on net amount.
[3] Pro-rated for January 1, 2023 until June 30, 2023.
[4] Pro-rated for July 1, 2023 until December 31, 2023.

The profit-sharing 2023 will be paid out in April 2024, while one-third must be held in shares of Merck KGaA, Darmstadt, Germany, for at least four years. Further details of the investment obligation can be found under "**Share Ownership Guideline**".

In fiscal 2023, the profit sharing for fiscal 2022 already explained in detail in the Compensation Report 2022 was paid out, which is thus reported as compensation awarded or due in fiscal 2023 in accordance with section 162 of the German Stock Corporation Act (AktG). Further details can be found in the following table from the previous year:

Profit sharing 2022 summary

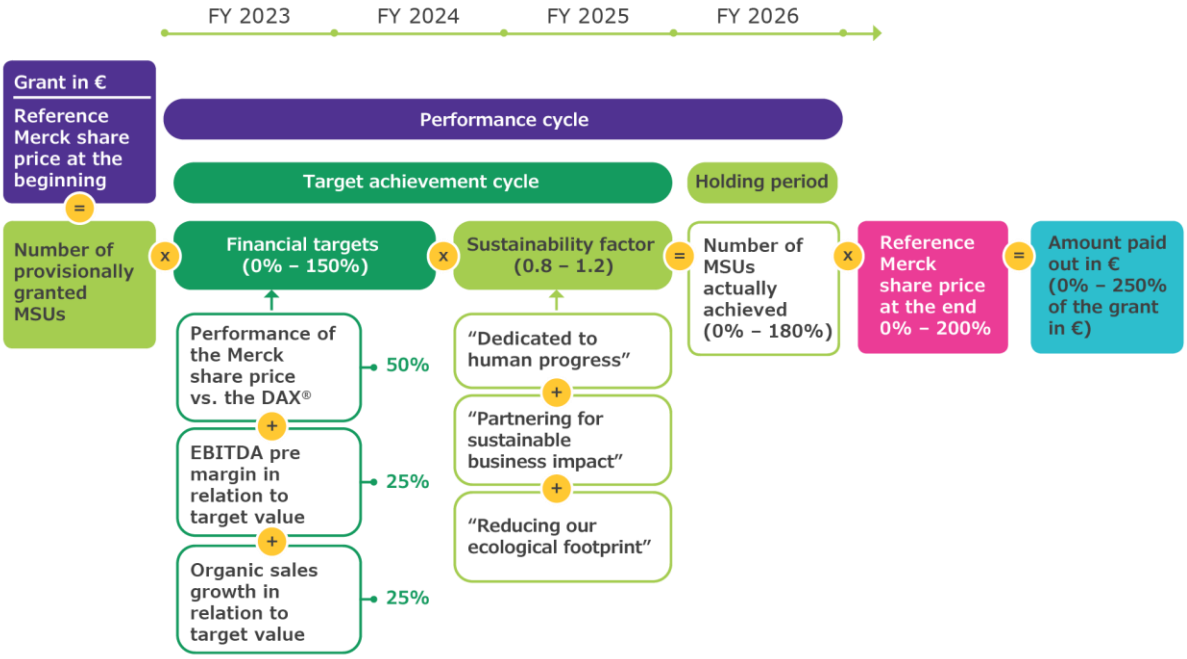
	Three-year average profit after tax of the E. Merck Group (€ million)	Average individual profit-sharing rate 2022 (in per mill)[1]	Performance factor for individual performance	Payout amount (€ thousand)	thereof share holding obligation (1/3) (€ thousand)[2]
Belén Garijo	2,735	1.60	1.0	4,390	1,463
Kai Beckmann		1.17	1.0	3,193	1,064
Peter Guenter		1.30	1.0	3,552	1,184
Matthias Heinzel		1.30	1.0	3,552	1,184
Marcus Kuhnert		1.09	1.0	2,993	998

[1] Payout amount of profit sharing in relation to the three-year average after tax.
[2] Gross amount - investment is based on net amount.

Long-Term Incentive Plan (LTIP)

Long-Term Incentive tranche for fiscal 2023

The Long-Term Incentive Plan is designed as a virtual performance share plan. It is based on a four-year future-oriented performance cycle that is composed of a three-year target achievement cycle and, since the 2021 tranche, a subsequent one-year holding period. In addition to three financial performance indicators, the LTIP has taken sustainability targets into account since fiscal 2022. These targets are linked to a sustainability factor. The sustainability factor has a range of 0.8 to 1.2 and can increase or reduce the target achievement resulting from the financial key performance indicators by up to 20%. The following graphic illustrates the calculation of the Merck Share Units (MSUs) as well as the functionality of the sustainability factor.



Calculation of the MSUs

As part of the LTIP, members of the Executive Board are provisionally granted a certain number of virtual shares, so-called share units of Merck KGaA, Darmstadt, Germany ("MSUs"). The number of MSUs is calculated as follows: An individual grant in Euros is set for each Executive Board member. Every year, this grant is divided by the definitive reference share price at the beginning of the performance cycle, resulting in the number of MSUs that the respective member is provisionally entitled to receive.

In fiscal 2023, the allocation of the LTIP tranche 2023 was made on the basis of the following parameters:

LTIP Tranche 2023 allocation

	Grant amount (€ thousand)	Reference Merck share price at the beginning (in €)	Number of provisionally granted MSUs	Maximum payout (€ thousand)
Belén Garijo	2,300	173.46	13,260	5,750
Kai Beckmann	1,715		9,887	4,288
Peter Guenter	1,900		10,954	4,750
Matthias Heinzel	1,900		10,954	4,750
Marcus Kuhnert (until June 30, 2023)[1]	1,400		8,071	3,500
Helene von Roeder (since July 1, 2023)	700		4,036	1,750

[1] Payout will be pro-rated based on the termination agreement.

The number of MSUs actually allocated to the Executive Board members after the end of the target achievement cycle depends on the development of the financial performance indicators and the sustainability factor during the three-year target achievement cycle.

Based on the three financial performance indicators, the number of MSUs allocated may be between 0% and 150% of the provisionally granted MSUs. The resulting number of MSUs is then multiplied by the sustainability factor.

The sustainability factor target achievement can range between 0.8 and 1.2 and is determined by the predefined sustainability key indicators. Thus, the total number of MSUs actually allocated can amount to a maximum of 180% of the provisionally granted MSUs.

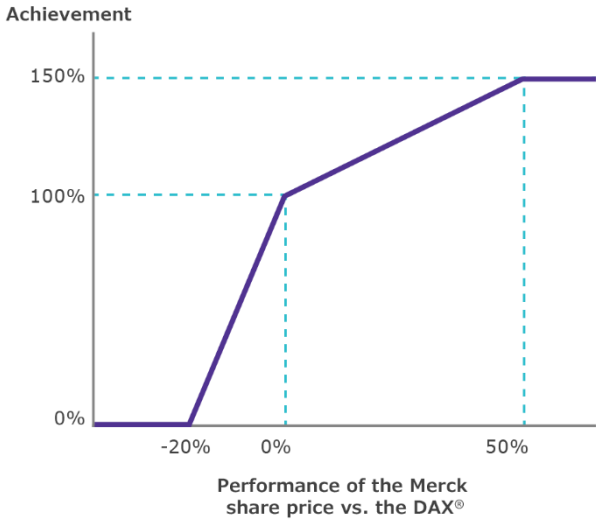
The target achievement cycle is followed by a one-year holding period. The final payout amount may be between 0% and a maximum of 250% of the amount originally granted and depends on the number of MSUs actually allocated and the reference share price at the end of the performance cycle.

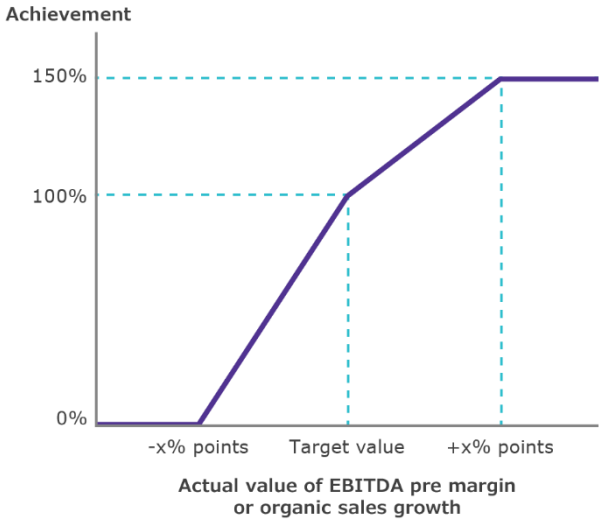
Financial key performance indicators

The relevant financial key performance indicators are:

- The performance of the share price of Merck KGaA, Darmstadt, Germany, compared with the performance of the DAX® with a weighting of 50%,
- The EBITDA pre margin as a proportion of a defined target value with a weighting of 25%, and
- The organic sales growth of the Merck Group as a proportion of a predefined target value with a weighting of 25%.

The number of MSUs actually allocated after the end of the target achievement cycle is based on the following target achievement curves. The targets and thresholds for the key performance indicators of the EBITDA pre margin and organic sales growth are defined by the Personnel Committee at the start of the performance cycle and subsequently published in the Compensation Report.





Non-financial key indicators of the sustainability factor

With the introduction of the sustainability factor in fiscal 2022, our sustainability strategy also becomes incorporated into the LTIP. On the basis of the sustainability goals ("Dedicated to human progress", "Partnering for sustainable business impact" and "Reducing our ecological footprint"), the Personnel Committee defines corresponding specific and measurable sustainability key indicators as well as associated target and threshold values at the beginning of each tranche of the LTIP. These values are used to calculate target achievement at the end of the relevant target achievement cycle. The following sustainability criteria were defined for the selection of the sustainability key indicators:

- Relevance and influence of the sustainability key indicators on the three overarching sustainability goals of the sustainability strategy
- Internal and external influence of the sustainability key indicators by management
- Good measurability and operationalization
- Sustained impact to support long-term solutions and not incentivize short-term actions

In addition, the Personnel Committee determines the weighting of the individual sustainability goal for each tranche of the LTIP to emphasize priorities.

The Personnel Committee has defined the following sustainability key indicators and weightings for the 2023 tranche of the LTIP:

Sustainability Goal	Weighting	Sustainability Key Indicator
Dedicated to human progress	30%	People treated with our Healthcare products (including schistosomiasis control program) and pharma products enabled by our Life Science business sector
Partnering for sustainable business impact	30%	Percentage of relevant suppliers (in terms of number and supplier spend) that are covered by a valid sustainability assessment
Reducing our ecological footprint	40%	Greenhouse gas emissions Scope 1+2

The following table shows the target corridor ex ante for the respective sustainability key indicators of the three overarching goals for the 2023 LTI tranche.

Sustainability Goal/Key Indicator	Minimum	Target	Maximum
Dedicated to human progress			
Number of people treated with Merck Healthcare products (in million)			
Number of people treated as part of the schistosomiasis control program (in million)	555	609	650
Number of people treated with pharmaceutical products of Merck Life Science (in million)			
Partnering for sustainable business impact			
Relevant suppliers with a valid sustainability assessment (% of all relevant suppliers)	65%	73%	80%
Relevant suppliers with a valid sustainability assessment (% of supplier spend)	85%	92%	100%
Reducing our ecological footprint			
Greenhouse gas emissions in Scope 1+2 worldwide (in kt)	965.0	875.0	805.0

- “Dedicated to human progress”

  We are convinced that with the help of science and technology, we can contribute to solving many global challenges. In this context, our Healthcare business sector measures how many people worldwide will be treated with our company's medical products. On the one hand, we look at the number of people treated with products from the Healthcare business sector and, on the other hand we consider patients who are offered treatment with our praziquantel tablets as part of the schistosomiasis control program. For the LTIP tranche 2023, an additional sustainability key indicator has been introduced that relates to our Life Science business sector. It covers people who are treated with drugs and medical products which are that are manufactured using key Merck Life Science technologies and products. We intend to continuously increase this sustainability goal and thus contribute to a significant improvement in medical care and the health status of as many people as possible.

- “Partnering for sustainable business impact”

  We measure our progress in embedding sustainability in our supply chains. We achieve this by increasing the transparency of our supply chains and subjecting more suppliers to a sustainability assessment. We are focusing particularly on suppliers for which we see a sustainability risks in the supply chain and those suppliers who cover a relevant share of our supplier spend. In connection with this sustainability assessment, it is important for us to increase the number of suppliers with a valid sustainability assessment.

- “Reducing our ecological footprint”

  On our path to climate neutrality, we have already joined the Science Based Targets Initiative and aim to reduce both direct (Scope 1) and indirect emissions (Scope 2) by 50% by 2030 compared with 2020. This target is to be achieved through the reduction of process-related emissions, energy efficiency measures, and increased purchase of electricity from renewable sources. Particularly in the case of process emissions (Scope 1), we aim to significantly reduce emissions by using new technologies.

Target Achievement Long-Term Incentive Plan

The LTIP tranche allocated in fiscal 2021 was still without a sustainability factor but already included the one-year holding period. Accordingly, the performance cycle is four years, consisting of the target achievement cycle of three years and the one-year holding period which will continue to be influenced by the share price development. Consequently, the target achievement cycle started on January 1, 2021, and was running until December 31, 2023. The final payout amounts of the LTIP Tranche 2021 will be determined after calculating the base price following the holding period and will be paid out in April 2025. The payout amounts will be published in the next compensation report.

The LTIP tranche 2020 was structured according to the former model without a one-year holding period and without a sustainability factor. Consequently, the LTIP tranche 2020 has been paid out in April 2023.

The targets and thresholds, the actual amounts, and the resulting target achievement for the LTI tranche 2020 are as follows:

LTIP 2020 target achievement

	Lower target corridor limit	Target	Upper target corridor limit	Actual achieved value	Target achievement[1]
Share price performance relative to the DAX® (weighting: 50%)	-20.0%	0.0%	50.0%	58.6%	150.0%
EBITDA pre margin (weighting: 25%)	25.6%	28.6%	31.6%	30.5%	131.7%
Organic sales growth (weighting: 25%)	5.1%	8.1%	11.1%	8.7%	110.0%
Total target achievement					**135.4%**

[1] Cap of 150% for the performance indicator "Share price performance relative to the DAX®" was reached.

The resulting final number of MSUs and the payout amounts of the LTIP tranche 2020 are shown in the following table.

LTIP 2020 summary

	Grant amount (€ thousand)	Reference Merck share price at the beginning (in €)	Number of provisionally granted MSUs	Total target achievement	Final number of MSUs	Reference Merck share price at the end (in €)	Payout amount (€ thousand)[1]
Stefan Oschmann (until April 30, 2021)	2,255		21,371		28,942		2,226
Udit Batra (until July 13, 2020)	1,705		16,159		21,883		633
Kai Beckmann	1,530	105.53	14,500	135.4%	19,637	173.46	3,406
Belén Garijo	1,970		18,670		25,284		3,910
Marcus Kuhnert (until June 30, 2023)	1,320		12,510		16,942		2,939

[1] Payout capped at 250% of the grant value. A pro-rata payout has been made for Stefan Oschmann and Udit Batra. The payout for Belén Garijo was reduced to ensure compliance with the cap on direct compensation.

The performance cycle of the LTIP tranche 2022 is still running until December 31, 2025, and will be paid out in April 2026.

Share Ownership Guideline

Since 2017, the members of the Executive Board are obliged to invest in and hold shares of Merck KGaA, Darmstadt, Germany, as part of the Share Ownership Guideline (SOG) valid until fiscal 2021. Since the introduction of the new compensation system at the beginning of fiscal 2021, the share ownership obligation has been linked to the variable compensation element of profit sharing. Under the revised SOG, members of the Executive Board are required to hold one-third of the net profit-sharing payout in shares for at least four years. The shareholding obligation thus builds up gradually over the first four fiscal years after the introduction of the new compensation system. The aim is that the Chairperson holds 200% of the base salary and the members of the Executive Board to hold 100% of the base salary in shares of Merck KGaA. A corresponding investment was made after payout of the profit sharing 2022 in fiscal 2023 as part of an automated purchase via an external provider.

The Share Ownership Guideline promotes an even stronger alignment of the interests of the members of the Executive Board with the sustainable interests of our shareholders and additionally increases the corporate responsibility of the members of the Executive Board in addition to their status as general partners.

The following table illustrates the investment volume of the members of the Executive Board in accordance with the SOG. The numbers show the shareholding obligation arising from the profit-sharing. No conclusions can be drawn as to the individual shareholdings.

Share Ownership Guideline

	Share holding obligation based on SOG (in € thousand)[1]					
	From profit sharing 2021	From profit sharing 2022	From profit sharing 2023	From profit sharing 2024	Total	In % of Annual Base Salary
Belén Garijo	1,224	1,463	1,529	Investment is made after payout of profit sharing for fiscal year 2024	4,216	281%
Kai Beckmann	951	1,064	1,111		3,126	261%
Peter Guenter	1,055	1,184	1,237		3,476	290%
Matthias Heinzel	795	1,184	1,237		3,216	268%
Marcus Kuhnert	885	998	522		2,405	200%
Helene von Roeder	–	–	522		522	44%

[1] Gross amounts from profit sharing. Shareholding obligation is calculated on the respective net amounts.

Malus and clawback provisions

Through their status as personally liable general partners of Merck KGaA, Darmstadt, Germany, and E. Merck KG, Darmstadt, Germany, the Executive Board members bear a unique entrepreneurial responsibility. This is also reflected by the malus criteria set forth in profit sharing and by the German statutory regulations on liability for damages stipulated in section 93 of the German Stock Corporation Act (AktG). In order to take even greater account of the prominent position of entrepreneurial responsibility in compensation, a clawback provision is implemented for the LTIP. Cases in which the clawback provision may be applied include violations of internal rules and regulations (Code of Conduct), legislation, other binding external requirements in responsibility, significant breaches of duty of care within the meaning of section 93 AktG, and other grossly non-compliant or unethical behavior or actions that are contradictory to our company values. In these cases, amounts that have already been allocated under the Long-Term Incentive Plan may be retained. The Personnel Committee is entitled to demand the repayment of profit sharing and LTIP payouts from a member of the Executive Board if it subsequently transpires that the payout was made wrongfully, either in full or in part. For example, this is the case when targets are not actually met or are not met to the extent assumed when the payout was calculated due to incorrect information being applied. The extent of these claims for restitution is based on section 818 of the German Civil Code (BGB). The Personnel Committee may agree deadlines for the assertion of claims for restitution with the members of the Executive Board.

Neither the malus provision nor the clawback provision were exercised in fiscal 2023.

Compensation-related transactions

Contracts with the members of the Executive Board are usually concluded for a period of five years. If a contract begins during the year, the fixed compensation, profit sharing and individual LTIP tranches are paid on a pro rata basis.

Should members of the Executive Board be held liable for financial losses while executing their duties, this liability risk is covered by a D&O insurance policy under certain circumstances. The D&O insurance policy has a deductible in accordance with the legal requirements.

Obligations in connection with the termination of Executive Board membership

The contracts of the Executive Board members do not provide for ordinary termination. The right to extraordinary termination for good cause in accordance with section 626 BGB is available to both parties without observing a notice period.

The contracts of the Executive Board members may provide for the continued payment of fixed compensation to surviving dependents for a limited period in the event of death. Above and beyond existing pension obligations, no further obligations are provided for in the event of the termination of the contractual relationships of the Executive Board members.

The amounts payable to Executive Board members are capped in the event of the early termination of the contract without good cause justifying such termination. Pursuant to this, payments in connection with the termination of an Executive Board member's duties shall not exceed twice the annual total compensation or constitute compensation for more than the remaining term of the employment contract (severance cap). If an Executive Board member's membership terminates due to the termination of the contract either by the company or the Executive Board member before the four-year performance cycle of an open LTIP tranche expires, the obligations resulting from the LTIP shall continue if there are specific reasons for the termination, such as the contract is not renewed after it expires or if the Board of Partners determines this to be appropriate at its own discretion; otherwise, the obligations shall expire.

Should obligations resulting from the LTIP continue to apply, any early severance payout is excluded. Likewise, no early payout or severance for the profit-sharing payment is granted. If the compensation in the fiscal year in which the Executive Board member's duties cease is expected to be significantly higher or lower than in the previous fiscal year, the Board of Partners may decide to adjust the amount applied as the member's total compensation at its own discretion.

In fiscal 2023, a termination agreement was reached with Marcus Kuhnert regarding the early termination of his membership in the Executive Board with effect from June 30, 2023. Initially, the term of his contract would have ended on July 31, 2024. In accordance with the contract as well as with the compensation system, the termination agreement regulates the continued payment of the fixed compensation of € 100,000 per month as well as the payment of profit-sharing and LTI for the initial contract term until July 31, 2024. Furthermore, the additional benefits will be paid out. It was stipulated that the variable compensation elements shall be calculated and paid out according to the initial contractual terms and conditions. As a consequence, Marcus Kuhnert shall receive the pro-rated amount of € 1,566,732 from profit-sharing for the time period from July 1, 2023, until December 31, 2023. According to the Share Ownership Guideline the amount of one third must be invested in Merck shares and must be held for four years. Regarding fiscal 2024 the respective payout amounts will be calculated at the end of the year and will be published in the Compensation Report 2024.

During the fiscal year, no adjustments or changes were made to the employment contracts of the Executive Board. In particular, the terms of the termination agreement with Marcus Kuhnert did not result in any adjustments or changes to the original contract with Marcus Kuhnert.

Post-contractual non-competition

Post contractual non-competition clauses have been agreed with the members of the Executive Board except for Marcus Kuhnert. His contract provided for the option to agree on a post-contractual non-compete in the event of termination of his membership of the Executive Board. In general, the post-contractual non-competition clause involves the payment of compensation amounting to 50% of the member's average compensation within the last twelve months and is paid for a period of two years. Other earnings, pension payments and any severance payments are offset against this amount.

Owing to his early termination, a post-contractual non-compete was agreed with Marcus Kuhnert with effect until July 31, 2024. As compensation, the post-contractual non-compete agreement provides for the payment of the fixed compensation as well as for the payment of the variable compensation until July 31, 2024, which means for the regular remaining term of his contract. Further compensation will not be granted.

There was also a post-contractual non-competition agreement with Stefan Oschmann which came into force upon the termination of his membership of the Executive Board. The parties agreed on a monthly compensation of € 343,184 for the period from May 1, 2021, to April 30, 2023. The monthly pension of € 51,569 as well as further additional income has been offset against this amount.

Loans, advances, payments by affiliates of Merck Group

In fiscal 2023, E. Merck Beteiligungen KG granted a loan of € 560,640.00 to Helene von Roeder. The loan bore interest at 4% per annum and had to be repaid within three years of disbursement. The loan was fully repaid in fiscal 2023.

Besides this, neither loans or advances were paid to other members of the Executive Board during fiscal 2023, nor any payments by affiliated companies.

Individual Disclosure of the Compensation of the Executive Board

Compensation awarded or due to current members of the Executive Board in fiscal 2023

In accordance with section 162 (1) of the German Stock Corporation Act (AktG), the compensation awarded or due to each member of the Executive Board in fiscal 2023 and the respective relative share of total compensation are presented transparently in the tables below. This includes all compensation elements that were paid out or became legally due in fiscal 2023.

To ensure a transparent presentation of the relation between business performance and the resulting compensation, variable compensation for fiscal 2023 is also disclosed on a voluntary basis, with the variable compensation components being allocated to the year in which the final performance was rendered, irrespective of the actual date of payment or the legal due date. Owing to the introduction of the holding period, the performance cycle of the LTIP tranche 2021 will run until December 31, 2024. We will report about the performance of the LTIP tranche 2021 for the first time on a voluntary basis in the Compensation Report 2024.

To provide a complete picture of the total compensation of the Executive Board members, pension expense is also reported on a voluntary basis.

The compensation of the current members of the Executive Board is shown in the following tables.

In fiscal year 2023 pursuant to section 162 AktG	For fiscal year 2023 as voluntary disclosure
Base salary	
Additional benefits	
Profit sharing for fiscal year 2022, payout in fiscal year 2023: - Payout in cash - Investment (in shares; 4-year holding period according to Share Ownership Guideline)	Profit sharing for fiscal year 2023, payout in fiscal year 2024: - Payout in cash - Investment (in shares; 4-year holding period according to Share Ownership Guideline)
LTIP tranche 2020 (Jan 1, 2020-Dec 31, 2022), payout was in fiscal year 2023	
Other compensation	
Service cost as voluntary disclosure	

The figures presented in the tables have been rounded in accordance with standard commercial practice. As a result, the individual values may not add up to the totals presented.

Compensation awarded or due

	Belén Garijo Chair of the Executive Board (since May 1, 2021; previously member of the Executive Board)				
	In the fiscal year (pursuant to section 162 AktG)			For the fiscal year (voluntary disclosure)	
	2023		2022	**2023**	2022
	€ thousand	in %	€ thousand	€ thousand	€ thousand
Base salary	1,500	15.2%	1,500	1,500	1,500
Additional benefits	89	0.9%	91	89	91
Profit sharing					
Profit sharing 2021					
Payout in cash	–	–	2,447	–	–
Investment (in shares; 4-year holding period)	–	–	1,224	–	–
Profit sharing 2022					
Payout in cash	2,927	29.6%	–	–	2,927
Investment (in shares; 4-year holding period)	1,463	14.8%	–	–	1,463
Profit sharing 2023					
Payout in cash	–	–	–	3,058	–
Investment (in shares; 4-year holding period)	–	–	–	1,529	–
LTIP[1]					
LTI 2019 (2019 to 2021)	–	39.5%	4,629	–	–
LTI 2020 (2020 to 2022)	3,910		–	–	3,910
Others	–	–	–	–	–
Compensation awarded or due pursuant to section 162 AktG	**9,889**	**100.0%**	**9,891**	**–**	**–**
Compensation for the fiscal year	**–**	**–**	**–**	**6,176**	**9,891**
Service cost	638	–	638	638	638
Total compensation incl. service cost	**10,527**	**–**	**10,529**	**6,814**	**10,529**

[1] Reduction of LTI 2019 and LTI 2020 payout due to maximum amount of direct compensation.

	Kai Beckmann Member of the Executive Board				
	In the fiscal year (pursuant to section 162 AktG)			For the fiscal year (voluntary disclosure)	
	2023		2022	**2023**	2022
	€ thousand	in %	€ thousand	€ thousand	€ thousand
Base salary	1,200	15%	1,200	1,200	1,200
Additional benefits	22	0.3%	16	22	16
Profit sharing					
Profit sharing 2021					
Payout in cash	–	–	1,903	–	–
Investment (in shares; 4-year holding period)	–	–	951	–	–
Profit sharing 2022					
Payout in cash	2,128	27.2%	–	–	2,128
Investment (in shares; 4-year holding period)	1,064	13.6%	–	–	1,064
Profit sharing 2023					
Payout in cash	–	–	–	2,222	–
Investment (in shares; 4-year holding period)	–	–	–	1,111	–
Merck LTIP					
LTI 2019 (2019 to 2021)	–	43.6%	3,825	–	–
LTI 2020 (2020 to 2022)	3,406		–	–	3,406
Others	–	–	–	–	–
Compensation awarded or due pursuant to section 162 AktG	**7,820**	**100.0%**	**7,895**	**–**	**–**
Compensation for the fiscal year	**–**	**–**	**–**	**4,555**	**7,814**
Service cost	435	–	439	435	439
Total compensation	**8,255**	**–**	**8,334**	**4,990**	**8,253**

	Peter Guenter Member of the Executive Board (since January 1, 2021)				
	In the fiscal year (pursuant to section 162 AktG)			For the fiscal year (voluntary disclosure)	
	2023		2022	**2023**	2022
	€ thousand	in %	€ thousand	€ thousand	€ thousand
Base salary	1,200	23.3%	1,200	1,200	1,200
Additional benefits	17	0.3%	21	17	21
Profit sharing					
Profit sharing 2021					
Payout in cash	–	–	2,110	–	–
Investment (in shares; 4-year holding period)	–	–	1,055	–	–
Profit sharing 2022					
Payout in cash	2,368	46.0%	–	–	2,368
Investment (in shares; 4-year holding period)	1,184	23.0%	–	–	1,184
Profit sharing 2023					
Payout in cash	–	–	–	2,475	–
Investment (in shares; 4-year holding period)	–	–	–	1,237	–
Merck LTIP					
LTI 2019 (2019 to 2021)	–	–	–	–	–
LTI 2020 (2020 to 2022)	–		–	–	–
Others	375	7.3%	375	375	375
Compensation awarded or due pursuant to section 162 AktG	**5,144**	**100.0%**	**4,761**	**–**	**–**
Compensation for the fiscal year	**–**	**–**	**–**	**5,304**	**5,148**
Service cost	435	–	437	435	437
Total compensation	**5,579**	**–**	**5,198**	**5,739**	**5,585**

	Matthias Heinzel Member of the Executive Board (since April 1, 2021)				
	In the fiscal year (pursuant to section 162 AktG)			For the fiscal year (voluntary disclosure)	
	2023		2022	**2023**	2022
	€ thousand	in %	€ thousand	€ thousand	€ thousand
Base salary	1,200	25.2%	1,200	1,200	1,200
Additional benefits	16	0.3%	12	16	12
Profit sharing					
Profit sharing 2021					
Payout in cash	–	–	1,590	–	–
Investment (in shares; 4-year holding period)	–	–	795	–	–
Profit sharing 2022					
Payout in cash	2,368	49.7%	–	–	2,368
Investment (in shares; 4-year holding period)	1,184	24.8%	–	–	1,184
Profit sharing 2023					
Payout in cash	–	–	–	2,475	–
Investment (in shares; 4-year holding period)	–	–	–	1,237	–
Merck LTIP					
LTI 2019 (2019 to 2021)	–	–	–	–	–
LTI 2020 (2020 to 2022)	–		–	–	–
Others	–	–	–	–	–
Compensation awarded or due pursuant to section 162 AktG	**4,768**	**100.0%**	**3,597**	**–**	**–**
Compensation for the fiscal year	**–**	**–**	**–**	**4,928**	**4,764**
Service cost	454	–	462	454	462
Total compensation	**5,222**	**–**	**4,059**	**5,382**	**5,226**

	Marcus Kuhnert Member of the Executive Board (until June 30, 2023)				
	In the fiscal year (pursuant to section 162 AktG)			For the fiscal year (voluntary disclosure)	
	2023		2022	**2023**	2022
	€ thousand	in %	€ thousand	€ thousand	€ thousand
Base salary	600	9.1%	1,200	600	1,200
Additional benefits	26	0.4%	26	26	26
Profit sharing					
Profit sharing 2021					
Payout in cash	–	–	1,769	–	–
Investment (in shares; 4-year holding period)	–	–	885	–	–
Profit sharing 2022					
Payout in cash	1,995	30.4%	–	–	1,995
Investment (in shares; 4-year holding period)	998	15.2%	–	–	998
Profit sharing 2023					
Payout in cash	–	–	–	1,044	–
Investment (in shares; 4-year holding period)	–	–	–	522	–
Merck LTIP					
LTI 2019 (2019 to 2021)	–	44.8%	3,300	–	–
LTI 2020 (2020 to 2022)	2,939		–	–	2,939
Others	–	–	–	–	–
Compensation awarded or due pursuant to section 162 AktG	**6,558**	**100.0%**	**7,180**	**–**	**–**
Compensation for the fiscal year	**–**	**–**	**–**	**2,193**	**7,158**
Service cost	396	–	401	396	401
Total compensation	**6,954**	**–**	**7,581**	**2,589**	**7,559**

	Helene von Roeder Member of the Executive Board (since July 1, 2023)				
	In the fiscal year (pursuant to section 162 AktG)			For the fiscal year (voluntary disclosure)	
	2023		2022	**2023**	2022
	€ thousand	in %	€ thousand	€ thousand	€ thousand
Base salary	600	98.5%	–	600	–
Additional benefits	9	1.5%	–	9	–
Profit sharing					
Profit sharing 2021					
Payout in cash	–	–	–	–	–
Investment (in shares; 4-year holding period)	–	–	–	–	–
Profit sharing 2022					
Payout in cash	–	–	–	–	–
Investment (in shares; 4-year holding period)	–	–	–	–	–
Profit sharing 2023					
Payout in cash	–	–	–	1,044	–
Investment (in shares; 4-year holding period)	–	–	–	522	–
Merck LTIP					
LTI 2019 (2019 to 2021)	–	–	–	–	–
LTI 2020 (2020 to 2022)	–		–	–	–
Others[1]	–	–	–	953	–
Compensation awarded or due pursuant to section 162 AktG	**609**	**100.0%**	**–**	**–**	**–**
Compensation for the fiscal year	**–**	**–**	**–**	**3,128**	**–**
Service cost	268	–	–	268	–
Total compensation	**877**	**–**	**–**	**3,396**	**–**

[1] Compensation payment for short-term variable remuneration (€ 257 thousand) and long-term variable remuneration (provision of € 696 thousand; final calculation and payment in 2027).

Compensation awarded or due to former members of the Executive Board in the fiscal year

The compensation awarded or due to former members of the Executive Board during the fiscal year is also presented below. Tranches of the LTIP already allocated before a member of the Executive Board left the company continue to run until the end of the originally contractually agreed term and are settled and paid out after the end of the performance period. In addition, some members who have already left the Executive Board receive fixed payments from pension plans.

The following tables show the compensation awarded or due to former members of the Executive Board in fiscal 2023 in accordance with section 162 (1) AktG and the respective relative share of total compensation. Compensation awarded or due includes all amounts received by the former members of the Executive Board in the fiscal year (compensation awarded) or all amounts legally due but not yet received (compensation due). For former members of the Executive Board who left the Executive Board in the last ten years, the information is indicated by name. In accordance with the provisions of section 162 (5) AktG, no personal information is provided on former members of the Executive Board who left the Executive Board more than ten years ago, i.e. before December 31, 2012.

Compensation awarded or due

	Marcus Kuhnert Member of the Executive Board (until June 30, 2023)		
	2023		2022
	in Tsd. €	in %	in Tsd. €
Others (waiting allowance)	600	100.0%	–
Compensation awarded or due pursuant to section 162 AKtG	**600**	**100.0%**	**–**

	Stefan Oschmann Chair of the Executive Board (until April 30, 2021)		
	2023		2022
	€ thousand	in %	€ thousand
Profit sharing			
Profit sharing 2021			
Payout in cash	–	–	858
Investment (in shares; 4-year holding period)	–	–	429
LTIP			
LTI 2019 (2019 bis 2021)	–	55.5%	4,377
LTI 2020 (2020 bis 2022)	2,226		–
Others	1,166	29.1%	3,953
Pensions	619	15.4%	572
Compensation awarded or due pursuant to section 162 AKtG	**4,011**	**100.0%**	**10,189**

	Udit Batra Member of the Executive Board (until July 13, 2020)		
	2023		2022
	€ thousand	in %	€ thousand
Merck LTIP			
LTI 2019 (2019 to 2021)	–	100.0%	2,131
LTI 2020 (2020 to 2022)	633		–
Others	–	–	–
Pension	–	–	–
Compensation awarded or due pursuant to section 162 AKtG	**633**	**100.0%**	**2,131**

	Walter Galinat Member of the Executive Board (until September 30, 2018)		
	2023		2022
	€ thousand	in %	€ thousand
Merck LTIP			
LTI 2019 (2019 to 2021)	–	–	361
Others	–	–	–
Pension	154	100.0%	334
Compensation awarded or due pursuant to section 162 AKtG	**154**	**100.0%**	**695**

Former members of the Executive Board who only received pension payments in fiscal 2023 are shown in the following table. The compensation awarded or due in fiscal 2023 in accordance with section 162 (1) AktG consists entirely of non-performance-related compensation elements.

Pension payments

€ thousand	**2023**	2022
Karl-Ludwig Kley	756	695
Bernd Reckmann	443	443

Payments to former members of the Executive Board and their surviving dependents

Payments to former members of the Executive Board and their surviving dependents are made in the form of pension payments, as a temporary continuation of the basic salary in the event of death, as part of the profit-sharing and the LTIP, as well as compensation for a post-contractual non-compete clause. In the 2023 financial year, they amounted to € 14.4 million (previous year: € 21.7 million). Provisions for defined benefit pension commitments in accordance with IAS 19 amounted to € 123.8 million as of December 31, 2023 (December 31, 2022: € 123.1 million).

Compliance with the defined maximum compensation

The maximum compensation limits the compensation awarded or due in the fiscal year, i.e. the total of all non-performance-related and performance-related compensation elements awarded or due in a fiscal year. Pension payments are not included in the maximum compensation.

The maximum compensation for the fiscal year is € 11,500,000 for the Chair of the Executive Board and € 9,500,000 each for ordinary members of the Executive Board. The sum of the compensation awarded or due in accordance with section 162 AktG less any pension payments and plus pension expenses is below the defined maximum compensation in accordance with section 87a AktG for all members of the Executive Board.

In addition to the maximum compensation, there is a separate contractually agreed payment cap for each of the performance-related compensation elements. A maximum amount has been set for the amount of profit sharing for all members of the Executive Board (please find more details in the paragraph “profit sharing”). The payout from the Long-Term Incentive Plan cannot exceed 2.5 times the individual award value, even in cases of exceptional performance.

In addition, there is a contractually agreed maximum limit on the direct compensation, i.e. the sum of base salary, profit-sharing, and LTIP. In this context, it is stipulated that capping, if necessary, shall be applied first to the LTIP and then to profit sharing. To ensure compliance with this cap, the 2020 LTIP payment for Belén Garijo was reduced accordingly by € 476,514 thousand.

Compliance with the defined maximum compensation is ensured by the Personnel Committee setting the amounts of the variable compensation components by resolution. The defined maximum compensation and the maximum limit for the direct compensation of the members of the Executive Board are shown in the following table.

Overall compensation limit

€ thousand	Maximum limit for Direct Compensation	Maximum compensation pursuant to section 87a AktG
Belén Garijo	9,800	11,500
Kai Beckmann	8,000	9,500
Peter Guenter	8,000	9,500
Matthias Heinzel	8,000	9,500
Marcus Kuhnert (until June 30, 2023)	8,000	9,500
Helene von Roeder (since July 1, 2023)	8,000	9,500

Compensation for the Supervisory Board members in fiscal 2023

The compensation of the Supervisory Board members is defined in Article 20 of the Articles of Association of Merck KGaA, Darmstadt, Germany, and corresponds to the compensation system for the Supervisory Board that was adopted by the 2023 Annual General Meeting with 99.64% of the votes cast.

Accordingly, the members of the Supervisory Board receive fixed compensation of € 47,000 per year, which is due and paid out in the reporting year. The Chair receives double, and the Vice Chair receives one and a half times this amount. In addition to their fixed compensation, Supervisory Board members who are also members of the Audit Committee, which was established in the meeting of the Supervisory Board on February 26, 2021, receive annual compensation of € 15,000. The Chair of the Audit Committee receives additional annual compensation of € 30,000. Moreover, the members receive additional compensation of € 750 per meeting they attend. There are no variable compensation components.

The compensation awarded or due and the respective relative share of the total compensation for the current members of the Supervisory Board is presented in the following table. The compensation components are allocated to the year in which the service was rendered, regardless of the actual time of payment or its legal due date.

In fiscal 2023, Helene von Roeder resigned from the Supervisory Board effective April 17, 2023, and Barbara Lambert joined the Supervisory Board effective August 11, 2023. There were no payments to former members of the Supervisory Board in the fiscal year.

Compensation awarded or due

	2023							2022						
	Fixed compensation		**Compensation for committee duties**		**Meeting fees**		**Total compensation**	Fixed compensation		Compensation for committee duties		Meeting fees		Total compensation
	€ thousand	in %	€ thousand	in %	€ thousand	in %	€ thousand	€ thousand	in %	€ thousand	in %	€ thousand	in %	€ thousand
Wolfgang Büchele	94.0	83%	15.0	13%	3.8	3%	112.8	94.0	84%	15.0	13%	3.0	3%	112.0
Sascha Held	70.5	79%	15.0	17%	3.8	4%	89.3	70.5	80%	15.0	17%	3.0	3%	88.5
Gabriele Eismann	47.0	93%	–	–	3.8	7%	50.8	47.0	94%	–	–	3.0	6%	50.0
Barbara Lambert (since August 11, 2023)	18.4	60%	11.3	37%	0.8	3%	30.5	–	–	–	–	–	–	–
Birgit Biermann (since July 14, 2022)	47.0	93%	–	–	3.8	7%	50.8	22.0	–	–	–	1.5	–	23.5
Jürgen Glaser	47.0	72%	15.0	23%	3.8	6%	65.8	47.0	79%	9.5	16%	3.0	5%	59.5
Michael Kleinemeier	47.0	93%	–	–	3.8	7%	50.8	47.0	94%	–	–	3.0	6%	50.0
Renate Koehler	47.0	93%	–	–	3.8	7%	50.8	47.0	94%	–	–	3.0	6%	50.0
Anne Lange	47.0	93%	–	–	3.8	7%	50.8	47.0	94%	–	–	3.0	6%	50.0
Peter Emanuel Merck	47.0	93%	–	–	3.8	7%	50.8	47.0	94%	–	–	3.0	6%	50.0
Dietmar Oeter	47.0	93%	–	–	3.8	7%	50.8	47.0	94%	–	–	3.0	6%	50.0
Alexander Putz	47.0	93%	–	–	3.8	7%	50.8	47.0	94%	–	–	3.0	6%	50.0
Christian Raabe	47.0	72%	15.0	23%	3.8	6%	65.8	47.0	72%	15.0	23%	3.0	5%	65.0
Helene von Roeder (until April 17, 2023)	13.8	59%	8.8	38%	0.8	3%	23.4	47.0	59%	30.0	38%	3.0	4%	80.0
Helga Rübsamen-Schaeff	47.0	93%	–	–	3.8	7%	50.8	47.0	94%	–	–	3.0	6%	50.0
Daniel Thelen	47.0	72%	15.0	23%	3.8	6%	65.8	47.0	72%	15.0	23%	3.0	5%	65.0
Simon Thelen	47.0	93%	–	–	3.8	7%	50.8	47.0	94%	–	–	3.0	6%	50.0

Supervisory Board member Wolfgang Büchele received an additional € 140,000 (2022: € 140,000) for 2023 in this function as a member of the corporate bodies of E. Merck KG.

Supervisory Board member Helga Rübsamen-Schaeff received an additional € 150,000 (2022: € 150,000) for 2023 in this function as a member of the corporate bodies of E. Merck KG and an additional € 6,000 (2022: € 6,000) for 2023 as a member of the Supervisory Board of Merck Healthcare KGaA.

Supervisory Board member Michael Kleinemeier received an additional € 140,000 (2022: € 140,000) for 2023 in this function as a member of committees of E. Merck KG, Darmstadt, Germany.

Supervisory Board member Helene von Roeder received an additional € 150,000 (2022: € 150,000) for 2023 in this function as a member of the corporate bodies of E. Merck KG.

Supervisory Board member Peter Emanuel Merck received an additional € 80,000 (2022: € 80,000) for 2023 in this function as a member of the corporate bodies of E. Merck KG.

Supervisory Board member Daniel Thelen received an additional € 140,000 for 2023 in this function as a member of the corporate bodies of E. Merck KG (2022: € 140,000).

Supervisory Board member Simon Thelen received an additional € 140,000 (2022: € 140,000) for 2023 in this function as a member of the corporate bodies of E. Merck KG and an additional € 3,000 (2022: € 3,000) for 2023 as a member of the Supervisory Board of Merck Healthcare KGaA.

Comparative presentation of compensation and earnings development

The comparative presentation in accordance with section 162 (1) no. 2 AktG shows the annual change in the compensation of current and former members of the Executive Board as well as members of the Supervisory Board, the development of earnings of the Merck Group and the development of the average compensation of a full-time employee of Merck KGaA over the last five years.

For employee compensation, the average personnel expenses excluding company pension costs are used. This reflects the total compensation of employees worldwide.

For members of the Executive Board, the compensation awarded or due in the fiscal years 2021, 2022 and 2023 is used in accordance with section 162 AktG. For the years 2020 and 2019, the allocated compensation is used excluding the service costs according to the German Corporate Governance Code (DCGK) sample table in the Compensation Report of the respective fiscal year.

Comparative presentation

in € thousand/change in %	**2023**	2022	**Change 2023/2022**	Change 2022/2021	Change 2021/2020	Change 2020/2019
Member of the Executive Board						
Belén Garijo (Chair since May 1, 2021)	9,889	9,891	–	22.20%	43.30%	-6.90%
Kai Beckmann (since April 1, 2011)	7,820	7,895	-0.90%	25.00%	37.90%	-11.00%
Peter Guenter (since January 1, 2021)	5,144	4,761	8.00%	185.10%	–	–
Matthias Heinzel (since April 1, 2021)	4,768	3,597	32.60%	288.90%	–	–
Marcus Kuhnert (until June 30, 2023)	7,158	7,180	-0.30%	17.00%	43.20%	-9.70%
Helene von Roeder (since July 1, 2023)	609	–	–	–	–	–
Former Member of the Executive Board						
Stefan Oschmann (until April 30, 2021)	4,011	10,189	-60.60%	-11.80%	41.80%	-11.30%
Udit Batra (until July 13, 2020)	633	2,131	-70.30%	-43.80%	-19.40%	-16.30%
Walter Galinat (until September 30, 2018)	154	695	-77.80%	-47.00%	22.30%	-10.10%
Karl-Ludwig Kley (until August 31, 2016)	756	695	8.80%	10.30%	–	67.10%
Bernd Reckmann (until April 29, 2016)	443	443	–	-3.50%	6.70%	-43.00%
Further former members	7,409	6,999	5.90%	-66.00%	85.00%	0.50%
Member of the Supervisory Board						
Wolfgang Büchele	112.8	112.0	0.70%	2.10%	13.10%	–
Sascha Held	89.3	88.5	0.80%	2.70%	17.30%	110.00%
Gabriele Eismann	50.8	50.0	1.50%	–	–	-1.60%
Barbara Lambert (since August 11, 2023)	30.5	–	–	–	–	–
Birgit Biermann (since July 14, 2022)	50.8	23.5	116.00%	–	–	–
Jürgen Glaser	65.8	59.5	10.50%	20.70%	-1.40%	42.00%
Michael Kleinemeier	50.8	50.0	1.50%	–	–	45.30%
Renate Koehler	50.8	50.0	1.50%	–	–	42.00%
Anne Lange	50.8	50.0	1.50%	–	–	45.30%
Peter Emanuel Merck	50.8	50.0	1.50%	–	–	42.00%
Dietmar Oeter	50.8	50.0	1.50%	–	–	-1.60%
Alexander Putz	50.8	50.0	1.50%	–	70.10%	87.30%
Christian Raabe	65.8	65.0	1.20%	3.70%	25.40%	42.00%
Helene von Roeder (until April 17, 2023)	23.4	80.0	-70.80%	6.10%	50.80%	42.00%
Helga Rübsamen-Schaeff	50.8	50.0	1.50%	–	–	–
Daniel Thelen	65.8	65.0	1.20%	3.70%	25.40%	42.00%
Simon Thelen	50.8	50.0	1.50%	–	–	42.00%
Personnel expenses without pension expenses	6,152,000	6,184,000	-0.50%	11.00%	3.90%	8.90%
Average number of employees	63,642	62,552	1.70%	6.60%	2.00%	7.40%
Average compensation of an employee	97	99	-2.20%	4.20%	1.90%	1.40%
Earnings development						
Profit after tax of the Merck KGaA (HGB)	284,881	241,958	17.70%	-16.20%	59.40%	7.30%
Profit after tax of the E. Merck Group (IFRS)	2,759,954	3,288,000	-16.10%	9.50%	56.80%	52.60%

Report of the Independent Auditor

To Merck Kommanditgesellschaft auf Aktien, Darmstadt/Germany

We have audited the accompanying compensation report of Merck Kommanditgesellschaft auf Aktien, Darmstadt, Germany, ("the Company") for the financial year from January 1 to December 31, 2023, including the related disclosures, which has been prepared to comply with Section 162 German Stock Corporation Act (AktG).

Responsibilities of the Executive Directors and of the Supervisory Board

The executive directors and the supervisory board of Merck Kommanditgesellschaft auf Aktien, Darmstadt/Germany, are responsible for the preparation of the compensation report, including the related disclosures, that complies with the requirements of section 162 AktG. The executive directors and the supervisory board are also responsible for such internal control as they consider necessary to enable the preparation of a compensation report, including the related disclosures, that is free from material misstatements, whether due to fraud or error.

Auditor's Responsibilities

Our responsibility is to express an opinion on this compensation report, including the related disclosures, based on our audit. We conducted our audit in compliance with German Generally Accepted Standards for Financial Statement Audits promulgated by the Institut der Wirtschaftsprüfer (IDW). These Standards require that we fulfill the professional responsibilities and that we plan and perform the audit so that we obtain reasonable assurance as to whether the compensation report, including the related disclosures, is free from material misstatements.

An audit involves performing audit procedures in order to obtain audit evidence for the amounts stated in the compensation report, including the related disclosures. The choice of the audit procedures is subject to the auditor's professional judgment. This includes assessing the risk of material misstatements, whether due to fraud or error, in the compensation report, including the related disclosures. In assessing these risks, the auditor considers the system of internal control, which is relevant to preparing the compensation report, including the related disclosures. Our objective is to plan and perform audit procedures that are appropriate in the circumstances, but not to express an audit opinion on the effectiveness of the Company's system of internal control. An audit also comprises an evaluation of the accounting policies used, of the reasonableness of accounting estimates made by the executive directors and the supervisory board as well as an evaluation of the overall presentation of the compensation report, including the related disclosures.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Audit Opinion

In our opinion, on the basis of the knowledge obtained in the audit, the compensation report for the financial year from January 1 to December 31, 2023, including the related disclosures, complies, in all material respects, with the accounting principles of section 162 AktG.

Other Matter – Formal Audit of the Compensation Report

The audit of the content of the compensation report described in this report comprises the formal audit required under section 162 (3) AktG including the issuance of a report on this audit. Since our audit opinion on the audit of the content is unmodified, this audit opinion includes that the disclosures required under section 162 (1) and (2) AktG are contained, in all material respects, in the compensation report.

Intended Use of the Report

We issue this report as stipulated in the engagement letter agreed with the Company. The audit has been performed for the purposes of the Company and the report is solely intended to inform the Company about the result of the audit.

Liability

This report is not intended to be used by third parties as a basis for any (asset) decision. We are liable solely to Merck Kommanditgesellschaft auf Aktien, Darmstadt, Germany, and our liability is also governed by the engagement letter dated July 24/28, 2023, agreed with the Company as well as the "General Engagement Terms for Wirtschaftsprüfer and Wirtschaftsprüfungsgesellschaften (German Public Auditors and Public Audit Firms)" promulgated by the Institut der Wirtschaftsprüfer (IDW) in the version dated January 1, 2017 (IDW-AAB). However, we do not accept or assume liability to third parties.

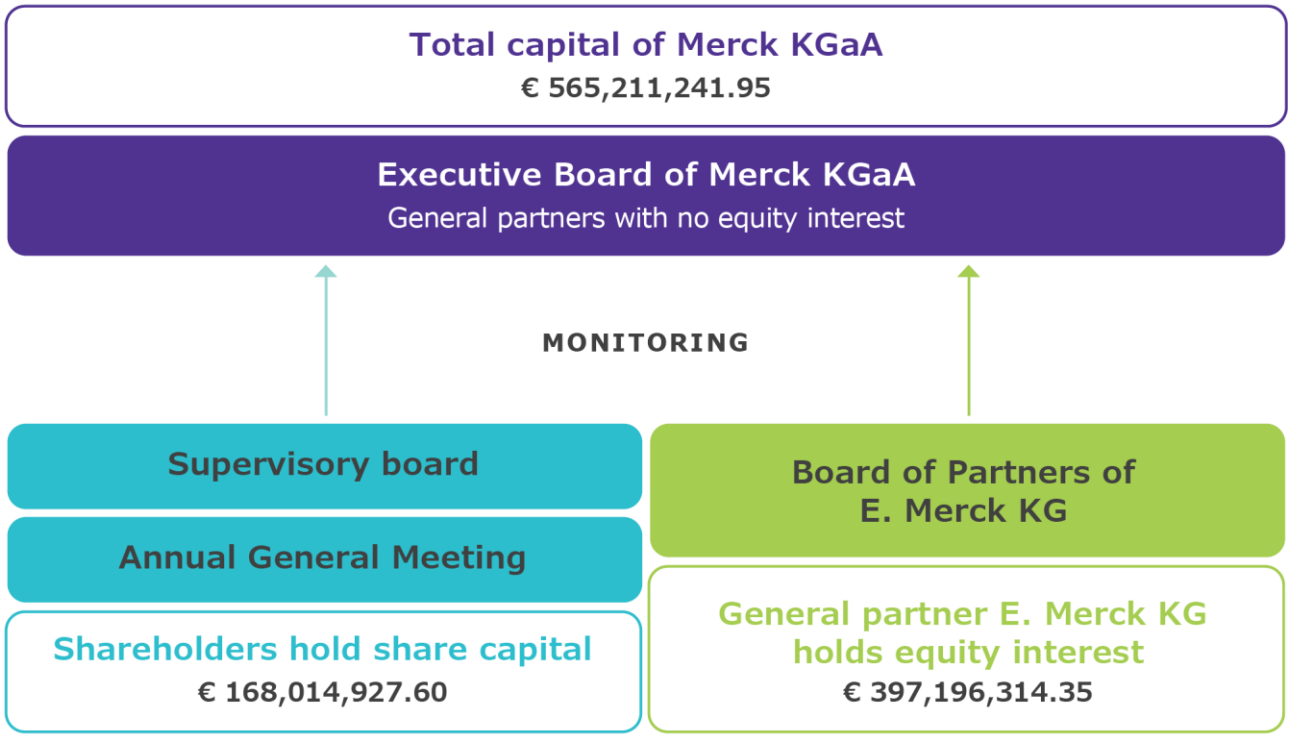
Frankfurt am Main, Germany, February 16, 2024

Deloitte GmbH

Wirtschaftsprüfungsgesellschaft

Signed:	Signed:
Christoph Schenk	Daniel Weise
Wirtschaftsprüfer	Wirtschaftsprüfer
(German Public Auditor)	(German Public Auditor)

capital structure and corporate bodies of Merck KGaA



Further information can be found under "**Merck KGaA**" in the "**Statement on Corporate Governance**".

Statement on Corporate Governance

The Statement on Corporate Governance contains the Declaration of Conformity, relevant information on practices within the company, and a description of the procedures of the corporate bodies, as well as targets for the percentage of positions held by women and the diversity policy.

Joint report of the Executive Board and the Supervisory Board including Declaration of Conformity

The German Corporate Governance Code is geared toward the conditions found in a German stock corporation ("Aktiengesellschaft" or "AG") and does not take into consideration the special characteristics of a corporation with general partners ("Kommanditgesellschaft auf Aktien" or "KGaA") such as Merck KGaA. Given the structural differences between an AG and a KGaA, several recommendations of the German Corporate Governance Code are to be applied to a KGaA only in a modified form. Major differences between the two legal forms exist in terms of liability and management. In the case of an AG, only the AG is liable as a legal entity, whereas the general partners of a KGaA also have unlimited personal liability for the company's obligations (section 278 (1) AktG). At Merck KGaA, this pertains to both E. Merck KG – which is excluded from management and representation pursuant to article 8 (5) of the Articles of Association – as well as to the managing general partners who collectively make up the Executive Board of Merck KGaA. The members of the Executive Board of Merck KGaA are therefore subject to unlimited personal liability. Unlike an AG, their executive authority is not conferred by the Supervisory Board, but rather by their status as general partners. Consequently, in addition to other responsibilities typical of the supervisory board of an AG (see description of the **procedures of the Supervisory Board**), the supervisory board of a KGaA does not have the authority to appoint the management board, draw up management board contracts, or specify the compensation of the management board. This legal form also involves special features with regard to the Annual General Meeting. For example, in a KGaA, many of the resolutions made require the consent of the general partners (section 285 (2) AktG), including in particular the adoption of the Annual Financial Statements (section 286 (1) AktG).

Merck KGaA applies the German Corporate Governance Code analogously where these regulations are compatible with the legal form of a KGaA. In order to enable shareholders to compare the situation at other companies more easily, we base corporate governance on the conduct recommendations made by the Government Commission of the German Corporate Governance Code to a broad extent and refrain from adopting our own, equally permissible, code. All recommendations of the German Corporate Governance Code in the version dated April 28, 2022, the intent and meaning of which are applied, have been complied with since the last Declaration of Conformity was submitted in February 2023.

For a clearer understanding, the following gives a general explanation of the application of German company law at Merck KGaA with additional references to the Annual General Meeting and shareholder rights.

Merck 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). E. Merck KG is excluded from the management of business activities. The general partners with no equity interest (Executive Board) manage the business activities. Nevertheless, due to its substantial capital investment and unlimited personal liability, E. Merck KG has a strong interest in ensuring that the businesses of Merck KGaA operate efficiently in compliance with procedures. Merck KGaA's participation in the profit/loss of E. Merck KG in accordance with articles 26 et seq. of the Articles of Association further harmonizes the interests of the shareholders and of E. Merck KG. E. Merck KG appoints and dismisses the Executive Board. In addition, E. Merck KG has created bodies – complementing the expertise and activities of the Supervisory Board – to monitor and advise the Executive Board. This applies primarily to the Board of Partners of E. Merck KG.

Based on the provisions of the German Stock Corporation Act, the Articles of Association of Merck KGaA, and the rules of procedure of the various committees, Merck KGaA has adopted a set of rules for the Executive Board and its supervision that meet the requirements of the German Corporate Governance Code. The investors, who bear the entrepreneurial risk, are protected as provided for by the German Corporate Governance Code. We take suggestions from the capital market on corporate governance seriously and hold discussions with investors and shareholder representatives.

The General Meeting of Merck KGaA

The 28th Annual General Meeting of Merck KGaA was held in Darmstadt, Germany, on April 28, 2023. In 2023, the Executive Board again decided, with the approval of the Supervisory Board, to hold the 2023 Annual General Meeting in virtual form, i.e. without the shareholders and their proxies attending in person. In doing so, it exercised the option that the legislation provided with the transitional provision of section 26n (1) of the Introductory Act to the German Stock Corporation Act (EGAktG) in relation to virtual annual general meetings in accordance with section 118a (AktG). Shareholders and shareholder representatives participated in the Annual General Meeting virtually. The meeting was broadcast audiovisually on the Internet in full. At 72.59%, the proportion of share capital represented at the meeting (including postal votes) was slightly higher than in the previous year. In 2022, the proportion of share capital represented was 70.34%. The Annual General Meeting service provider does not forward voting instructions to Merck in advance of the Annual General Meeting but keeps them in the system until the count takes place.

In particular, the Annual General Meeting passes resolutions concerning the approval of the Annual Financial Statements, the appropriation of net retained profit, the approval of the actions of the Executive Board members and the Supervisory Board members, the election of the auditor, amendments to the Articles of Association, the compensation system for the Executive Board, and the control and profit and loss transfer agreements of Merck KGaA. The shareholders of Merck KGaA exercised their rights at the virtual Annual General Meeting using the Internet-based Annual General Meeting system and via video communication. In addition, the shareholders were again given the opportunity to submit statements on the agenda to the company prior to the Annual General Meeting. They were able to exercise their voting rights personally, through an authorized representative or a proxy appointed by the company, or by postal vote. The proxies were in attendance throughout the duration of the Annual General Meeting. All the documents and information concerning upcoming General Meetings (including a summary explanation of shareholder rights) are also posted on our website. The introductory speech by the Chair of the Executive Board was published in advance on the Internet on April 17, 2023, in order to make it available to interested shareholders and members of the public and thus satisfy the high transparency requirements of the Merck Group.

Declaration of Conformity

In accordance with section 161 AktG, applying the provisions of the German Corporate Governance Code correspondingly, the Executive Board and the Supervisory Board issued the following Declaration of Conformity with the recommendations of the Government Commission of the German Corporate Governance Code:

"Declaration of the Executive Board and the Supervisory Board of Merck KGaA on the recommendations of the Government Commission of the German Corporate Governance Code pursuant to section 161 of the German Stock Corporation Act (AktG). Since the last Declaration of Conformity in February 2023, we have complied with all the recommendations of the Government Commission of the German Corporate Governance Code in the version dated April 28, 2022, as published in the official section of the German Federal Gazette.

With regard to future compliance with the current recommendations of the Government Commission of the German Corporate Governance Code, the Executive Board and the Supervisory Board declare the following: The company will comply with the recommendations of the Code in the version dated April 28, 2022."

Darmstadt, February 2024

For the Executive Board
signed Belén Garijo

For the Supervisory Board
signed Wolfgang Büchele

Information on corporate governance practices

Reporting

It is Merck KGaA's objective to provide the latest information to all shareholders, media, financial analysts, and interested members of the public, while creating the greatest possible transparency. For this reason, Merck uses a wide range of communication platforms to engage in a timely dialog with all interested parties about the company's situation and business changes. Merck's principles include providing factually correct, comprehensive, and fair information.

Information subject to disclosure requirements, as well as information that is not, can be accessed worldwide on the Merck KGaA website (**www.merckgroup.com**), which is the company's most important publication platform. In addition to a comprehensive financial calendar, quarterly statements and/or quarterly and half-year financial reports covering at least the past five years are available there in German and English. In line with the legal requirements, ad hoc announcements are also published on the website. These contain information on circumstances and facts that could impact the Merck share price.

Regular press conferences, investor meetings on the occasion of investor conferences, and roadshows offer another platform for dialog. The company presentations prepared for this purpose are also available on the Merck KGaA website. In addition, the Investor Relations team is available to private and institutional investors who wish to receive further information. To ensure the greatest possible transparency, all documents concerning the General Meeting are available on the company website. Additionally, at least some parts of the General Meeting are generally webcast live on the Internet. The Annual General Meeting on April 28, 2023, was again held virtually and hence was webcast live on the Internet in full.

Dealing with insider information

Dealing properly with insider information is very important to us. Our Insider Committee examines the existence of insider information, ensures compliance with legal obligations, and prepares any necessary measures. The members of the Insider Committee are appointed by the Executive Board; at least two members work in Group Legal & Compliance. The Insider Committee meets at regular intervals or when circumstances require. The Chief Financial Officer is vested with the authority to make the final decision on handling potential insider information.

In order to ensure a high level of protection for insider information, the Executive Board issued internal insider guidelines applicable throughout the Merck Group worldwide. The guidelines inform employees about their responsibilities under insider trading laws and give clear instructions for compliant behavior. In addition, they describe the function of the Insider Committee in detail. Moreover, our Code of Conduct, which is binding for all employees, also contains an explicit, detailed reference to the ban on using insider information. Within the scope of obligatory training courses on the Code of Conduct as well as specific training courses on insider law, all employees are instructed on the key stipulations of insider trading.

Accounting and audits of financial statements

Merck KGaA prepares its Consolidated Financial Statements and Combined Management Report in accordance with the International Financial Reporting Standards (IFRS) effective at the end of the reporting period and adopted by the European Union and the additional provisions of section 315e (1) of the German Commercial Code (HGB). The Consolidated Financial Statements and the Combined Management Report are prepared by the Executive Board and examined by an auditor, taking into account the German generally accepted standards for the audit of financial statements promulgated by the Institute of Public Auditors in Germany (Institut der Wirtschaftsprüfer, IDW).

The Supervisory Board commissioned Deloitte GmbH Wirtschaftsprüfungsgesellschaft, Munich, to audit the Consolidated Financial Statements and the Combined Management Report for 2023. Deloitte GmbH Wirtschaftsprüfungsgesellschaft, Munich, is obliged to inform the Supervisory Board without delay of any grounds for disqualification or bias occurring during the audit if these cannot be immediately rectified. Additionally, the auditor shall immediately report to the Supervisory Board any findings and issues that emerge during the audit that have a direct bearing upon the tasks of the Supervisory Board. The auditor shall inform the Supervisory Board or note in the audit report any circumstances determined during the audit that would render inaccurate the Declaration of Conformity made by the Executive Board and the Supervisory Board. It has also been agreed with the auditor that in order to assess whether the Executive Board has fulfilled its obligations in accordance with section 91 (2) of the German Stock Corporation Act (AktG), the audit will also cover the company's early warning risk identification system. Moreover, the auditor is required to examine and evaluate the accounting-relevant internal control system as part of its audit insofar as this is necessary and appropriate for assessing the accuracy of financial reporting.

Since 2023, Deloitte GmbH Wirtschaftsprüfungsgesellschaft, Munich, has been the auditing firm responsible for the statutory audit of the Annual Financial Statements and Consolidated Financial Statements of Merck KGaA. The auditor responsible for auditing the Consolidated Financial Statements changes regularly as required by law. Daniel Weise is currently leading the audit engagement. Mr. Weise has been the auditor in charge of the engagement since fiscal 2023. Deloitte GmbH Wirtschaftsprüfungsgesellschaft, Munich, has assured the company that it is independent of the group entities in accordance with the requirements of European law and German commercial and professional law, and that it has fulfilled its other German professional responsibilities in accordance with these requirements. The Supervisory Board has found no grounds to doubt the independence of Deloitte GmbH Wirtschaftsprüfungsgesellschaft, Munich. Neither party identified any conflicts of interest. The Audit Committee reviews the quality of the audit, including the performance of the auditor in charge of the engagement, annually on the basis of objective indicators.

Further reports

The Combined Management Report of Merck KGaA and the Merck Group includes a combined non-financial declaration that incorporates the non-financial declaration of the Merck Group in accordance with section 315b HGB and the non-financial declaration of Merck KGaA in accordance with 289b HGB and section 315b (1) HGB in conjunction with section 298 (2) HGB. It is included as a separate chapter of the Combined Management Report. An overview of the information contained in the combined non-financial declaration can be found at "**Topics for the non-financial statement**". In addition, Merck publishes a sustainability report that meets the requirements of the Global Reporting Initiative (GRI) standards and contains reports in accordance with the standards published by the Sustainability Accounting Standards Board (SASB) and the Task Force on Climate-related Financial Disclosures (TCFD). This will be available from April 11, 2024, as an online version on the company's website at **https://www.merckgroup.com/en/sustainability-report/2023**. In addition, the remuneration report, which is also published on the company's website, is included as a separate item of the disclosures on corporate governance.

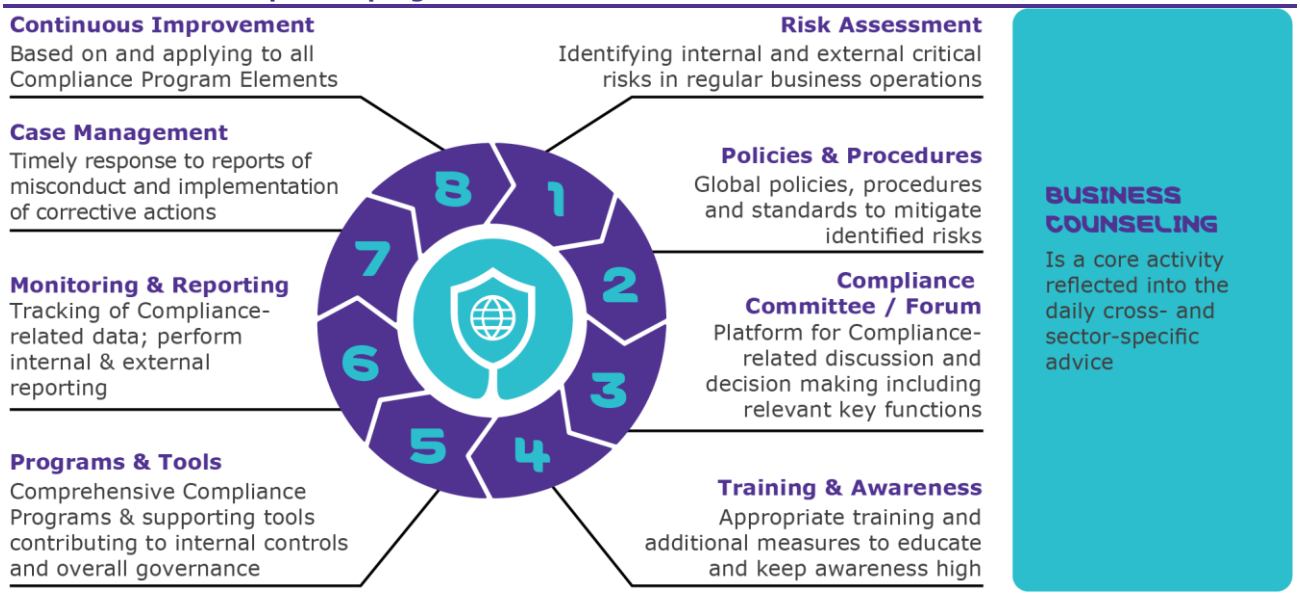
Values and compliance

First and foremost, responsible entrepreneurship means acting in accordance with the law – also known as compliance. All our activities are required to adhere to the applicable laws, regulations, and international ethical standards around the world. Compliance violations would result not only in possible legal action but also could seriously compromise our reputation as an employer and business partner.

Our Group Compliance function is responsible for the core topics: Merck's Code of Conduct, anti-corruption and anti-bribery (including healthcare compliance, third-party due diligence, transparency reporting), anti-money laundering, and conflicts of interest. Group-wide and local policies, procedures, and processes are in place for these important compliance topics in order to ensure that our business activities are consistent with the relevant laws, regulations, and international ethical standards.

Our compliance management system encompasses eight core elements and ongoing consultation with the business fields that make up our compliance portfolio:

Elements of our compliance program



Living our values together is the underlying principle of our compliance management system. The Compliance department adopts a specific brief in this respect.

A global framework for ethical and legally compliant business processes serves to minimize risk. We achieve this by identifying specific compliance risks and requirements. Suitable policies and effective controls are implemented in order to reduce risk. Our goals also focus on our employees. We achieve this by informing employees about the applicable compliance rules and ethical standards and by giving them the responsibility for complying with these requirements. This serves to strengthen employees' sense of responsibility and accountability. As compliance is the second line of defense against risks, it is important that we consistently safeguard what really matters. This is why we regularly monitor key indicators that allow us to assess risks and the effectiveness of controls. Compliance not only contributes to company growth but also creates targeted value added by allowing us to advise the business sectors and help them to navigate the respective compliance requirements. Our advice takes into account and adapts to changing business requirements.

Based on a corporate culture that places the fundamental company values – courage, achievement, responsibility, respect, integrity, and transparency – at the center of our entrepreneurial actions, our Code of Conduct (**https://www.merckgroup.com/company/responsibility/en/regulations-and-guidelines/code-of-conduct.pdf**) helps us implement these when dealing with one another daily. The Code of Conduct applies to all Merck employees in all countries and at all levels of our organization.

With its Code of Conduct, Merck has established a set of rules intended to help our employees to act responsibly and to make the right decisions in their daily work.

The Code of Conduct explains the company principles for dealings with business associates, shareholders, colleagues, and employees, and within the scope of our responsibility for society. Therefore, it supports all employees in acting ethically – not only in their dealings with one another but also outside the company. Accordingly, the Code of Conduct is also the main set of rules for our Compliance Program. Merck has aligned the content of its Code of Conduct with the Merck values and integrated important topics such as data privacy, healthcare compliance, and bioethics.

To Merck, compliance means observing legal and internal regulations and the basic ethical principles anchored in the company's values. With the Code of Conduct and the various unit-specific ethical compliance rules, the values are integrated into daily work and business practice. We also expect our business partners (e.g.

customers, suppliers, distributors etc.) to comply with these principles or to have their own comparable principles. Our Business Partner Code of Conduct describes our expectations and requirements regarding human rights, health and safety, integrity, environmental protection, and continuous improvement. While supplier management ensures compliant behavior of suppliers, global business partner risk management encompasses the relations with sales-related business associates such as distributors, commercial agents, dealers and high-risk suppliers.

The Compliance department monitors observance of the Code of Conduct with support from corresponding monitoring and training programs throughout the company. Suitable controls and tailored training programs across the company ensure monitoring of the Code of Conduct. All employees are called upon to report potential compliance violations, so that Merck can take the necessary and appropriate action. In cooperation with Group Internal Auditing, the Compliance Office regularly reviews the implementation of Group-wide compliance measures at the subsidiaries. The audits regularly focus on the local compliance structure, the compliance measures taken, and the existence of corresponding compliance guidelines and processes.

The Group Compliance Officer is responsible for the establishment, maintenance, and further development of our global Compliance Management System. Among other things, the Group Compliance Officer and its team, consisting of a global Compliance Center of Expertise and compliance officers, take appropriate measures to help lower the risk of serious compliance violations and implement the compliance program across Merck globally. Our Compliance Center of Expertise is a central body responsible for designing and structuring our compliance program in all business areas and Group functions.

Our Group Compliance Officer reports on the status of our compliance activities, potential risks and serious compliance violations to the Executive Board and Audit Committee 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.

A further focus area of the Compliance Program is ensuring legally and ethically correct dealings with medical stakeholders and adhering to the transparency requirements. The Compliance organization has agreed on extensive measures with the affected areas of the company in order to establish an internal framework of rules as well as the corresponding processes for approving and documenting interactions with healthcare professionals that ensure Merck complies with reporting obligations. We, of course, also ensure compliance with the respectively valid data protection regulations.

The importance of compliance is also reflected in the subsidiaries, which ensure via country representatives that compliance measures are implemented effectively in the countries. Compliance tasks in the countries are largely performed by full-time compliance officers. In terms of the functional structure, compliance officers in the countries report directly and indirectly to the Group Compliance Officer. A separate responsibility was created for Group functions. Regular regional and global compliance meetings are held to promote the exchange of information within the Compliance organization. This is supplemented by a global concept for local compliance forums and global compliance committees, at which relevant compliance-related topics are discussed with senior management. These constitute an important element of risk assessment and quality assurance.

Newcomer trainings are run for newly appointed compliance officers. These seminars serve to build up compliance expertise and strengthen cooperation within the Compliance organization. This Group-wide network is used to steer the global Compliance Program. The Compliance organization is also involved in the relevant due diligence processes for the incorporation of new business units as well as possible divestments and acquisitions, and the subsequent integration of companies. Within the scope of the global compliance program, a high degree of importance is given to regular compliance trainings of the Merck Compliance Training Plan, which are conducted as web-based training courses and classroom sessions. The various training topics addressed, particularly on the Code of Conduct, anti-corruption and bribery, conflicts of interest, anti-money laundering, antitrust and competition law, and healthcare compliance, serve to sensitize employees and management on the consequences of compliance violations.

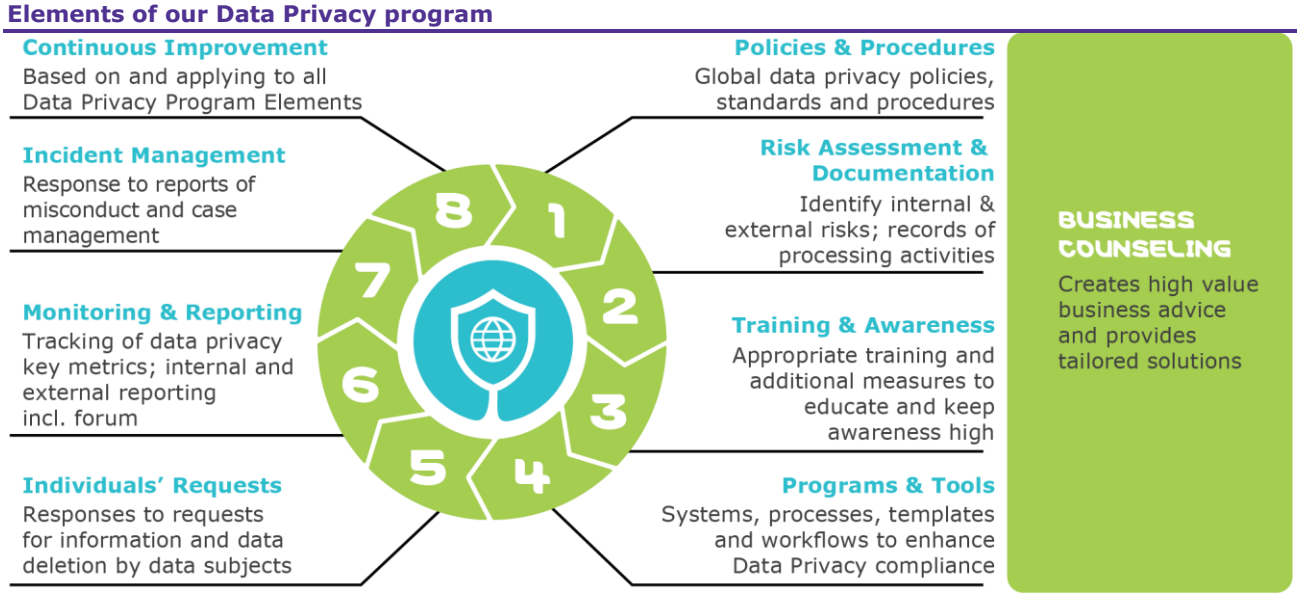
As described in various compliance training courses and the Code of Conduct, whistleblowers may choose from various reporting channels. The choice of reporting channel may depend on the reason for the report and the whistleblower's preferences in the respective circumstances. Reports to the central reporting channels, including the Compliance hotline, are received directly by an independent and qualified team at Group Compliance and examined. The report may be forwarded to a different responsible function for further processing depending on the nature and content of the report. Employees and individuals from outside the company can report potential compliance violations to the Compliance hotline by telephone or via a web-based application in their respective language. The Compliance hotline is available 24 hours a day, free of charge. The system enables anonymous, two-way communication. If there is evidence of a compliance violation, corresponding corrective measures are taken based on concrete action plans. If necessary, disciplinary measures are taken which can range from a simple verbal warning up to the dismissal of the employee who violated a compliance rule. Merck has set up a Compliance Case Committee to guide these processes. The Compliance Case Committee consists of senior members from various Group governance functions; they are involved in reviewing certain compliance violations and initiating appropriate and necessary measures. The joint work in the Compliance Case Committee enables processes between the various Group functions to be coordinated optimally and designed efficiently and potential risks to be addressed adequately.

Data privacy

Group Data Privacy at Merck is integrated into the Group's Compliance organization. As required by law, this department operates independently and without being required to follow instructions. The department regularly prepares data privacy updates and produces a comprehensive data privacy report at regular intervals as part of our broader compliance reporting efforts. The Group Data Privacy Officer has a team of dedicated local data privacy officers working in countries that are particularly privacy-sensitive for Merck. Other individuals around the world also serve as local Data Privacy Officers alongside their core activity for Merck. The tasks of these two groups of local data privacy officers include implementing and applying the global data privacy policy in the countries, performing regular efficiency tests, and promoting awareness of data privacy. They also advise the company on relevant and critical matters relating to data privacy. A Center of Expertise also provides support in the form of structures and tools.

Our data privacy management system encompasses various elements of our portfolio alongside the pillars of people and communication. The portfolio is composed as follows:

Elements of our Data Privacy program



The Data Privacy organization has put specific guidelines in place to ensure that Data Privacy processes comply with the relevant regulations. The Group Data Privacy Policy defines the standards according to which data is processed, stored, used, and transmitted at Merck. This enables us to provide a high level of privacy when it comes to processing the data of our employees, contract partners, customers, suppliers, patients, healthcare practitioners, and participants in clinical trials. The statutory documentation requirements are realized in a central IT tool that also serves as the basis for other key data privacy processes: documenting processing activities, performing a general risk audit and – if required by law – a specific data privacy impact assessment, reporting and evaluating potential data privacy violations, and processing requests from data subjects. Our understanding of data privacy throughout the Group is based on European legislation in particular, including the data privacy principles of the EU's General Data Protection Regulation (EU GDPR), which has been in force since May 2018. However, we also comply with and implement local data privacy regulations.

Corresponding training and awareness measures are a core element of any data privacy management system. The effective communication of relevant standards, procedures and other guidelines in the form of regular training is important, as are regular awareness measures in order to establish an appropriate culture of data privacy within our company. Our data privacy services comprise general awareness measures, such as e-learning on data privacy that is mandatory for all Merck employees, and broad-based communication using various channels including e-mail and the company intranet, as well as targeted training, e.g. interactive training for certain subsets of employees and standardized training sets focusing on specific topics and tailored to corresponding groups of companies.

Risk and opportunity management

For detailed information, including a description of the main characteristics of the entire internal control system and risk management system and the statement on the appropriateness and effectiveness of these systems, please refer to the "**Internal control system**" section of the "**Report on Risks and Opportunities**" in the Management Report.

Avoidance of conflicts of interest

Within the framework of their work, all Executive Board and Supervisory Board members of Merck KGaA are exclusively committed to the interests of the company and neither pursue personal interests nor grant unjustified advantages to third parties.

Before an Executive Board member takes on honorary offices, board positions, or other sideline activities, this must be approved by the Personnel Committee of the Board of Partners of E. Merck KG. The Chair of the Executive Board, Belén Garijo, the Chief Financial Officer until June 30, 2023, Marcus Kuhnert, and the Chief Financial Officer from July 1, 2023, Helene von Roeder, are also members of the Executive Board of E. Merck KG. This does not, however, create conflicts of interest.

In its report to the General Meeting, the Supervisory Board discloses any conflicts of interest involving its members and how they were dealt with. Consultancy agreements as well as other service and work contracts of a Supervisory Board member with Merck require the approval of the Supervisory Board. In fiscal 2023, there were neither conflicts of interest nor consultancy agreements or other service or work contracts with Merck KGaA involving Supervisory Board members.

Adherence to environmental and safety standards

Our thinking and actions with regard to environmental protection and safety are based on the principle of sustainability and the guidelines for responsible action as set out by the International Council of Chemical Associations (ICCA) in its Responsible Care Global Charter, which emphasizes overall responsibility for products, supply chains, and society. We have signed up to this charter and declared its principles to be binding throughout the Group in our Environment, Health and Safety (EHS) Policy.

We also adopt environmental safety and protection targets with the aim of permanently improving our environmental protection and safety:

- We have set ourselves the goal of climate-neutral business operations along the entire value chain by 2040. By 2030, we aim to reduce our direct (Scope 1) and indirect (Scope 2) emissions by 50% compared with 2020. Our goal is to achieve this primarily by reducing process-related emissions and implementing energy efficiency measures. In terms of our Scope 3 emissions, we want to reduce emissions throughout the entire value chain by 52% (per € of value added) by 2030. These short-term targets for 2030 were approved by the Science Based Targets Initiative (SBTi) in May 2022. The independent initiative assesses and approves companies' targets based on its strict climate science criteria. By receiving this confirmation, we are helping limit global warming to 1.5 °C, meeting the requirements of the Paris Agreement.
- In addition, we are aiming to source 80% of our purchased electricity from renewable energies by 2030.
- We also intend to reduce the environmental impact of our waste, reduce water intensity, and improve the quality of our wastewater by 2030. Having achieved our short-term targets for waste and water consumption to 2025 ahead of schedule in 2023, we have adopted new ambitions for the period to 2030. By the end of the decade, we want to achieve a circularity rate of 70% in our waste flows and improve our water intensity (per euro of value added) by 50%.
- To improve occupational safety, we aim to lower the lost time injury rate (LTIR) to below 1 by 2025.

Merck has also rolled out BeHealthy, a global program aimed at maintaining and promoting employee health. The objective of the program is to strengthen the physical, mental, social and workplace-related health of all employees for the long term. The focal points of the content are healthy leadership, mindfulness, and delivering a diverse healthcare offering that is accessible globally.

Based on the EHS Policy, many guidelines specify how the sites and employees of the Merck Group are to observe the principles in their daily work. The Group function Corporate Sustainability, Quality and Trade Compliance steers these global activities and ensures compliance with statutory requirements, internal standards, and business needs throughout the entire Group. In this way, Group-wide risks are minimized, and continuous improvement is promoted in the areas of environment, health, safety, security, and quality.

We report on our ecological, environmental and social performance transparently in accordance with the internationally recognized principles of the Global Reporting Initiative (GRI), the standards issued by the Sustainability Accounting Standards Board (SASB), and the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD).

Procedures of the Executive Board, Supervisory Board, Board of Partners, and its Committees

Members of the Executive Board of Merck KGaA

Information on memberships of statutory supervisory boards and comparable German and foreign supervisory bodies (section 285 no. 10 HGB in conjunction with section 125 (1) sentence 5 AktG).

Member	Memberships of (a) statutory supervisory boards and (b) comparable German and foreign supervisory bodies of corporations
Belén Garijo Frankfurt am Main, Chair	(b) • Banco Bilbao Vizcaya Argentaria S. A., Bilbao, Spain (listed) • L'Oréal S. A., Clichy, France (listed)
Kai Beckmann Darmstadt, CEO Electronics	(a) • Bundesdruckerei GmbH, Berlin, Germany (not listed) • Bundesdruckerei Gruppe GmbH, Berlin, Germany (not listed)
Peter Guenter Berlin, CEO Healthcare	(b) • Galapagos N.V., Mechelen, Belgium (listed) • Zentiva Group a.s., Prague, Czech Republic (not listed)
Matthias Heinzel Weinheim, CEO Life Science	No mandates
Marcus Kuhnert (until June 30, 2023) Königstein, Chief Financial Officer	(b) • Döhler Group SE, Darmstadt, Germany (not listed)
Helene von Roeder (as of July 1, 2023) Frankfurt am Main, Chief Financial Officer	No mandates

The general partners with no equity interest (Executive Board) manage the business activities in accordance with the laws, the Articles of Association, and the rules of procedure. They are appointed by E. Merck KG with the approval of a simple majority of the other general partners. The members of the Executive Board are jointly responsible for the entire management of the company. Certain tasks are assigned to individual Executive Board members based on a responsibility distribution plan. Each Executive Board member promptly informs the other members of any important actions or operations in his or her respective business area. Among other things, the Executive Board is responsible for preparing the Annual Financial Statements of Merck KGaA and of the Merck Group as well as for approving the quarterly and half-year financial statements of the Merck Group. In addition, the Executive Board ensures that all legal provisions, official regulations, and the company's internal policies are observed, and works to achieve compliance with them by all the companies of the Merck Group. A Group-wide guideline defines in detail which transactions require prior approval by the Executive Board.

The Executive Board provides the Supervisory Board and its Audit Committee with regular, up-to-date, and comprehensive reports about all company-relevant issues concerning strategy, planning, business development, risk situation, risk management, and compliance. The rules of procedure of the Executive Board and of the Supervisory Board regulate the further details and ensure that the Supervisory Board is kept adequately informed by the Executive Board.

The Executive Board informs the Board of Partners and the Supervisory Board at least quarterly of the progress of business and the situation of the company. In addition, the Executive Board informs the aforementioned boards at least annually of the company's annual plans and strategic considerations.

The Executive Board passes its resolutions in meetings that are normally held once a month.

Supervisory Board

The Supervisory Board has 16 members. The Supervisory Board was composed as follows in fiscal year 2023:

Member	Memberships of (a) other statutory supervisory boards and (b) comparable German and foreign supervisory bodies of corporations	Member of the Supervisory Board since	Attendance of meeting of the Supervisory Board
Wolfgang Büchele **(Chair of the Supervisory Board)** Römerberg, Chair of Exyte GmbH, Stuttgart (Independent Shareholder Representative)	(a) • Gelita AG, Eberbach, Germany (Chair) (not listed) • Merck Life Science KGaA, Darmstadt, Germany[1] (not listed) • Merck Electronics KGaA, Darmstadt, Germany[1] (Chair) (not listed) (b) • E. Merck KG, Darmstadt, Germany[1] (not listed) • Wegmann Unternehmens-Holding GmbH & Co. KG, Fürstenfeldbruck, Germany (Chair) (not listed) • KNDS NV, Amsterdam, Netherlands (not listed)	Jul. 1, 2009	5/5
Sascha Held **(Vice Chair of the Supervisory Board)** Riedstadt, Application Consultant (full-time member and Chair of the Merck Joint Works Council)	No board positions	Apr. 26, 2019	5/5
Birgit Biermann Bochum, Member of the Central Board of Executive Directors of the German Mining, Chemical and Energy Industrial Union (IG BCE), Hannover	(a) • adidas AG, Herzogenaurach, Germany (listed)	Jul. 14, 2022	5/5
Gabriele Eismann Seeheim-Jugenheim, full-time member of the Works Council	No board positions	May 09, 2014	5/5
Jürgen Glaser Bingen, former Regional Director of the German Mining, Chemical and Energy Industrial Union (IG BCE), Darmstadt	(a) • SIRONA Dental Systems GmbH, Wals, Austria (not listed) (b) • Merck BKK, Darmstadt, Germany (not listed)	Apr. 26, 2019	5/5
Michael Kleinemeier Heidelberg, Managing Director of e-mobiligence GmbH, Heidelberg	(a) • Merck Life Science KGaA, Darmstadt, Germany[1] (Chair) (not listed) (b) • E. Merck KG, Darmstadt, Germany[1] (not listed) • SRH Holding (SdbR), Heidelberg (not listed)	Apr. 26, 2019	5/5
Renate Koehler Darmstadt, Pharmacist and until January 02, 2024, Manager of Engel-Apotheke pharmacy, Darmstadt (Independent Shareholder Representative)	No board positions	Apr. 26, 2019	5/5
Barbara Lambert Givrins (Switzerland), Supervisory and Administrative Board Member (Independent Shareholder Representative)	(a) • Deutsche Börse AG, Eschborn, Germany (listed) • Synlab AG, Munich, Germany (listed) (b) • Implenia AG, Opfikon, Switzerland (listed) • UBS Switzerland AG / Credit Suisse AG (Group Mandate), Zurich, Switzerland (not listed)	Aug. 11, 2023	1/1
Anne Lange Riedstadt, Application Engineer (full-time member and Vice-Chair of the Merck Joint Works Council)	No board positions	Apr. 26, 2019	5/5

Footnotes follow at the end of the table.

Member	Memberships of (a) other statutory supervisory boards and (b) comparable German and foreign supervisory bodies of corporations	Member of the Supervisory Board since	Attendance of meeting of the Supervisory Board
Peter Emanuel Merck[2] Hamburg, Managing Partner of Golf-Lounge GmbH, Hamburg (Independent Shareholder Representative)	No board positions	Apr. 26, 2019	5/5
Dietmar Oeter Seeheim-Jugenheim, Vice President Corporate Quality Assurance	No board positions	May 09, 2014	5/5
Alexander Putz Michelstadt, Chemical Laboratory Assistant (full-time member of the Merck Joint Works Council)	(a) • Merck Electronics KGaA, Darmstadt, Germany[1] (not listed)	May 28, 2020	5/5
Christian Raabe Höchst, IT Business Partner Darmstadt Site	No board positions	Apr. 26, 2019	5/5
Helene von Roeder Frankfurt am Main, at that time Member of the Executive Board (CTO) of Vonovia SE, Bochum (Independent Shareholder Representative)	(a) • AVW Versicherungsmakler GmbH, Hamburg, Germany (not listed) • Deutsche Wohnen SE, Berlin, Germany (listed) (b) • E. Merck KG, Darmstadt, Germany[1] (not listed) • AVW Versicherungsmakler GmbH, Hamburg, Germany (not listed)	Apr. 26, 2019 until Apr. 17, 2023	1/1
Helga Rübsamen-Schaeff Düsseldorf, Member of the Supervisory Board of AiCuris Anti-infective Cures AG, Wuppertal	(a) • Merck Healthcare KGaA, Darmstadt, Germany[1] (Chair) (not listed) • Merck Life Science KGaA, Darmstadt, Germany[1] (not listed) • 4SC AG, Martinsried, Germany (listed) • AiCuris Anti-Infective Cures AG, Wuppertal, Germany (not listed) (b) • E. Merck KG, Darmstadt, Germany[1] (not listed)	May 09, 2014	5/5
Daniel Thelen Cologne, Program Manager Infrastructure at DB InfraGO AG, Frankfurt am Main (Independent Shareholder Representative)	(b) • E. Merck KG, Darmstadt, Germany[1] (not listed)	Apr. 26, 2019	5/5
Simon Thelen[2] Cologne, Senior Physician at the Clinic for Trauma and Hand Surgery, University Hospital Düsseldorf (Independent Shareholder Representative)	(a) • Merck Healthcare KGaA, Darmstadt, Germany[1] (not listed) • Merck Life Science KGaA, Darmstadt, Germany[1] (not listed) • Merck Electronics KGaA, Darmstadt, Germany[1] (not listed) (b) • E. Merck KG, Darmstadt, Germany[1] (not listed)	Apr. 26, 2019	5/5

[1] Internal board position.

[2] Members delegated according to article 6 (5) of the Articles of Association.

The Supervisory Board performs a monitoring function. It supervises the Executive Board's management of the company. In comparison with the supervisory board of a German stock corporation, the role of the supervisory board of a corporation with general partners (KGaA) is limited. This is due to the fact that the members of the Executive Board are personally liable partners and therefore are responsible for the management of the company. In particular, the Supervisory Board is not responsible for appointing and dismissing general partners or for regulating the terms and conditions of their contracts. This is the responsibility of E. Merck KG. Similarly, the Supervisory Board does not have the authority to issue rules of procedure for the Executive Board or a catalog of business transactions requiring approval. This is also the responsibility of E. Merck KG (article 13 (3) sentence 1 and (4) sentence 1 of the Articles of Association).

However, the fact that the Supervisory Board has no possibility of directly influencing the Executive Board restricts neither its information rights nor its audit duties. The Supervisory Board must monitor the legality, regularity, usefulness, and economic efficiency of the Executive Board. In particular, the Supervisory Board has the duty to examine the reports provided by the Executive Board. This includes regular reports on the intended

business policy, as well as other fundamental issues pertaining to corporate planning, especially financial, investment, and HR planning, the profitability of the Merck Group, and the course of business. In particular, this also includes IT security and sustainability issues, which fall within the responsibility of the Audit Committee. The regular reports pertaining to Group Internal Auditing, risk management, the internal control system, and compliance are received by the Audit Committee of the Supervisory Board. In addition, by means of consultation with the Executive Board, it creates the basis for supervision of the management of the company by the Supervisory Board in accordance with section 111 (1) AktG. The Supervisory Board and the Audit Committee examine the Annual Financial Statements as well as the Consolidated Financial Statements and the Combined Management Report, taking into account the auditor's reports. Moreover, the Audit Committee discusses the quarterly statements and the half-year financial report, taking into account in the latter case the report of the auditor on the audit review of the abridged financial statements and the interim management report of the Group, and reports to the Supervisory Board. The adoption of the Annual Financial Statements is not the responsibility of the Supervisory Board, but of the Annual General Meeting. The Supervisory Board and the Audit Committee normally meet four times a year. Further meetings may be convened if requested by a member of either the Supervisory Board or the Executive Board. As a rule, resolutions of the Supervisory Board are passed at meetings at the instruction of the Chair. In exceptional cases a resolution may be passed by other means, details of which are given in the rules of procedure.

The members of the Board of Partners of E. Merck KG and of the Supervisory Board may be convened to a joint meeting if so agreed by the chairpersons of the two boards.

The Supervisory Board has adopted rules of procedure for its activities that are available on the company's website at: **https://www.merckgroup.com/company/who-we-are/management-and-company-structure/supervisory-board/EN/Rules-of-Procedure-Supervisory-Board-EN.pdf**.

The rules of procedure prescribe that the Supervisory Board may form committees. The Supervisory Board has formed a Nomination Committee and an Audit Committee.

The Nomination Committee comprises three shareholder representatives. Its members are Wolfgang Büchele (Chair), Helga Rübsamen-Schaeff, and Simon Thelen. The Nomination Committee is responsible for proposing to the Supervisory Board suitable candidates for its proposal to the Annual General Meeting. In addition to the legal requirements and the recommendations of the German Corporate Governance Code, the objectives of the Supervisory Board with respect to its composition, the qualification matrix, and the diversity policy must be taken into consideration.

The Audit Committee comprises three shareholder representatives and three employee representatives. The members of the Audit Committee are Helene von Roeder (Chair) until April 17, 2023, and Barbara Lambert (Chair) since August 11, 2023, Wolfgang Büchele, Jürgen Glaser, Sascha Held, Christian Raabe, and Daniel Thelen.

The German Stock Corporation Act and the German Corporate Governance Code in the versions currently applicable to the company state that at least one member of the Audit Committee shall have professional expertise in accounting and at least one additional member of the Audit Committee shall have professional expertise in auditing. Accounting and auditing also include sustainability reporting and its audit and assurance. The Chair of the Audit Committee should have professional expertise in at least one of the two areas. As financial experts, Helene von Roeder and Barbara Lambert both have particular knowledge and experience of the application of reporting principles and internal control and risk management systems. They are also familiar with auditing and, in this context, with sustainability reporting. Helene von Roeder's aforementioned knowledge is based, among other things, on her previous role as a member of the Management Board of Vonovia SE, to which she belonged first as Chief Financial Officer (CFO) and later as Chief Technology Officer (CTO). She was also the Chair of the Audit Committee of the company's Supervisory Board and the Finance Committee of the Board of Partners of E. Merck KG (stepping down on April 17, 2023). Helene von Roeder thus qualifies as a financial expert within the meaning of section 100 (5) of the German Stock Corporation Act (AktG) and Recommendation D.3 of the German Corporate Governance Code. Barbara Lambert's aforementioned knowledge is based, among other things, on her education and many years of activity as an auditor and a

member of the Board of Directors of Banque Pictet & Cie SA until 2022. Among other things, she is also a member of the Supervisory Board and Chair of the Audit Committee of Deutsche Börse AG and a member of the Board of Directors of UBS Switzerland AG. In these roles, she regularly participates in the training offered by the respective companies. Barbara Lambert thus qualifies as a financial expert within the meaning of section 100 (5) of the German Stock Corporation Act (AktG) and Recommendation D.3 of the German Corporate Governance Code. Furthermore, the Vice Chair of the Audit Committee, Daniel Thelen, qualifies as a financial expert within the meaning of section 100 (5) of the German Stock Corporation Act (AktG) and Recommendation D.3 of the German Corporate Governance Code. A fully qualified lawyer with a Master of Business Administration (MBA) and many years of experience as a member of the Audit Committee, he has particular knowledge and experience of the application of reporting principles and internal control and risk management systems. Finally, Wolfgang Büchele also has expertise in the area of accounting. His expertise results from his role as CEO of Exyte GmbH, his many years as a member of the executive boards of other companies, and his membership of other supervisory bodies. Wolfgang Büchele thus also qualifies as a financial expert within the meaning of section 100 (5) of the German Stock Corporation Act (AktG) and Recommendation D.3 of the German Corporate Governance Code.

Defining the required knowledge in more detail, a further provision of the German Stock Corporation Act also states that the members of the Supervisory Board must be collectively familiar with the sector in which their company operates. This requirement is addressed in the Supervisory Board's qualification matrix, which stipulates that the Supervisory Board should have at least four members who possess such knowledge of the sector. We currently meet this requirement (see also "**Objectives of the Supervisory Board with Respect to Its Composition, Profile of Skills and Expertise, and Qualification Matrix**"). Information on the independence of the shareholder representatives can be found under "**Objectives of the Supervisory Board with Respect to its Composition, Profile of Skills and Expertise, and Qualification Matrix**".

The Supervisory Board and the Audit Committee conduct regular self-assessments every two years. These take the form of an internal efficiency review based on an extensive questionnaire. The questionnaire includes feedback on cooperation within the Supervisory Board, corporate governance, accounting, risk management, and the dialog with the Executive Board and the Audit Committee. The next self-assessment of the Supervisory Board is scheduled for 2024.

Board of Partners of E. Merck KG

Some of the responsibilities that lie with the supervisory board of a German stock corporation are fulfilled at Merck by E. Merck KG. This applies primarily to the Board of Partners of E. Merck KG. Accordingly, the Board of Partners as well as the composition and procedures of its committees are described below.

The Board of Partners has nine members. The Board of Partners was composed as follows in fiscal 2023:

Member	Memberships of (a) statutory supervisory boards and (b) comparable German and foreign supervisory bodies of corporations
Johannes Baillou **(Chair of the Board of Partners)** Vienna, Austria, Vice Chair of the Executive Board and General Partner of E. Merck KG	(a) • Merck Life Science KGaA, Darmstadt, Germany (not listed) • Merck Electronics KGaA, Darmstadt, Germany (not listed)
Simon Thelen **(Vice Chair of the Board of Partners)** Cologne, Senior Physician at the Clinic for Trauma and Hand Surgery, University Hospital Düsseldorf, Düsseldorf	(a) • Merck KGaA, Darmstadt, Germany (listed) • Merck Healthcare KGaA, Darmstadt, Germany (not listed) • Merck Life Science KGaA, Darmstadt, Germany (not listed) • Merck Electronics KGaA, Darmstadt, Germany (not listed)
Wolfgang Büchele Römerberg, Chair of Exyte GmbH, Stuttgart	(a) • Merck KGaA, Darmstadt, Germany (listed) • Merck Life Science KGaA, Darmstadt, Germany (not listed) • Merck Electronics KGaA, Darmstadt, Germany (Chair) (not listed) • Gelita AG, Eberbach, Germany (Chair) (not listed) (b) • Wegmann Unternehmens-Holding GmbH & Co. KG, Fürstenfeldbruck, Germany (Chair) (not listed) • KNDS NV, Amsterdam, Netherlands (not listed)
Michael Kleinemeier Heidelberg, Managing Director of e-mobiligence GmbH, Heidelberg	(a) • Merck KGaA, Darmstadt, Germany (listed) • Merck Life Science KGaA, Darmstadt, Germany (Chair) (not listed) (b) • SRH Holding (SdbR), Heidelberg (not listed)
Katharina Kraft Mannheim, Senior Strategy Manager at BASF SE, Ludwigshafen	No board positions
Helene von Roeder (until April 2, 2023) Frankfurt am Main, at that time Member of the Executive Board (CFO) of Vonovia SE, Bochum	(a) • Merck KGaA, Darmstadt, Germany (listed) • AVW Versicherungsmakler GmbH, Hamburg, Germany (not listed) • Deutsche Wohnen SE, Berlin, Germany (listed) (b) • AVW Versicherungsmakler GmbH, Hamburg, Germany (not listed)
Helga Rübsamen-Schaeff Düsseldorf, Member of the Supervisory Board of AiCuris Anti-infective Cures AG, Wuppertal	(a) • Merck KGaA, Darmstadt, Germany (listed) • Merck Healthcare KGaA, Darmstadt, Germany (Chair) (not listed) • Merck Life Science KGaA, Darmstadt, Germany (not listed) • 4SC AG, Martinsried, Germany (listed) • AiCuris Anti-Infective Cures AG, Wuppertal, Germany (not listed)
Frank Stangenberg-Haverkamp Darmstadt, Chair of the Executive Board and General Partner of E. Merck KG, Darmstadt	(a) • Fortas GmbH, Rösrath, Germany (Chairman) (not listed) • Merck Healthcare KGaA, Darmstadt, Germany (not listed) • Merck Life Science KGaA, Darmstadt, Germany (Vice Chair) (not listed) • Merck Electronics KGaA, Darmstadt, Germany (Vice Chair) (not listed) (b) • Travel Asset Group Ltd., London, United Kingdom (Chair) (not listed)
Daniel Thelen Cologne, Program Manager Infrastructure at DB InfraGO AG, Frankfurt am Main	(a) • Merck KGaA, Darmstadt, Germany (listed)

The Board of Partners supervises the Executive Board in its management of the company. It informs itself about the business matters of Merck KGaA and may inspect and examine the company's accounts, other business documents, and assets for this purpose. According to article 13 (4) of the Articles of Association of Merck KGaA, the Executive Board requires the approval of E. Merck KG for transactions that are beyond the scope of the Group's ordinary business activities. For such transactions, approval must first be obtained from the Board of Partners of E. Merck KG. The Board of Partners convenes as and when necessary; however, it

normally meets four times a year. The members of the Executive Board of Merck KGaA are invited to all meetings of the Board of Partners, unless the Board of Partners resolves otherwise in individual cases. The members of the Board of Partners may convene a joint meeting with the Supervisory Board of Merck KGaA if so agreed by the chairpersons of the two boards.

The Board of Partners may delegate the performance of individual duties to committees. Currently, the Board of Partners has three committees in place: the Personnel Committee, the Finance Committee, and the Research and Development Committee.

Personnel Committee

The Personnel Committee has four members: Johannes Baillou (Chair), Wolfgang Büchele, Michael Kleinemeier, and Frank Stangenberg-Haverkamp. The Personnel Committee meets at least twice a year. Further meetings are convened as and when necessary. Meetings of the Personnel Committee are attended by the Chair of the Executive Board of Merck KGaA unless the Committee decides otherwise. Among other things, the Personnel Committee is responsible for the following decisions concerning members and former members of the Executive Board: contents and conclusion of employment contracts and pension contracts; granting of loans and salary advances; changes to the compensation structure and adaptation of compensation; approval for taking on honorary offices, board positions, and other sideline activities; and division of responsibilities within the Executive Board of Merck KGaA. The Personnel Committee passes its resolutions by a simple majority; in matters concerning the Chair of the Executive Board, unanimity is required. The Chair of the Committee regularly informs the Board of Partners of its activities.

Finance Committee

The Finance Committee has four members: Wolfgang Büchele (Chair) since May 9, 2023, and Helene von Roeder (Chair) until April 2, 2023, Johannes Baillou, Daniel Thelen, and Simon Thelen. The Finance Committee holds at least four meetings a year, some of which are joint meetings with the Audit Committee of the Supervisory Board of Merck KGaA. At least one meeting is a joint meeting with the auditor of Merck KGaA. Further meetings are convened as and when necessary. Meetings of the Finance Committee are attended by the Chief Financial Officer of Merck KGaA. Other members of the Executive Board of Merck KGaA may attend the meetings upon request of the Finance Committee. These meetings regularly include the Chair of the Executive Board. Among other things, the Finance Committee is responsible for analyzing and discussing the Annual Financial Statements, the Consolidated Financial Statements, and the respective reports of the auditor, as well as the half-year financial report and the quarterly statements. In addition, the Finance Committee addresses Merck’s net assets, financial position, results of operations, and liquidity, as well as accounting issues. Upon request of the Board of Partners, the Finance Committee examines investment projects that must be approved by the Board of Partners and provides recommendations pertaining thereto. It passes its resolutions with a simple majority. The Chair of the Committee regularly informs the Board of Partners of its activities.

Research and Development Committee

The Research and Development Committee has four members: Helga Rübsamen-Schaeff (Chair), Johannes Baillou, Katharina Kraft, and Simon Thelen. The Research and Development Committee is convened as and when necessary but holds at least two meetings a year. Meetings of the Research and Development Committee are attended by members of the Executive Board of Merck KGaA upon request of the Committee. These meetings regularly include the Chair of the Executive Board as well as the CEO Life Science, the CEO Healthcare, and the CEO Electronics. Among other things, the Research and Development Committee is responsible for reviewing and discussing the research activities of the Life Science, Healthcare, and Electronics business sectors. It passes its resolutions with a simple majority. The Chair of the Committee reports to the Board of Partners on the insights gained from the meetings.

Stipulations to promote the percentage of management positions held by women pursuant to section 76 (4) and section 111 (5) of the German Stock Corporation Act (AktG)

Stipulations pursuant to section 76 (4) AktG (target for the percentage of positions held by women on the two upper management levels below the Executive Board)

We foster diversity within the company, which also includes ensuring a balance of genders in management. To this end, we pursue both voluntary and legally required objectives, and we work continuously and sustainably to achieve them. As a global company with correspondingly aligned global (leadership) structures, we are striving to increase the proportion of management positions held by women (managers, experts, and project managers in roles 4 and above)[1] as a voluntary goal. Our aim is to achieve gender parity by the end of 2030.

In addition, Merck KGaA is subject to the statutory obligations under section 76 (4) AktG.

On December 21, 2021, the Executive Board of Merck KGaA therefore set the new targets to be achieved by December 31, 2024, in order to implement the obligations under section 76 (4) AktG as follows:

- First management level of Merck KGaA below the Executive Board: 35.5% of positions held by women, corresponding to full headcounts at the date on which the targets were defined.
- Second management level of Merck KGaA below the Executive Board: 31.8% of positions held by women, also corresponding to full headcounts at the date on which the targets were defined.

The first management level comprises all managers of Merck KGaA with a direct reporting line to the Executive Board of Merck KGaA or who belong to the Global Executive Group. The second management level comprises all managers of Merck KGaA who report to managers with a direct reporting line to the Executive Board of Merck KGaA or the Global Executive Group.

Stipulations pursuant to section 111 (5) AktG (target for the percentage of positions on the Supervisory Board held by women)

Pursuant to section 111 (5) AktG, the Supervisory Board of companies that are listed or subject to codetermination must stipulate binding targets for the percentage of positions on the Supervisory Board and on the Management Board held by women. However, Merck KGaA is not required to stipulate targets pursuant to section 111 (5) AktG for the following reasons:

The statutory target of 30% pursuant to section 96 (2) AktG is already applied to the Supervisory Board of Merck KGaA; this eliminates the obligation to stipulate a further target for the percentage of positions held by women on the Supervisory Board (see section 111 (5) sentence 5 AktG).

In turn, the obligation to stipulate a target for the percentage of positions held by women on the Executive Board pursuant to section 111 (5) AktG and the minimum composition requirement for the Executive Board pursuant to section 76 (3a) AktG are not applicable to the legal form of a corporation with general partners (Kommanditgesellschaft auf Aktien), as a corporation with general partners neither has a management board comparable to that of a stock corporation, nor does the Supervisory Board have personnel authority over the Executive Board. Rather, the Executive Board of Merck KGaA consists of personally liable general partners (see also the description of Supervisory Board procedures). In line with its diversity policy, however, Merck also continues to pursue representation of both genders as an objective for the Executive Board.

[1] This group makes up around 7% of the total workforce; see the description under "Diversity and management".

Diversity policy pursuant to section 289f (2) no. 6 of the German Commercial Code (HGB)

Merck is pursuing a Group-wide, global diversity strategy. At Merck, diversity stands for a culture of inclusion, mutual esteem, and respect. To demonstrate this open and dynamic company culture, we promote diversity, equal opportunity, and inclusion throughout the Group – and do so at all levels, including the Executive Board and Supervisory Board.

We believe that a diverse workforce boosts the innovative strength of the Merck Group and contributes materially to our business success. That is why Merck is furthering a culture of diversity independent of factors such as age, gender, disability, ethnic or cultural background, religion, industry experience, and educational background. As part of our global diversity strategy, we have developed a diversity policy to strategically steer the topics of diversity and inclusion in our corporate bodies; this focuses on the following key criteria:

The Group-wide diversity strategy encompasses both voluntary as well as legally defined objectives that we continuously and sustainably work to achieve (see also the "**Diversity and Inclusion**" section of the Non-Financial Statement and the Sustainability Report for 2023). In this context, it should be noted that, with respect to the Executive Board of Merck KGaA, many rules can only be applied correspondingly. This is because the Executive Board comprises personally liable general partners of Merck KGaA and is not a management board with employed members of a corporate body (for details, please also see the "**Joint Report of the Executive Board and the Supervisory Board**").

In addition to the aspects presented below, reference is made to the objectives of the Supervisory Board with respect to its composition and the profile of skills and expertise and qualification matrix of the Supervisory Board (see the information under "**Objectives of the Supervisory Board with Respect to Its Composition, Profile of Skills and Expertise, and Qualification Matrix**"). The statements made therein form part of the diversity policy for the Supervisory Board presented here.

Age

Our boards are to have a balanced age structure. This permits future-oriented and consistent succession planning and is a key element of sustainable company management and monitoring. Maximum age limits apply to both boards. A maximum age of 70 applies to members of the Executive Board, while the standard age limit for Supervisory Board members is 75. Our diversity policy aims for an age range of at least ten years between the youngest and the oldest member of the respective board.

The current composition of the Executive Board and the Supervisory Board satisfies this objective. The age range of the Supervisory Board is 35 years, while the age range of the Executive Board is currently ten years.

Gender

Gender diversity also plays a crucial role, since it enables us to benefit from a larger talent pool and allows us to develop a better understanding of important customer groups as a company.

Additionally, Merck continues to pursue representation of both genders as an objective for the Executive Board. The Board of Partners of E. Merck KG appointed Belén Garijo as the new Chair of the Executive Board effective May 1, 2021, making it the first time a woman had been appointed to this position. Helene von Roeder has been a member of the Executive Board and the Chief Financial Officer of Merck since July 1, 2023. This means that women account for 40% of the members of the Executive Board. The statutory target of 30% pursuant to section 96 (2) AktG already applies to the Supervisory Board of Merck KGaA and is currently met.

Internationality and global mindset

As a science and technology company with global operations and major markets on five continents with more than 64,000 employees at locations in 66 countries, internationality and the associated global mindset is one of our key success factors. According to our diversity policy, the Executive Board’s internationality derives from leadership experience or national origin, relative to our key sales markets or those locations that are organizationally and culturally relevant to our employee development efforts. For both criteria, Europe, North America, and Asia-Pacific are currently the key regions.

The Executive Board meets this objective with management experience in these regions, e.g. in the following countries: Denmark, United Kingdom, Malaysia, Singapore, Spain, and United States. In addition, 40% of the Executive Board members are not German citizens.

Management experience

The key prerequisites for high-performance leadership teams are the diversity of the individual competency profiles and a balance between an internal and external management perspective. Therefore, the Executive Board as a whole must have in-depth knowledge and experience in the following key areas of importance to the company: strategy and planning, finance and accounting, sales and operations, human resources, legal and compliance, and information technology, as well as ecological and social sustainability. In addition, it is important for the composition of the Executive Board to ensure a good balance of members from within and outside the company. Our diversity policy seeks to derive inspiration and innovation from outside the company and to identify the latest trends of relevance to the core businesses of the company, while ensuring sustainability and continuity in line with our corporate culture.

The current Executive Board fulfills both of the aforementioned objectives: All required aspects of the competency profile are covered by at least one member of the Executive Board. Likewise, two members of the Executive Board possess multiple years of experience working within the Merck Group prior to their appointment to the Executive Board.

Industry experience

To efficiently lead and manage the Group, the Executive Board must have in-depth knowledge of the key industries and business sectors in which the company operates. For each of the areas Life Science, Healthcare, and Electronics, there should be at least one member of the Executive Board with in-depth expertise in accordance with the diversity concept.

The Executive Board covers the full range of the necessary industry experience.

Educational background

In order to translate the tremendous innovative potential of a science and technology company into sustainable business success, interdisciplinary educational backgrounds are a key element of our diversity policy both for the Executive Board and for the Supervisory Board. The current composition of both boards illustrates this interdisciplinary aspect to a very high degree.

The members of the Executive Board contribute knowledge of various fields including medicine (pharmacology, physical education), (astro)physics, information technology, and electrical engineering. In addition, the majority of members of the Executive Board hold a university and doctorate degree.

Moreover, the members of the Supervisory Board have a background in one or more of the following fields of specialization: chemistry, pharmaceutics, mathematics, law, business administration and economics, physics, process technology, and computer sciences.

Seven Supervisory Board members are university graduates and hold doctorates.

Report of the Supervisory Board

The Supervisory Board again properly executed its duties in 2023 in accordance with the law as well as the company's Articles of Association and rules of procedure. In particular, the Supervisory Board monitored the work of the Executive Board diligently and regularly.

Cooperation with the Executive Board

The cooperation with the Executive Board was characterized by an intensive dialog on the basis of mutual trust. During fiscal 2023, the Executive Board provided the Supervisory Board with regular written and verbal reports on the business development of Merck KGaA and the Merck Group. In particular, the Supervisory Board was informed about the market and sales situation of the company in the context of macroeconomic developments, and the financial position of the company and its subsidiaries, along with their earnings development and corporate planning. Within the scope of quarterly reporting, the sales and operating results were presented for the Merck Group as a whole and broken down by business sector. In addition to the Supervisory Board meetings, the Chair of the Supervisory Board also maintained, and continues to maintain, a regular exchange of information with the Chair of the Executive Board.

Key topics of the Supervisory Board meetings

A total of five Supervisory Board meetings were held in fiscal 2023. All of the meetings were held in person. At four of these five meetings, the Supervisory Board intensely discussed the reports of the Executive Board, as well as company developments and strategic issues together with the Executive Board. The Chair of the Audit Committee or, in the case of the meetings in May and July 2023, the Vice Chair reported comprehensively on the previous meetings of the Audit Committee at these meetings of the Supervisory Board.

At the meeting in February 2023, the Supervisory Board intensively addressed the Annual Financial Statements and Consolidated Financial Statements for 2022, the Combined Management Report, the reports of the auditor (KPMG AG Wirtschaftsprüfungsgesellschaft, Berlin, "KPMG"), including the audit report on the non-financial declaration for fiscal 2022, and the proposal for the appropriation of net retained profit. The auditor (KPMG) explained the audit reports including the focus areas of the audit. The Executive Board and the Head of Group Accounting reported on the financial statements. Furthermore, the Supervisory Board resolved on the report and the objectives of the Supervisory Board with respect to its composition and the profile of skills and expertise including the qualification matrix, the Declaration of Conformity with the German Corporate Governance Code, and the Statement on Corporate Governance. The Supervisory Board also adopted the proposals to be made to the Annual General Meeting (including the creation of new Contingent Capital II) and approved the plan to hold the Annual General Meeting in virtual form. The Executive Board reported on business performance in 2022 and presented the plans for fiscal 2023, which was likely to be challenging in light of geopolitical tensions in particular.

The Supervisory Board met in April 2023 to resolve on the amendment to the rules of procedure of the Audit Committee and the election of Daniel Thelen as the Vice Chair of the Audit Committee. The meeting was held after Helene von Roeder stepped down as a member of the Supervisory Board and the Audit Committee effective April 17, 2023. The Chair of the Supervisory Board informed the Supervisory Board members about this development at the meeting. As part of the amendment to the rules of procedure of the Audit Committee, the Supervisory Board transferred the responsibility for resolving on sustainability topics of relevance to the company to the Audit Committee.

The meeting in May 2023 focused on the report of the Executive Board on business performance in the first quarter and the forecast for fiscal 2023. The Executive Board discussed developments in the first quarter of

2023 and provided an outlook concerning expected business performance in 2023 as a whole. The Supervisory Board extensively discussed the contributions of the individual business sectors to the company's financial performance. The report of the Research and Development Committee of the Board of Partners of E. Merck KG for Life Science and Electronics was an additional focus of the meeting. Finally, the Supervisory Board addressed Merck's global strategy.

At the meeting in July 2023, the Executive Board reported on the comparatively good business performance in the second quarter of 2023 in spite of the challenging environment. The non-financial statement, which forms part of the Combined Management Report, was a further topic of discussion. The Supervisory Board resolved to commission the auditor (Deloitte GmbH Wirtschaftsprüfungsgesellschaft, Munich) to conduct a limited assurance review of the non-financial declaration for fiscal 2023. In addition, the auditor (Deloitte GmbH Wirtschaftsprüfungsgesellschaft, Munich) was commissioned to conduct the formal and material audit of the compensation report for fiscal 2023. Another topic addressed by the meeting was the amendment to the Articles of Association of Merck KGaA following the departure of Marcus Kuhnert and the appointment of Helene von Roeder to the Executive Board. All of the training undertaken by the Supervisory Board was on the subject of sustainability.

At the Supervisory Board meeting in November 2023, the Executive Board provided an overview of business performance in the third quarter of 2023 in an extremely challenging business environment. The background to this business performance was then discussed in detail by the Supervisory Board. Other topics discussed included the report by the Research and Development Committee for Healthcare and Merck KGaA's transactions with related parties within the meaning of section 111a et seq. of the German Stock Corporation Act (AktG). There were no transactions requiring the approval of the Supervisory Board in accordance with section 111b (1) AktG. This was followed by an overview and an intensive discussion of the Group and business sector strategies, also in the context of external developments. The Chair of the Executive Board also reported on the Global Leadership Summit (GLS), at which Merck managers discussed the geopolitical environment and its impact on Merck as well as the priorities of the Merck Group.

In parts of its meetings, the Supervisory Board regularly meets without the members of the Executive Board being present. Additionally, the employee representatives gather for a preparatory meeting ahead of each Supervisory Board meeting. The employee representatives also gather immediately after each Supervisory Board meeting to discuss the topics addressed at the meeting. Among other things, this includes a discussion of topics which should be placed on the agenda for the next Supervisory Board meeting.

Annual Financial Statements and Consolidated Financial Statements

The Annual Financial Statements of Merck KGaA, the Consolidated Financial Statements of the Merck Group, and the Combined Management Report for Merck KGaA and the Merck Group, including the accounts, were audited by Deloitte GmbH Wirtschaftsprüfungsgesellschaft, Munich.

The auditors issued an unqualified audit opinion on the Annual Financial Statements of Merck KGaA in accordance with German Auditing Standards.

For the Consolidated Financial Statements prepared in accordance with International Financial Reporting Standards and for the Combined Management Report, the auditors issued the unqualified auditor's report that is reproduced in the Annual Report of the Merck Group.

In addition, the auditor audited the calculation of Merck KGaA's participation in the profit of E. Merck KG in accordance with Article 27 (2) of the Articles of Association, as well as the combined non-financial declaration. The Annual Financial Statements of Merck KGaA, the Consolidated Financial Statements of the Merck Group, and the Combined Management Report for Merck KGaA and the Merck Group, including the non-financial declaration and the proposal of the Executive Board for the appropriation of net retained profit, were submitted firstly to the Audit Committee and then to the Supervisory Board together with the auditor's reports.

The Audit Committee assessed the Annual Financial Statements of Merck KGaA, the proposal for the appropriation of net retained profit, and the auditor's report. It also examined the Consolidated Financial Statements of the Merck Group as well as the Combined Management Report for Merck KGaA and the Merck Group, including the non-financial declaration, and took note of the auditor's reports of Deloitte GmbH Wirtschaftsprüfungsgesellschaft, Munich. In particular, it focused on the key audit matters of particular importance in the audit opinion, the resulting risks for the financial statements, the approach adopted during the audit as described, and the conclusions drawn by the auditor. On completion of its assessment, the Audit Committee raised no objections and thus recommended that the Supervisory Board approve the Annual Financial Statements for Merck KGaA, the Consolidated Financial Statements of the Merck Group, the Combined Management Report of Merck KGaA and the Merck Group prepared by the Executive Board, and the report presented by the auditor in accordance with Article 27 (2) of the Articles of Association.

At its meeting in February 2024 to approve the financial statements, the Supervisory Board also assessed the Annual Financial Statements of Merck KGaA, the proposal for the appropriation of net retained profit, the auditor's report presented in accordance with Article 27 (2) of the Articles of Association, the Consolidated Financial Statements of the Merck Group, and the Combined Management Report of Merck KGaA and the Merck Group in accordance with Article 14 (2) of the Articles of Association, and took note of the auditor's reports of Deloitte GmbH Wirtschaftsprüfungsgesellschaft, Munich. The discussion of the relevant agenda item at this meeting was also attended by the auditors who sign the audit opinion on the Annual Financial Statements of Merck KGaA and the Consolidated Financial Statements of the Merck Group. This was also the case for the meeting of the Audit Committee. Based on the recommendation of the Audit Committee and its own review, the Supervisory Board approved the Annual Financial Statements for Merck KGaA, the Consolidated Financial Statements of the Merck Group, the Combined Management Report of Merck KGaA and the Merck Group prepared by the Executive Board, and the report presented by the auditor in accordance with Article 27 (2) of the Articles of Association. The Supervisory Board gave its consent to the proposal of the Executive Board for the appropriation of net retained profit after conducting its own review.

Corporate governance and Declaration of Conformity

Corporate governance is a high-priority topic for the Supervisory Board. In its own estimation, the Supervisory Board has an adequate number of independent members. There were no conflicts of interest as defined by the German Corporate Governance Code involving Supervisory Board members during the year under review. Dialog with the stakeholder groups set out in the German Corporate Governance Code is an important aspect of opinion-forming within the company. Among other things, this takes the form of surveys in connection with the materiality analysis as well as direct discussions. For example, we take the related investor suggestions extremely seriously. In fiscal 2023, the Chair of the Supervisory Board held discussions with investors on Supervisory Board-specific topics, including investor meetings with Allianz Global Investors GmbH and DWS Investment GmbH. In particular, the topics discussed included the qualification matrix and the independence of the Supervisory Board with a view to the Supervisory Board election in 2024 as well as the remuneration of the Supervisory Board. Mr. Büchele stated that the qualification matrix plays a significant role in the selection of candidates and that a particular focus has been placed on sustainability and digitalization. Independence, internationality and diversity are other important factors. Mr. Büchele also stated that the company is planning to reduce the term of office of the Supervisory Board members. Mr. Büchele reported that consideration was being given to possibly adjusting Supervisory Board compensation to reflect the development of the market in recent years in order to remain competitive with regard to attracting the best candidates. Ahead of the Supervisory Board election in 2024, the Supervisory Board also actively engaged in dialog with the biggest investors in order to determine their expectations and opinions. Among others, initial meetings with Blackrock, Amundi and Union Invest already took place in December 2023.

The Supervisory Board has an onboarding process aimed at enabling the quick and efficient induction of new members. Most recently, Barbara Lambert received corresponding training upon joining the Supervisory Board.

After discussing corporate governance issues in detail, the Executive Board and the Supervisory Board adopted the updated Declaration of Conformity in accordance with section 161 AktG and issued it jointly in February 2024. The statement is permanently available on the website of Merck KGaA (**https://www.merckgroup.com/en/investors/corporate-governance/reports.html**). More information about corporate governance at Merck KGaA, including the compensation of the Executive Board and Supervisory Board, can be found in the Statement on Corporate Governance.

Committees

The Supervisory Board of Merck KGaA had a Nomination Committee and an Audit Committee in fiscal year 2023.

Audit Committee

The Audit Committee meets four times a year. Further meetings are convened as and when necessary. The Audit Committee is generally responsible for accounting and auditing matters. This includes sustainability reporting and auditing the sustainability reports. In particular, its responsibilities include auditing the Annual Financial Statements, the Consolidated Financial Statements, and the respective reports of the auditor, as well as the half-year financial report and the quarterly statements. The Audit Committee discusses the assessment of audit risk, the audit strategy and audit planning, and the results of the audit with the auditor. The Chair of the Audit Committee regularly discusses the progress of the audit with the auditor and reports back to the committee. The other responsibilities of the Audit Committee include assessing the performance of the auditor, and especially the performance of the auditor in charge of the engagement. The Audit Committee is also tasked with sustainability. This topic was assigned to it at the Supervisory Board meeting in April 2023.

The Audit Committee prepares the negotiations and resolutions of the Supervisory Board on the approval of the Annual Financial Statements and Consolidated Financial Statements and the proposal to the Annual General Meeting on the election of the auditor. The adoption of the Annual Financial Statements is not the responsibility of the Audit Committee or the Supervisory Board but of the Annual General Meeting. The Audit Committee also ascertains the independence of the auditor, assigns the audit mandate to the auditor, and determines the focus areas of the audit and the fee agreement. Furthermore, the Audit Committee monitors the accounting process, the effectiveness of the internal control system, the risk management system and the internal auditing system, and compliance. The Chair of the Audit Committee and the auditor also engage in a regular dialog outside of the meetings of the Audit Committee.

At the meeting in February 2023, which was held in person, the Chief Financial Officer and the Head of Group Accounting reported on the 2022 Consolidated Financial Statements and the Annual Financial Statements of Merck KGaA, which were then discussed in detail by the Audit Committee. This included a discussion of the sustainability topics contained in the non-financial statement. The auditor (KPMG) also reported on the audit of the financial statements and discussed the focus areas of the audit. The declaration of auditor independence was acknowledged and evaluated. The meeting also reviewed and resolved on the proposal on the appropriation of net retained profit to be submitted to the Supervisory Board, including the dividend payment by Merck KGaA for fiscal 2022. Furthermore, the Audit Committee acknowledged and discussed the written risk report. In addition, the Audit Committee proposed that the Supervisory Board resolve the creation of a new authorization to issue convertible bonds and/or bonds with warrants, accompanied by the simultaneous creation of new Contingent Capital II. The Head of Group Internal Auditing then presented the report from Group Internal Auditing for 2022. The compliance and data protection report was also presented and discussed. The details of the non-audit services approved in fiscal 2022 were also discussed.

The report on the net assets, financial position, and results of operations of the Merck Group for the first quarter of 2023 was presented to the meeting in May 2023, which was held in person. The Audit Committee then discussed the report in detail. The Audit Committee also discussed the start date of the audit period with the auditors (Deloitte). The auditors shared their initial impressions following the handover of the audit engagement and provided an overview of the planning for the audit review of the half-year financial report.

The meeting of the Audit Committee in July 2023, which was also held in person, began with a detailed discussion of the report on the net assets, financial position, and results from operations of the Merck Group for the second quarter of 2023. The auditors (Deloitte) shared their initial impressions following the handover of the audit engagement and presented the results of the audit review of the half-year financial report. The auditors also presented an overview of the process planning for the audit of the Annual Financial Statements and the planned focal points. Next, the Audit Committee resolved on the list of the individual audit and non-audit related services. A further focal point was the report on the key developments regarding the accounting-related internal control system (ICS), which the Audit Committee discussed in detail. This was followed by the risk management status report for the first half of 2023.

At the meeting in November 2023, which was held in person, the Chief Financial Officer presented the initial observations and findings of the financial reporting health check. In particular, this included a discussion of the internal control system and the IT systems used to support financial reporting. The Chief Financial Officer and the Head of Group Accounting then reported on the net assets, financial position, and results of operations of the Merck Group in the third quarter of 2023. It was noted that the income statement was showing lower net sales than in the same quarter of the previous year due to the sustained difficult environment. The Audit Committee discussed the report on the third quarter in detail. It then reviewed the contractual terms for the annual audit of the financial statements and evaluated the audit of the financial statements and non-audit services following an extensive presentation by the Head of Group Accounting. Finally, the planned scope of the audit of the financial statements on the basis of the statutory provisions and the provisions of the European Securities and Markets Authority (ESMA) and the defined schedule were discussed with Deloitte GmbH Wirtschaftsprüfungsgesellschaft, Munich. The reports on Group Internal Auditing and compliance and data protection were then presented.

Nomination Committee

The Nomination Committee met twice in fiscal 2023.

At the meeting in July 2023, which was held as a video conference, the members of the Nomination Committee met with the aim of recommending a suitable replacement for Helene von Roeder to the Supervisory Board. Following a brief discussion regarding potential candidates, Barbara Lambert was proposed to the Supervisory Board of Merck KGaA as a suitable candidate for its proposal for election by court appointment.

The meeting in October 2023, which was held as a video conference, heard a report on the search for candidates for the Supervisory Board to be proposed for election at the 2024 Annual General Meeting. In particular, a well-known headhunting firm was commissioned in order to ensure that the criteria of the candidate profiles were satisfied to the greatest possible extent. Potential candidates were selected on the basis of several selection interviews and discussed at the meeting. The Nomination Committee then resolved to propose the candidates it deemed most suitable to the Supervisory Board of Merck KGaA for election at the 2024 Annual General Meeting.

Personnel matters and training

The Supervisory Board attended all of the meetings in full. Helene von Roeder attended the meeting in February prior to stepping down from the Supervisory Board, while Barbara Lambert attended the meeting in November following her appointment to the Supervisory Board. The members of the Audit Committee attended all meetings of the Audit Committee. Helene von Roeder attended the meeting in February, while her successor Barbara Lambert attended the meeting in November. The members of the Nomination Committee attended all meetings of the Nomination Committee.

For the purposes of targeted further training, the Supervisory Board is offered an information event with internal and external speakers at least once a year. In fiscal 2023, a training event on sustainability for all Supervisory Board members was held on May 10, 2023. The event, which featured high-profile internal and external speakers, encompassed the topics of “Sustainability in the Corporate Environment” as well as the legal dimensions of aspects and developments in the area of sustainability and ESG that are relevant to the Supervisory Board (e.g. climate-related litigation, greenwashing, due diligence obligations in supply chains, and sustainability reporting in accordance with the CSRD). The company generally covers the cost of training measures for the Supervisory Board.

New members of the Supervisory Board – including Barbara Lambert in 2023 – also undergo an onboarding process prepared by employees of the Legal department in accordance with the onboarding plan.

Darmstadt, February 2024

The Supervisory Board of Merck KGaA

Wolfgang Büchele
Chair

Objectives of the Supervisory Board with Respect to its Composition, Profile of Skills and Expertise, and Qualification Matrix

Initial situation

According to recommendation C.1 of the German Corporate Governance Code in the version dated April 28, 2022, the Supervisory Board shall specify concrete objectives regarding its composition as well as preparing a qualification matrix for the entire board. In its composition, the Supervisory Board shall take into account the number of independent members, consider the principle of diversity, specify an age limit, and disclose the term of Supervisory Board membership. The qualification matrix for the Supervisory Board shall also comprise expertise regarding sustainability issues relevant to the enterprise.

General notes on the composition of the Supervisory Board

The Supervisory Board of Merck KGaA currently comprises 16 members, of whom eight represent the shareholders and a further eight represent the employees. The eight employee representative members are elected by employee delegates pursuant to the provisions of the German Co-determination Act (MitbestG). These consist of six company employees, including a senior executive, as well as two union representatives. The Supervisory Board has no statutory right of proposal with respect to the election of delegates or employee representatives to the Supervisory Board. Two of the eight shareholder representatives are appointed under a delegation right of E. Merck Beteiligungen KG. The Supervisory Board also has no statutory right of proposal with respect to the exercise of this delegation right. The other six shareholder representatives are elected by the Annual General Meeting. In accordance with section 124 (3) sentence 1 AktG, the Supervisory Board shall propose Supervisory Board members to the Annual General Meeting for election. These proposals require a majority of the votes of the shareholder representative members of the Supervisory Board. The next scheduled election to the Supervisory Board will take place at the 2024 Annual General Meeting. The Annual General Meeting is not required to follow the election proposals. Accordingly, the appointment objectives and competency requirements set out by the Supervisory Board below do not constitute requirements to be met by those eligible to elect or delegate members. Instead, they are intended to express the objectives pursued by the Supervisory Board in office with regard to its advisory and monitoring functions.

For the Supervisory Board of Merck KGaA, professional qualifications and personal expertise are the two most important prerequisites for appointments to positions on the Supervisory Board. In accordance with the German Stock Corporation Act, at least one member of the Supervisory Board must have knowledge and expertise in the area of accounting, and at least one additional member of the Supervisory Board must have knowledge and expertise in the auditing of financial statements. The expertise in the field of accounting shall consist of special

knowledge and experience in the application of accounting principles and internal control and risk management systems, and the expertise in the field of auditing shall consist of special knowledge and experience in the auditing of financial statements. Accounting and auditing also include sustainability reporting and its audit and assurance. The Chair of the Audit Committee shall have appropriate expertise in at least one of the two areas and shall be independent. When proposing Supervisory Board candidates for election or delegation, the Supervisory Board will always give top priority to these prerequisites, which are essential for fulfilling its legal duties. Overall, the Supervisory Board's policy is to optimally meet its monitoring and advisory duties by ensuring diversity among its members. In particular, diversity includes internationality as well as different experience backgrounds and career paths. The proportion of women on the Supervisory Board is also considered to be an aspect of diversity. When preparing proposals for election or delegation to the Supervisory Board, the Supervisory Board shall consider in each case to what extent different, complementary specialist skills, professional and life experience, and an appropriate representation of both genders benefit the work of the Supervisory Board. Additionally, the Supervisory Board shall support the Executive Board in its efforts to increase diversity within the company.

Objectives of the Supervisory Board with Respect to its composition

In accordance with recommendation C.1 of the German Corporate Governance Code in the version dated April 28, 2022, the Supervisory Board has specified the following objectives regarding its composition, and reports below on the status of implementation.

Internationality

The Supervisory Board shall have at least three members with business experience in the main sales markets of Merck KGaA. Currently, the main sales markets of Merck KGaA are Europe, America, and Asia-Pacific. The present composition of the Supervisory Board satisfies this objective. More than three Supervisory Board members have entrepreneurial experience in a wide range of European countries. More than three Supervisory Board members have experience in management positions in companies that operate globally.

Women on the Supervisory Board

Six women are currently members of the Supervisory Board of Merck KGaA. This corresponds to a share of women of 37.5%. The Supervisory Board has undertaken to comply with the minimum quotas set out in section 96 (2) sentence 2 AktG separately for the shareholder and employee representatives. When nominating candidates for election to the Supervisory Board or making proposals for delegations, the Supervisory Board shall examine whether the percentage of women can be increased by suitable candidates. The Supervisory Board considers the 37.5% share of female members to be satisfactory at the present time. This is due to the percentage of women in leadership positions at Merck and in consideration of the composition of the Supervisory Boards of other companies of comparable size.

Independence

The Supervisory Board shall have an appropriate number of independent shareholder representatives as members. In any case, at least five of the shareholder representatives on the Supervisory Board shall be independent. According to the Articles of Association of Merck KGaA, six members representing the shareholders are to be elected by the Annual General Meeting, and two members are to be delegated. Taking this and the special ownership structure of Merck KGaA into account, the shareholder representatives consider five shareholder representatives to be an appropriate number of independent members. In the opinion of the shareholder representatives, the objectives concerning independent members are met at the present time. The shareholder representatives consider the following members to be independent: Wolfgang Büchele, Michael Kleinemeier, Renate Koehler, Barbara Lambert, Peter Emanuel Merck, Helene von Roeder (until stepping down

from the Supervisory Board on April 17, 2023), Helga Rübsamen-Schaeff, Daniel Thelen, and Simon Thelen. In determining the independence of Wolfgang Büchele, the shareholder representatives took account of the fact that he has been a member of the Supervisory Board for more than twelve years, which the German Corporate Governance Code considers to be an indicator of a lack of independence.

Exercising their own professional judgment, the shareholder representatives satisfied themselves that this indicator does not contradict their assessment that Wolfgang Büchele is, on the whole, independent of the company and its Executive Board. In his work on the Supervisory Board and its committees and in the exercise of his duties, Mr. Büchele continues to demonstrate the necessary critical distance from the company and its Executive Board, along with the capacity for objective judgment. Moreover, Mr. Büchele has confirmed in a personal statement that he considers himself to be independent of the company and its Executive Board.

In addition, the shareholder representatives do not believe that membership of the Board of Partners of E. Merck KG conflicts with independence. The Board of Partners exists to complement the skills and expertise of the Supervisory Board and its activities. Like the Supervisory Board, it supports the Executive Board in an independent advisory and control function. This is not expected to lead to material and not merely temporary conflicts of interest. It should also be taken into account that, due to its substantial capital investment and unlimited personal liability, E. Merck KG has a strong interest in the businesses of Merck KGaA operating efficiently and in compliance with procedures, thus counteracting from the outset any conflicts of interest between E. Merck KG and Merck KGaA and hence any corresponding conflicts of interest between the members of the respective corporate boards.

No material conflicts of interest

Moreover, no one shall be proposed for election to the Supervisory Board who simultaneously serves on a board of or advises a major competitor of the company, or who, owing to another function, such as advisor to major contractual partners of the company, could potentially become involved in a conflict of interest. No Supervisory Board member serves on a board of or advises a major competitor. Moreover, no Supervisory Board member performs a function that could lead to a lasting conflict of interest.

Age limit

As a rule, the members of the Supervisory Board shall not exceed the age of 75. This objective is met at the present time.

Regular limit on the length of Supervisory Board membership

The objective of the Supervisory Board regarding its composition is that, as a rule, all members shall belong to the board for an uninterrupted period of no more than twelve years. This objective is also met at the present time (with the exception of Wolfgang Büchele; see the discussion under “Independence” above). The length of membership of the Supervisory Board members is set out in the “**Procedures of the Executive Board, Supervisory Board, Board of Partners, and its Committees**” section of the Statement on Corporate Governance.

Qualification matrix

Additionally, in accordance with recommendation C.1 of the German Corporate Governance Code in the version dated April 28, 2022, the Supervisory Board has prepared a qualification matrix and reports on the status of implementation below.

	Sector Knowledge (HC and LS/EL)	Management Experience	Accounting incl. Sustainability Reporting[1,2]	Auditing[2]	External Supervisory or Control Bodies[3]	Sustainability	Business Adminis-tration	Data and Digital
Wolfgang Büchele (Chair)	•	•	•	•	•	•	•	•
Sascha Held (Vice Chair)	•	•	-	-	-	•	•	•
Birgit Biermann	-	•	-	-	•	•	-	•
Gabriele Eismann	•	•	-	-	-	•	•	•
Jürgen Glaser		•	-	-	•	-	•	-
Michael Kleinemeier	•	•	-	-	•	•	•	•
Renate Koehler	•	•	-	-	-	-	-	-
Barbara Lambert (from Aug. 11, 2023)	-	•	•	•	•	-	•	•
Anne Lange	•	•	-	-	-	•	•	•
Peter Emanuel Merck	•	•	-	-	•	•	•	-
Dietmar Oeter	•	•	•	-	-	•	•	•
Alexander Putz	•	•	-	-	-	•	•	-
Christian Raabe	•	•	•	-	-	•	•	•
Helene von Roeder (until Apr. 17, 2023)	-	•	•	•	•	-	•	•
Helga Rübsamen-Schaeff	•	•	•	-	•	•	•	•
Daniel Thelen	•	•	•	-	•	-	•	•
Simon Thelen	•	•	-	-	-	-	•	•

[1] Including internal control system & risk management system.

[2] According to the German Corporate Governance Code, experience in the fields of accounting and auditing requires own activity in these areas.

[3] Not Supervisory Board or Board of Partners at Merck.

• Criterion met, based on a self-assessment by the Supervisory Board. A dot means at least “good knowledge” and thus the ability to understand the relevant issues well and make informed decisions on the basis of existing qualifications, the knowledge and experience acquired in the course of work as a member of the Supervisory Board (for example, many years of service on the Audit Committee) or the training measures regularly attended by all members of the Supervisory Board.

In-depth knowledge of the fields relevant to the company

The Supervisory Board shall have at least four members with in-depth knowledge of and experience in fields that are important to the company, including at least one expert for the Life Science and Healthcare/Electronics business sectors. This requirement is met at the present time. At present, more than four members of the Supervisory Board have in-depth knowledge and experience in the fields of Life Science, Healthcare and Electronics. In addition, more than four Supervisory Board members also have executive experience in companies that also or exclusively operate in the Life Science and Healthcare/Electronics business sectors.

Management Experience

The Supervisory Board shall have at least three members who have experience in managing or supervising a medium- or large-sized company. The Supervisory Board has more than three members who have the corresponding experience. They include Supervisory Board members who were or still are members of the management or executive board at relevant companies, as well as Supervisory Board members who have gained experience in supervisory bodies of German or foreign companies of this size.

Business Administration

The Supervisory Board must have at least four members who have in-depth knowledge of business administration and at least one member who has professional expertise in accounting or auditing. This requirement is met at the present time.

Experience in other supervisory or control bodies

In addition, the Supervisory Board shall have at least four members who have experience as members of other supervisory or control bodies (not including membership of the Board of Partners of E. Merck KG). This requirement is also met at the present time.

Sustainability expertise

Finally, the qualification matrix for the Supervisory Board shall also comprise expertise regarding sustainability issues relevant to the enterprise. The majority of the Supervisory Board members have such expertise.

consolidated financial statements

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Consolidated Income Statement

€ million	Note	2023	2022
Net sales	9	**20,993**	**22,232**
Cost of sales	10	-8,600	-8,527
Gross profit		**12,392**	**13,705**
Marketing and selling expenses	11	-4,510	-4,714
Administration expenses		-1,392	-1,306
Research and development costs	12	-2,445	-2,521
Impairment losses and reversals of impairment losses on financial assets (net)	42	-51	-6
Other operating income	13	445	486
Other operating expenses	14	-830	-1,170
Operating result (EBIT)[1]		**3,609**	**4,474**
Finance income	40	197	90
Finance costs	40	-322	-277
Profit before income tax		**3,484**	**4,287**
Income tax	15	-650	-948
Profit after tax		**2,834**	**3,339**
thereof: attributable to Merck KGaA shareholders (net income)		2,824	3,326
thereof: attributable to non-controlling interests	34	10	14
Earnings per share (in €)	17		
Basic		6.49	7.65
Diluted		6.49	7.65

[1] Not defined by International Financial Reporting Standard (IFRS).

Consolidated Statement of Comprehensive Income

€ million	Note	2023	2022
Profit after tax		**2,834**	**3,339**
Items of other comprehensive income that will not be reclassified to profit or loss in subsequent periods			
Net defined benefit liability	33		
Changes in remeasurement		-236	1,440
Tax effect		48	-300
Changes recognized in equity		**-187**	**1,140**
Equity instruments	34		
Fair value adjustments		158	-34
Tax effect		2	3
Changes recognized in equity		**160**	**-31**
		-28	**1,109**
Items of other comprehensive income that may be reclassified to profit or loss in subsequent periods			
Cash flow hedge reserve	39		
Fair value adjustments		98	-98
Reclassification to profit or loss		-95	194
Reclassification to assets		–	–
Tax effect		-5	-5
Changes recognized in equity		**-2**	**91**
Cost of cash flow hedge reserve	39		
Fair value adjustments		-17	-15
Reclassification to profit or loss		22	16
Reclassification to assets		–	–
Tax effect		–	10
Changes recognized in equity		**5**	**11**
Currency translation difference			
Changes taken directly to equity		-1,003	1,228
Reclassification to profit or loss		-15	-71
Changes recognized in equity		**-1,018**	**1,157**
		-1,015	**1,259**
Other comprehensive income		**-1,043**	**2,368**
Comprehensive income		**1,791**	**5,708**
thereof: attributable to Merck KGaA shareholders		1,783	5,696
thereof: attributable to non-controlling interests	34	8	12

Consolidated Balance Sheet

€ million	Note	Dec. 31, 2023	Dec. 31, 2022
Non-current assets[1]			
Goodwill[1]	18	17,845	18,389
Other intangible assets[1]	19	6,551	7,335
Property, plant and equipment[1]	20	9,056	8,204
Investments accounted for using the equity method		3	3
Non-current receivables	25	28	27
Other non-current financial assets	36	981	957
Other non-current non-financial assets	22	115	99
Non-current income tax receivables	15	9	10
Deferred tax assets	15	1,514	1,310
		36,102	**36,334**
Current assets			
Inventories	24	4,637	4,632
Trade and other current receivables	25	4,004	4,114
Contract assets	26	104	128
Other current financial assets	36	499	321
Other current non-financial assets	22	633	705
Current income tax receivables	15	473	446
Cash and cash equivalents	35	1,982	1,854
Assets held for sale	6	62	–
		12,393	**12,201**
Total assets[1]		**48,495**	**48,535**
Total equity	34		
Equity capital		565	565
Capital reserves		3,814	3,814
Retained earnings		20,228	18,463
Gains/losses recognized in equity		2,073	3,086
Equity attributable to Merck KGaA shareholders		**26,680**	**25,927**
Non-controlling interests		75	78
		26,754	**26,005**
Non-current liabilities[1]			
Non-current provisions for employee benefits	33	2,192	2,030
Other non-current provisions	27	277	299
Non-current financial debt	37	9,239	9,200
Other non-current financial liabilities[2]	38	147	141
Other non-current non-financial liabilities[2]	29	17	19
Non-current income tax liabilities	15	39	38
Deferred tax liabilities[1]	15	1,130	1,287
		13,042	**13,015**
Current liabilities[1]			
Current provisions for employee benefits[2]	33	83	81
Current provisions	27	575	372
Current financial debt	37	702	1,228
Other current financial liabilities[2]	38	1,005	1,153
Trade and other current payables[1]	30	2,545	2,499
Refund liabilities	9	877	912
Current income tax liabilities	15	1,433	1,483
Other current non-financial liabilities[2]	29	1,479	1,786
		8,699	**9,514**
Total equity and liabilities[1]		**48,495**	**48,535**

[1] Previous year's figures have been adjusted, see note (6) "**Acquisitions and divestments**".

[2] Previous year's figures have been adjusted, see note (2) "**Reporting principles**".

Consolidated Cash Flow Statement

€ million	Note	2023	2022
Profit after tax		**2,834**	**3,339**
Depreciation/amortization/impairment losses/reversals of impairment losses		1,880	2,030
Changes in inventories		-89	-604
Changes in trade accounts receivable		-8	-413
Changes in trade accounts payable/refund liabilities		-43	101
Changes in provisions[1]		188	279
Changes in other assets and liabilities[1]		-755	-445
Neutralization of gains/losses on disposal of fixed assets and other disposals		-150	-48
Other non-cash income and expenses		-72	21
Operating Cash Flow	16	**3,784**	**4,259**
Payments for investments in intangible assets		-216	-275
Payments from the disposal of intangible assets		136	38
Payments for investments in property, plant and equipment		-1,807	-1,531
Payments from the disposal of property, plant and equipment		19	21
Payments for investments in financial assets		-537	-364
Payments for acquisitions less acquired cash and cash equivalents (net)		-12	-854
Proceeds from the disposal of other financial assets		510	219
Payments for the acquisition of non-financial assets		-2,494	-1,075
Proceeds from the disposal of non-financial assets		2,511	1,077
Payments from divestments		–	4
Investing Cash Flow	23	**-1,892**	**-2,743**
Dividend payments to Merck KGaA shareholders		-284	-239
Dividend payments to non-controlling interests		-12	-11
Profit withdrawal by E. Merck KG		-868	-716
Proceeds from new borrowings of financial debt from E. Merck KG and E. Merck Beteiligungen KG		697	1,637
Repayment of financial debt to E. Merck KG and E. Merck Beteiligungen KG		-420	-1,613
Payments from new borrowings of other current and non-current financial debt[2]		519	1,281
Repayment of other current and non-current financial debt[2]		-1,364	-1,893
Financing Cash Flow	41	**-1,732**	**-1,555**
Changes in cash and cash equivalents		**160**	**-39**
Changes in cash and cash equivalents due to currency translation		-31	-7
Cash and cash equivalents as of January 1		1,854	1,899
Cash and cash equivalents as of December 31 (consolidated balance sheet)	35	**1,982**	**1,854**

[1] Prior-year figures have been adjusted, see note (2) "**Reporting principles**".

[2] The lines "Repayments of bonds" and "Repayments of other current and non-current financial debt" as well as "Proceeds from the issuance of bonds" and "Payments from new borrowings of other current and non-current financial debt", which were presented separately in the previous year, have been summarized to improve clarity.

Consolidated Statement of Changes in Net Equity

For details see Note (34) "**Equity**".

€ million	Equity capital	Capital reserves	Retained earnings	Gains/losses recognized in equity	**Equity attributable to Merck KGaA shareholders**	Non-controlling interests	**Total equity**
Jan. 1, 2022	**565**	**3,814**	**15,134**	**1,824**	**21,338**	**78**	**21,416**
Profit after tax	–	–	3,326	–	3,326	14	3,339
Gains/losses recognized in equity	–	–	1,109	1,261	2,370	-2	2,368
Comprehensive income	**–**	**–**	**4,435**	**1,261**	**5,696**	**12**	**5,708**
Dividend payments	–	–	-239	–	-239	-11	-251
Capital increases	–	–	–	–	–	–	–
Profit transfer to/from E. Merck KG including changes in reserves	–	–	-868	–	-868	–	-868
Transactions with no change of control	–	–	–	–	–	–	–
Change in scope of consolidation/Other	–	–	–	–	–	–	–
Dec. 31, 2022	**565**	**3,814**	**18,463**	**3,086**	**25,927**	**78**	**26,005**

€ million	Equity capital	Capital reserves	Retained earnings	Gains/losses recognized in equity	**Equity attributable to Merck KGaA shareholders**	Non-controlling interests	**Total equity**
Jan. 1, 2023	**565**	**3,814**	**18,463**	**3,086**	**25,927**	**78**	**26,005**
Profit after tax	–	–	2,824	–	2,824	10	2,834
Gains/losses recognized in equity	–	–	-28	-1,013	-1,041	-2	-1,043
Comprehensive income	**–**	**–**	**2,796**	**-1,013**	**1,783**	**8**	**1,791**
Dividend payments	–	–	-284	–	-284	-16	-300
Capital increases	–	–	–	–	–	5	5
Profit transfer to/from E. Merck KG including changes in reserves	–	–	-746	–	-746	–	-746
Transactions with no change of control	–	–	-1	–	-1	–	–
Change in scope of consolidation/Other	–	–	–	–	–	–	–
Dec. 31, 2023	**565**	**3,814**	**20,228**	**2,073**	**26,680**	**75**	**26,754**

Notes to the consolidated financial statements

General Disclosures

(1) Company information

These consolidated financial statements for the year ended December 31, 2023, were prepared for Merck Kommanditgesellschaft auf Aktien (Merck KGaA), Frankfurter Strasse 250, 64293 Darmstadt, Germany, entered in the commercial register of the Darmstadt Local Court under HRB 6164. The ultimate parent company of the Group is the parent company of Merck KGaA, E. Merck Kommanditgesellschaft (E. Merck KG), Darmstadt. The consolidated financial statements of E. Merck KG can be accessed at **https://www.unternehmensregister.de**. Shares in Merck KGaA are traded on the regulated market of the Frankfurt Stock Exchange and on other exchanges.

The German Corporate Governance Code declaration (declaration of conformity) in accordance with section 161 of the German Stock Corporation Act (AktG) was issued and can be viewed at **https://www.merckgroup.com/en/investors/corporate-governance/reports.html**.

(2) Reporting principles

These consolidated financial statements have been prepared in accordance with the International Financial Reporting Standards (IFRSs) effective at the end of the reporting period and adopted by the European Union and the additional provisions of section 315e (1) of the German Commercial Code (HGB). The fiscal year is the calendar year. These consolidated financial statements have been prepared in euros, the reporting currency. The values presented in the consolidated financial statements have been rounded. This may lead to individual values not adding up to the totals presented.

The Executive Board of Merck KGaA prepared these consolidated financial statements on February 14, 2024, and approved them to be forwarded to the Supervisory Board. The Supervisory Board is responsible for examining the consolidated financial statements and declaring whether it approves them.

The accounting and measurement policies used in the consolidated financial statements are presented in the respective Notes and are indicated there.

Standards and amendments to standards effective for the first time in fiscal 2023

Standard/Interpretation	Title	Date of publication	Date of endorsement by EU law	Impact on the consolidated financial statements
Amendments to IAS 1	Disclosure of Accounting Policies	February 12, 2021	March 2, 2022	No material impact
Amendments to IAS 8	Definition of Accounting Estimates	February 12, 2021	March 2, 2022	No material impact
Amendments to IAS 12	Deferred Tax related to Assets and Liabilities arising from a Single Transaction	May 7, 2021	August 11, 2022	No material impact
Amendments to IAS 12	International Tax Reform - Pillar Two Model Rules	May 23, 2023	November 8, 2023	See below
IFRS 17; Amendments to IFRS 17	IFRS 17 Insurance Contracts; Amendments to IFRS 17; Initial Application of IFRS 17 and IFRS 9 - Comparative Information	May 18, 2017 June 25, 2020 December 9, 2021	November 19, 2021 November 19, 2021 September 8, 2022	No material impact

Amendments to standards effective for the first time from fiscal 2024

Standard/ Interpretation	Title	Date of publication	Date of endorsement by EU law	Required date of first-time application[1]	Expected impact on the consolidated financial statements
Amendments to IFRS 16	Lease Liability in a Sale and Leaseback	September 22, 2022	November 20, 2023	January 1, 2024	No material impact
Amendments to IAS 1	Classification of Liabilities as Current or Non-current; Classification of Liabilities as Current or Non-Current — Deferral of Effective Date	January 23, 2020 July 15, 2020	December 19, 2023	January 1, 2024	No material impact
Amendments to IAS 1	Non-current Liabilities with Covenants	October 31, 2022	December 19, 2023	January 1, 2024	No material impact

[1] None of the regulations was applied early.

Regulations published but not yet endorsed by the European Union

Standard/Interpretation	Title	Date of publication	Expected to be effective for the first time for financial years beginning on or after	Expected impact on the consolidated financial statements
Amendments to IAS 7	Supplier Finance Arrangements	May 25, 2023	January 1, 2024	No material impact
Amendments to IAS 21	Lack of Exchangeability	August 15, 2023	January 1, 2025	Currently under review
Amendments to IFRS 7	Supplier Finance Arrangements	May 25, 2023	January 1, 2024	No material impact

Impact of efforts to achieve international convergence on taxation

Based on the information currently available, Merck expects the efforts to achieve international convergence on tax rules as part of the OECD's Inclusive Framework to have an impact on the Group's taxation. Although the tax rules apply to the ultimate parent company of the Group, E. Merck Kommanditgesellschaft, top-up taxes could be payable in a number of jurisdictions, and this could have an impact on the Merck Group.

Allocation of taxing rights (Pillar I)

The planned allocation of taxing rights between jurisdictions as part of the OECD rules is currently still being negotiated. An analysis of the available drafts found that the rules are likely to apply to Merck. Due to the status of the negotiations and the lack of clarity concerning the participation of key nations, it is not currently possible to make a reliable statement about the expected impact.

Ensuring global minimum taxation within the OECD (Pillar II)

The legislation on global minimum taxation was published in the German Federal Law Gazette on December 27, 2023, and came into force on January 1, 2024. The exception provided by IAS 12 for the recognition and disclosure of information about deferred tax assets and liabilities in connection with income taxes relating to global minimum taxation was applied for fiscal 2023.

Under the regulations on global minimum taxation, Merck is obliged to determine the effective tax rate for each country in which its business units operate within the meaning of the legislation and, where the effective tax rate is lower than the minimum tax rate of 15%, to pay a top-up tax in the amount of the difference. Jurisdictions where Merck has material operating activities and where the nominal tax rate is below 15% are Ireland and Switzerland. Merck is currently taking action to ensure that it satisfies the reporting obligations and tax compliance requirements arising from the legislation. When it comes to determining the effective tax rate, the legislation provides for numerous specific adjustments that can lead to effective tax rates that differ from those calculated in accordance with IAS 12.86. The complexity of applying the legislation, the extensive

additional data requirements as a result and changes to the tax rules of individual nations meant that it was not yet possible to quantify the impact precisely and fully at the reporting date. For example, it is possible that the specific adjustments provided for the calculation of minimum taxation will not result in a tax burden for Merck even though the effective tax rate calculated in accordance with IAS 12.86 is lower than 15%. Conversely, minimum taxation may apply even if the effective tax rate is higher than 15%.

Based on a preliminary calculation and taking account of the data available as of the reporting date, Merck anticipates an additional annual tax expense in a mid-double-digit million-euro amount.

Change in the recognition of liabilities and provisions

In order to increase transparency, the tranche of the Merck Long-Term Incentive Plan that is payable in the months following the reporting date has been reported in other current non-financial liabilities rather than current provisions for employee benefits since January 1, 2023. This resulted in a reclassification in the amount of € 158 million. The changes in provisions and other assets and liabilities in the operating cash flow were adjusted by € 166 million accordingly.

For the same reason, liabilities in connection with wages and salaries have been reported in other non-financial liabilities rather than other financial liabilities since January 1, 2023. With regard to the comparative period (December 31, 2022), this resulted in the reclassification of € 127 million to other non-financial liabilities (of which € 121 million to other current non-financial liabilities).

Accounting and measurement policies

Currency translation

Functional currency

The subsidiaries of Merck KGaA conduct their business largely in the respective local currency, which they use as their functional currency.

However, some subsidiaries, particularly in the Electronics business sector, use the U.S. dollar as their functional currency rather than the local currency.

Transactions in non-functional currency

When the financial statements of consolidated companies are prepared, business transactions that are conducted in currencies other than the functional currency are translated using the exchange rate on the date of the transaction.

Translation of financial statements into the reporting currency (Euro)

The financial statements of consolidated companies not using the euro as their functional currency are translated into the reporting currency, the euro. Assets and liabilities are measured at the closing rate while income and expenses are translated at average monthly rates. Any currency translation differences arising during consolidation of Group companies are recognized in equity.

Hyperinflation

Argentina (since 2018) and Türkiye (since April 2022) are classified as hyperinflationary economies in accordance with IAS 29 “Financial Reporting in Hyperinflationary Economies.” Accordingly, business activities in these countries are no longer reported at historical cost but are presented adjusted for inflation. In Argentina, Merck uses a combination of the wholesale index IPIM (Índice de precios internos al por mayor) and the consumer price index IPC (Índice de precios al consumidor). The index applied stood at 37,078.3 as of the balance sheet date (December 31, 2022: 14,227.31/January 1, 2022: 7,396.8). In Türkiye, the Consumer Price Index (CPI) published by the Turkish Statistical Institute is applied retrospectively with effect from January

1, 2022. The index applied stood at 1,859.4 as of the balance sheet date (December 31, 2022: 1,128.5/January 1, 2022: 686.9). In accordance with the requirements of IAS 21 "The Effects of Changes in Foreign Exchange Rates" for financial statements in non-hyperinflationary reporting currencies, the prior-year amounts have not been restated.

The respective loss from the net position of the monetary items is recognized within other operating expenses and reported separately as a loss from hyperinflation accounting (see Note (14) "**Other operating expenses**").

After adjusting the amounts for inflation, the balance sheet items and income and expenses are translated into the reporting currency, the euro, at the closing rate in accordance with IAS 21.42.

Exchange rates of most significant currencies

The exchange rates of the most significant currencies in these consolidated financial statements were as follows:

	Average rate		Closing rate	
€ 1 =	**2023**	2022	**Dec. 31, 2023**	Dec. 31, 2022
Chinese renminbi (CNY)	7.667	7.088	7.854	7.420
Japanese yen (JPY)	151.913	137.989	156.462	140.716
Swiss franc (CHF)	0.972	1.005	0.931	0.985
South Korean won (KRW)	1,412.674	1,357.642	1,428.798	1,342.189
Taiwan dollar (TWD)	33.695	31.336	33.845	32.728
U.S. dollar (USD)	1.082	1.054	1.107	1.065

(3) Discretionary decisions and sources of estimation uncertainty

Dealing with discretionary decisions and sources of estimation uncertainty

The preparation of the consolidated financial statements requires Merck to make discretionary decisions on the applicable accounting and measurement policies as well as estimates to a certain extent. The discretionary scope and estimation uncertainty are assessed on a company-specific basis. Discretion describes the need to make assumptions concerning recognition or measurement when applying accounting policies. Sources of estimation uncertainty affecting the selection of the valuation techniques to be applied relate in particular to the parameters used therein. The degree of estimation uncertainty may vary considerably depending on the availability and reliability of the input factors.

Increased uncertainty due to the macroeconomic situation

The continued dynamic development of the macroeconomic environment means that the degree of uncertainty in the preparation of the consolidated financial statements remains high. In particular, uncertainties included the sustained high level of inflation, the development of interest rates, geopolitical challenges, and efforts on the part of various nations to reduce international dependencies along with the related trade restrictions and sanctions. This applies in particular to the recoverability of non-financial assets. Based on the information currently available, there is no evidence of significant impairment losses to date. Furthermore, as in previous years, there are no grounds to suggest that the going concern assumption should not have been applied in preparing the consolidated financial statements.

Impact of inflation

The high rate of inflation slowed in fiscal 2023. Procurement costs for materials and energy in particular, which were mainly reflected in the increased cost of sales, remained above the level seen in previous years. As in the previous year, the cost of purchasing natural gas and electricity came to a low triple-digit million-euro amount

for the Group in fiscal 2023. As in the previous year, Merck was able to offset these increased procurement costs by passing on price rises to the market. The assumptions concerning the long-term salary and pension trends applied in calculating pension obligations were reviewed again in fiscal 2023 to reflect the development of inflation, as they had been in the previous year. Compared with the previous year, however, this resulted in an adjustment and an increase in defined benefit obligations in connection with the measurement of defined benefit pension plans only in certain countries (see Note (33) "**Provisions for employee benefits**").

Impact of higher interest rates

The sustained high level of interest rates in fiscal 2023 affected our customers' refinancing costs, especially in the Life Science business sector, resulting in lower customer demand.

The higher interest rates also resulted in a rise in the discount rates applied in performing impairment testing and determining the fair values of financial and non-financial assets compared with the previous year (see Note (18) "**Goodwill**" and Note (43) "**Information on fair value measurement**" in particular).

Direct impact of armed conflicts

The war in Ukraine has not had any material effects on the Merck Group's net assets, financial position, or results of operations owing to its limited business volume in Russia, Ukraine, Belarus, and the Republic of Moldova. In fiscal 2023 and 2022 alike, the total share of Group net sales generated in the aforementioned countries amounted to less than 1.5%. Furthermore, the conflict in the Middle East did not have a material impact on the Merck Group's net assets, financial position, and results of operations in the reporting period. In fiscal 2023 and 2022 alike, the share of Group net sales generated with customers in Israel was less than 1%.

Impact of trade restrictions, sanctions, and supply chain bottlenecks

In the past, inventories were increased in order to limit the risks in connection with supply chain disruption. Accordingly, there is a heightened risk of subsequent write-downs if it is not possible to process or sell these inventories. Furthermore, the impact of the trade restrictions concerning semiconductor materials that were imposed between the United States of America and China in the fourth quarter of 2022 has been examined since fiscal 2022. No impairment losses have been recognized to date. However, there is considerable uncertainty with regard to future developments.

Increased uncertainty due to climate risks

As a globally active science and technology group, Merck is subject to transition-related and physical climate risks that could have a potentially negative impact on its net assets, financial position, and results of operations and lead to increased estimation uncertainty in accounting. To determine the potential impact of climate risks, a structured climate risk analysis is currently being conducted as part of a project aimed at implementing the recommendations of the "Task Force on Climate-Related Financial Disclosures" (TCFD) with the support of an external consulting firm and an insurance company.

Reduction targets for greenhouse gas emissions

Merck has set itself the goal of reducing its direct (Scope 1) and indirect (Scope 2) greenhouse gas emissions by 50% in comparison with the 2020 base year in the period from 2020 to 2030. By 2030, 80% of its purchased electricity will come from renewable sources. Merck also plans to reduce the indirect emissions along the entire value chain (Scope 3) in terms of metric kilotons of CO_2 equivalents per euro of gross profit by 52% by 2030 and to achieve climate-neutral business operations along the entire value chain (Scope 1-3) by 2040. In 2022, the Science Based Targets Initiative confirmed that the targets for 2030 and the necessary measures support its ambition and that of the Paris Agreement to limit global warming to 1.5°C.

The goals described above are to be achieved through the following measures in particular:

- reduction in process-related emissions,
- increased purchase of electricity from renewable sources,
- energy efficiency measures,
- reduced emissions in the supply chain (e.g. switching to sea transportation), and
- recognition of a shadow price for the CO_2 emissions of major projects.

Transition-related climate risks

Transition-related climate risks describe the consequences for companies as a result of the transition to a more sustainable economic system.

The most significant transition-related climate risks to the net assets, financial position, and results of operations are in the Electronics business sector, which is responsible for well in excess of half of the Group's direct (Scope 1) and indirect (Scope 2) greenhouse gas emissions. The majority of these greenhouse gas emissions take the form of process-related emissions resulting from the production of specialty gases for the semiconductor and electronics industries. In order to achieve the climate goals it has adopted, the Group intends to reduce the emissions in its business with these specialty gases by making technological improvements to the production process in particular. The recoverability of the assets recognized in connection with these products depends on the successful implementation of the technological improvements in production, as they could largely prevent the risk of long-term price rises due to the increased pricing of greenhouse gas emissions. Furthermore, based on the information currently available, the implementation of Merck's sustainability strategy is not expected to result in a significant decline in net sales in this business. There have been no indications of impairment of the assets concerned to date, nor has it been necessary to adjust their remaining useful lives. There is significant estimation uncertainty due to the long-term nature of the underlying analyses and the high degree of uncertainty concerning future development.

Merck has concluded several virtual purchase agreements for the purchase of electricity from renewable energy sources as an additional measure to mitigate climate risks, and it also intends to increasingly purchase such electricity physically. After signing two virtual power purchase agreements in 2022, renewable energy sources will account for 90% of the electricity consumed by Merck in the United States and 55% of its global electricity consumption in the future. A further three virtual power purchase agreements were concluded in Spain in 2023 (see the disclosures in Note (42) "**Management of financial risks**" in addition to the existing virtual power purchase agreements that are in place with wind and solar farm project developers in the United States and Spain). This will further increase the proportion of energy consumption covered by renewable energy sources.

Merck participates in EU emissions trading and purchases emission certificates where the certificates allocated by the public authorities are not sufficient to cover Merck's greenhouse gas emissions. The impact of this EU emissions trading is currently immaterial to Merck's net assets, financial position, and results of operations.

Physical climate risks

Physical climate risks describe the risks that could result from longer-term changes in the general climatic conditions. For example, physical climate risks can have an accounting impact in the form of the necessary shortening of the economic life of items of property, plant, and equipment ("stranded assets"); the risk of operational disruption; or increased future expenses due to necessary adaptations to safeguard sites. In determining physical climate risks as part of the current TCFD project, the long-term impact of climate change was simulated for 100 site clusters of the Merck Group using two global warming scenarios for 2030 and 2050 that took account of risks due to flood, fire, wind, extreme heat, precipitation, drought, extreme cold, thunderstorms, and hail. All in all, the identified physical climate risks have not led to any material direct accounting impact. However, there is significant estimation uncertainty due to the long-term nature of the underlying analyses and the high degree of uncertainty concerning future development.

Overview of significant discretionary decisions and sources of estimation uncertainty

The accounting matters with the most significant discretionary decisions as well as the most comprehensive assumptions relating to the future and sources of estimation uncertainty are described below:

Accounting matter	**Carrying amount as of Dec. 31, 2023 in € million**	IFRS	Discretionary scope/ estimation uncertainty	Sensitivity analysis	Note
Goodwill	17,845			yes	18
Determination of recoverable amount		IAS 36	high		
Other intangible assets	6,551			yes	6, 19
Identification and measurement of intangible assets within the scope of business combinations		IFRS 3	high		
In-licensing of intangible assets		IAS 38	medium		
Determination of amortization		IAS 38	medium		
Identification of impairments or reversal of impairments		IAS 36	high		
Property, plant, and equipment	9,056			no	20
Determination of depreciation		IAS 16	medium		
Identification of impairments or reversal of impairments		IAS 36	medium		
Leases	500			yes	21
Recognition and measurement of lease arrangements		IFRS 16	medium		
Inventories	4,637			no	24
Identification of impairments or reversal of impairments		IAS 2	medium		
Trade and other receivables	4,031			no	25, 42
Determination of loss allowance		IFRS 9	medium		
Other financial assets				yes	36, 43
Determination of fair values of contingent consideration	125	IFRS 13	high		
Determination of fair values of equity instruments	643	IFRS 9, IFRS 13	medium		
Provisions for employee benefits				yes	33
Determination of present value of defined-benefit obligations	4,787	IAS 19	medium		
Other provisions and contingent liabilities	852			no	27, 28
Recognition and measurement of other provisions and contingent liabilities		IAS 37	high		
Revenue recognition				yes	9
Measurement of sales deductions and refund liabilities	877	IFRS 15	high		
Income tax				no	15
Recognition and measurement of income tax liabilities	1,473	IAS 12	high		
Recognition and measurement of deferred taxes from temporary differences		IAS 12	medium		
Recognition of deferred tax assets from tax loss carryforwards	67	IAS 12	high		

(4) Subsequent events

In January 2024, Merck announced measures for Life Science to streamline processes to become more efficient, customer focused, and agile. The implementation of these measures will adversely impact profit before tax in a mid-double-digit million-euro amount in 2024.

No other events of particular importance that could have a material impact on the net assets, financial position, or results of operations occurred subsequent to the balance sheet date.

Group Structure

(5) Scope of Consolidation

Accounting and measurement policies

Scope of Consolidation

Subsidiaries that are immaterial to the assessment of the net assets, financial position, and results of operations of the Group are not included in consolidation but are instead reported in non-current financial assets (see Note (36) "**Other financial assets**").

The scope of consolidation changed as follows in the reporting period:

Fully consolidated companies as of Dec. 31, 2022[1]		**313**
Additions	Companies established	–
	Acquisitions	–
	Materiality	2
Retirements	Liquidations/mergers	-9
	Divestments	–
	Immateriality	–
	Loss of control	–
Fully consolidated companies as of Dec. 31, 2023		**306**
Companies rated at-equity as of Dec. 31, 2022		2
Companies rated at-equity as of Dec. 31, 2023		2
Non-consolidated subsidiaries as of Dec. 31, 2022		31
Non-consolidated subsidiaries as of Dec. 31, 2023		34

[1] Previous year has been adjusted for better comparability with note (48) "List of shareholdings".

The list of non-consolidated subsidiaries mainly comprises non-operating shelf companies as well as entities subject to liquidation procedures, which were subsequently measured at fair value through other comprehensive income.

Overall, the impact of subsidiaries not consolidated due to immateriality on net sales, profit after tax, assets, and equity was less than 1% relative to the entire Merck Group. The two companies accounted for using the equity method are Syntropy Technologies LLC, United States, and MM Domain Holdco Limited, United Kingdom. There is also one (2022: two) joint operation within the meaning of IFRS 11 (Resonac Versum Materials Co. LTD, Japan, formerly: Showa Denko Versum Materials 2 Co., Ltd., Japan). This joint operation is immaterial to the presentation of the net assets, financial position, and results of operations. The effects of the existing contractual arrangements also have no potentially significant effect in these contexts.

The list of shareholdings presents all of the companies included in the consolidated financial statements as well as all of the shareholdings of Merck KGaA (see Note (48) "**List of shareholdings**").

(6) Acquisitions and divestments

Accounting and measurement policies

Business combinations

The balance sheet items goodwill, other intangible assets, and deferred taxes are significantly influenced by purchase price allocations conducted within the scope of business combinations. As observable market prices are mostly not available for the acquired other intangible assets, Merck regularly relies on the expertise of external professionals when it comes to business combinations. The following overview shows the methods typically used to measure intangible assets within the scope of purchase price allocations:

	Measurement method for determining fair value
Customer relationships	Multi-period excess earnings method
Technology	Relief from royalty method
Trademark	Relief from royalty method

Results from foreign currency hedging of expected business combinations, if they meet the requirements for hedge accounting, are offset against the carrying value of the net assets acquired.

Where management considers it to be appropriate, the optional concentration test set out in IFRS 3.B7B is applied in individual transactions in order to determine the presentation of the transaction in the consolidated financial statements.

Significant discretionary decisions and sources of estimation uncertainty

Business combinations

In particular, estimation uncertainty and discretionary decisions in conjunction with purchase price allocation relate to:

- planning of future cash flows;
- the customer churn rate, which indicates how existing customer relationships will change in the future;
- the license rate for technologies, which estimates royalty savings on the basis of comparable transactions of similar technologies;
- the discount factor, which is applied for maturity- and risk-based discounting of expected cash inflows; and
- the useful life and the degree of technical obsolescence which depend, among other things, on assumptions about technological developments.

Divestments

The assessment as to when a non-current asset, disposal group, or discontinued operation meets the prerequisites of IFRS 5 for classification as “held for sale” is subject to discretionary judgment.

Acquisitions in the previous year

Acquisition of Exelead Inc., United States

On December 30, 2021, Merck signed a definitive agreement to acquire Exelead Inc., United States (Exelead), a biopharmaceutical contract development and manufacturing organization (CDMO). The transaction closed on February 22, 2022, after regulatory clearances and the satisfaction of other customary closing conditions. The purchase price amounted to US$ 793 million (€ 702 million) in cash. The determination of the fair values for Exelead was completed by December 31, 2022.

Exelead specializes in complex injectable formulations, including the lipid nanoparticles that are key components of mRNA (messenger ribonucleic acid) therapeutics for treating Covid-19 and other indications. The aim of the acquisition is to use Exelead's capacities and expertise to expand the service range for mRNA contract development and manufacturing and to provide a fully integrated offering across the entire mRNA manufacturing process. The business was integrated into the Life Science Services business unit, which is part of the Life Science business sector.

Acquisition of the chemicals business of Mecaro Co. Ltd., Korea

On December 30, 2022, Merck successfully completed the acquisition of the chemicals business of Mecaro Co. Ltd., Korea (Mecaro), trading as M Chemicals Inc., Korea (M Chemicals), after obtaining the necessary regulatory clearances; the acquisition had been announced on August 17, 2022. Mecaro is a Korea-based, publicly listed manufacturer of heater blocks and chemical precursors for semiconductors.

The acquisition forms part of the Level Up growth program of the Electronics business sector. M Chemicals primarily develops and produces precursors used in thin film deposition. The total purchase price involved payments totaling € 90 million, of which € 80 million and € 9 million were due and were paid in 2022 and 2023 respectively.

No preliminary purchase price allocation had taken place by the time the 2022 consolidated financial statements were prepared. The total difference between the purchase price and the net assets acquired, amounting to € 46 million, was therefore recognized as goodwill on a preliminary basis at this date. The purchase price allocation was completed in 2023 and served to reduce goodwill by € 5 million, which mainly resulted in a reclassification to other intangible assets.

Acquisition of Erbi Biosystems Inc., United States

Merck acquired all the shares in Erbi Biosystems Inc., United States (Erbi), on December 1, 2022. The purchase price amounted to € 78 million in cash.

Erbi is the developer of Breez™, one of the few micro-scale, fully automated, functionally closed and continuous perfusion cell culture platform technologies on the market. By integrating Breez™ into its existing Mobius® portfolio, Merck can offer a full range of bioreactors, cell retention systems, and devices as well as cell culture media. The business is allocated to the Process Solutions business unit in the Life Science business sector.

No preliminary purchase price allocation had taken place by the time the 2022 consolidated financial statements were prepared. The total difference between the purchase price and the net assets acquired, amounting to € 72 million, was therefore recognized as goodwill on a preliminary basis at this date. The purchase price allocation was completed in 2023 and served to reduce goodwill by € 21 million, which mainly resulted in a reclassification to other intangible assets.

Adjustments to the prior-year consolidated balance sheet to reflect the purchase price allocations completed in fiscal 2023

In the case of the Erbi and M Chemicals acquisitions, the carrying amounts of the assets and liabilities as of the acquisition date were recognized as preliminary fair values in the previous year because the completion date

was shortly before the reporting date. The completion of the purchase price allocations for both companies in 2023 resulted in the following adjustments:

€ million	Dec. 31, 2022 as reported	Adjustments for Erbi and M Chemicals	Dec. 31, 2022 adjusted
Non-current assets			
Goodwill	18,415	-26	18,389
Intangible assets (excluding goodwill)	7,302	34	7,335
Property, plant and equipment	8,203	1	8,204
Other non-current assets	2,406	–	2,406
	36,325	**9**	**36,334**
Current assets			
Current assets	12,201	–	12,201
	12,201	**–**	**12,201**
Total assets	**48,526**	**9**	**48,535**
Equity			
Equity	26,005	–	26,005
	26,005	**–**	**26,005**
Non-current liabilities			
Other non-current provisions and liabilities	11,729	–	11,729
Deferred tax liabilities	1,279	8	1,287
	13,007	**8**	**13,015**
Current liabilities			
Trade payables and other liabilities	2,498	1	2,499
Other current liabilities	7,016	–	7,016
	9,513	**1**	**9,514**
Total equity and liabilities	**48,526**	**9**	**48,535**

Divestments

Sale of shares in Calypso Biotech B.V., Netherlands

Assets held for sale as of December 31, 2023, included equity and debt components in connection with the M Ventures portfolio company Calypso Biotech B.V., Netherlands (Calypso). Calypso is a biotech company that develops drug candidates for the treatment of autoimmune diseases. It was allocated to "Corporate and other". The company was acquired in full by Novartis AG, Switzerland, on January 8, 2024. The disposal group included non-current equity instruments in a mid-double-digit million-euro amount that were measured at fair value through other comprehensive income subsequent to initial recognition, and a convertible bond issued by Calypso in a mid-single-digit million-euro amount that was measured at fair value through profit or loss subsequent to initial recognition. The cumulative income recognized in other comprehensive income amounted to € 48 million.

(7) Collaboration and licensing agreements

Accounting and measurement policies

Out-licensing agreements

Merck primarily enters into material out-licensing agreements for intellectual property in the Healthcare business sector. The granting of a license typically constitutes a distinct performance obligation that must usually be recognized at a point in time. Due to the uncertainty of development results and regulatory events, contingent consideration is typically recognized when the event in question has occurred. Sales-based and usage-based royalties are recognized when the contract partner makes the corresponding sales or uses the intellectual property. As out-licensing transactions in the Healthcare business sector do not form part of ordinary activities and the licensees do not constitute customers within the meaning of IFRS 15, the corresponding income from upfront payments, milestone payments, and royalties is reported in other operating income (see Note (13) "**Other operating income**").

In-licensing agreements

The accounting and measurement policies for the in-licensing of intellectual property are presented in Note (19) "**Other intangible assets**".

Collaboration agreements

In addition to out-licensing agreements for selling intellectual property, Merck enters into collaboration agreements in the Healthcare business sector in which the Group works with partners to develop pharmaceutical drug candidates and, if regulatory approval is granted, to commercialize them.

As the partner companies do not have customer characteristics, these collaboration agreements do not fall directly within the scope of IFRS 15, and any income from upfront payments, milestone payments, and royalties is reported under other operating income. Reimbursements of research and development costs made between the collaboration partners are recognized on a net basis in research and development costs. Merck recognizes the consideration received in the course of collaboration agreements for bundled obligations arising from granting rights to intellectual property as well as other goods and services promised as income over the performance period in line with industry practice. Income is caught up cumulatively upon receipt of uncertain future milestone payments attributable to contractual obligations that have already been fulfilled. This refers in particular to milestone payments subsequent to regulatory approval. Furthermore, collaboration agreements in the Healthcare business sector typically allocate the net sales generated in specific markets, or with specific products, to the respective collaboration partners in the event of a successful approval; in turn, defined income and expense items are carried by the collaboration partners according to fixed allocation ratios. Under these circumstances, Merck recognizes the net sales from the commercialization of products to third-party customers, if Merck takes on the role of a principal within the meaning of IFRS 15. Expenses resulting from payments made to collaboration partners in connection with profit share agreements are reported under Note (14) "**Other operating expenses**".

Significant discretionary decisions and sources of estimation uncertainty

Collaboration and licensing agreements

As part of the accounting treatment of collaboration and licensing agreements, significant discretionary decisions have to be made in the following areas:

- Identification of an appropriate income recognition method and
- Determination of the appropriate timing of income recognition.

Estimates are to be made, especially when it comes to determining the transaction price and progress on the performance obligation.

Strategic alliance with Pfizer Inc., United States, to jointly co-develop and co-commercialize active ingredients in immuno-oncology and its termination effective June 30, 2023

On November 17, 2014, Merck formed a global strategic alliance with Pfizer Inc., United States (Pfizer), to co-develop and co-commercialize the anti-PD-L1 antibody avelumab. From 2017, avelumab was approved for the treatment of several cancer indications under the trade name Bavencio®. The overriding objective of the strategic alliance was to share the development risks and to expand the two companies' presence in immuno-oncology. The execution of the collaboration agreement was not structured through a separate vehicle. Upon entry into the agreement in 2014, Pfizer made an upfront cash payment of US$ 850 million (€ 678 million) to Merck, which was recognized in the income statement until the end of 2019.

According to the collaboration agreement, each company bore one half of the development expenses during the development period. In the commercialization phase, Merck recognized the majority of net sales from the commercialization of Bavencio® while Merck and Pfizer evenly split the net amount of sales less defined expense components up until the termination of the agreement. The net sales recognized by Merck in connection with Bavencio® amounted to € 713 million in fiscal 2023 (fiscal 2022: € 611 million). Merck recognized a high double-digit million-euro amount in research and development expenses in fiscal 2023, as in the previous year, in addition to profit transfer expenses of € 143 million up until the termination of the agreement (2022: € 255 million).

On March 27, 2023, Merck announced the termination of the alliance agreement with Pfizer on the co-development and co-commercialization of Bavencio® with effect from June 30, 2023.

Since the termination agreement came into force on June 30, 2023, Merck has held the exclusive global rights for development, manufacturing, and commercialization and has full control over Bavencio®. Pfizer's previous even split of the net amount of sales less defined expense components was replaced by a 15% royalty on defined net sales of Bavencio® that is reported in the cost of sales (see Note (10) "**Cost of sales**"). While Merck and Pfizer will continue to run their respective clinical studies on Bavencio®, Merck will control all future research and development activities. Merck will also have sole responsibility for manufacturing the product and serving the supply chain.

In-licensing agreement with Debiopharm International SA, Switzerland, on drug candidates for the treatment of head and neck cancer

On March 1, 2021, Merck announced its entry into an in-licensing agreement with Debiopharm International SA, Switzerland (Debiopharm), for the exclusive rights for the development and global commercialization of the drug candidate xevinapant (Debio 1143) and for the development of preclinical follow-on compounds. Xevinapant is currently being investigated in a Phase III study for patients with untreated high-risk locally advanced squamous cell carcinoma of the head and neck in combination with platinum-based chemotherapy and standard fractionation intensity-modulated radiotherapy.

Merck made upfront payments of € 188 million in conjunction with the agreement. Moreover, Debiopharm received a right to future milestone payments of up to € 710 million in total, dependent on the achievement of certain development and sales milestones, plus royalties on future net sales. The transaction became effective in April 2021. The upfront cash payment resulted in the recognition of an intangible asset not yet available for use in the amount of € 118 million, an asset under other financial assets for claims for reimbursement in respect of Debiopharm, and a prepayment for future development activities.

In-licensing agreement with Jiangsu Hengrui Pharmaceuticals Co. Ltd., China, on drug candidates for the treatment of metastatic colorectal cancer

On October 30, 2023, Merck announced the conclusion of an in-licensing agreement with Jiangsu Hengrui Pharmaceuticals Co. Ltd., China (Hengrui), including an exclusive worldwide license (excluding China) to develop, manufacture and commercialize the PARP1 inhibitor HRS-1167 and a corresponding option for SHR-A1904, an antibody-drug conjugate.

Merck agreed to make an upfront cash payment of € 160 million for acquired rights and future development activities to be performed by the seller. Additional milestone payments will be due on the achievement of certain development, approval, and commercialization milestones. The agreement also includes tiered royalties on potential net sales. The acquisition of the rights resulted in the recognition of an intangible asset not yet available for use in the amount of € 147 million.

In-licensing agreement with Abbisko Therapeutics Co. Ltd., China, on drug candidates for the treatment of tenosynovial giant cell tumor

On December 4, 2023, Merck announced the conclusion of an in-licensing agreement with Abbisko Therapeutics Co. Ltd., China (Abbisko), including an exclusive license to commercialize pimicotinib in China, Hong Kong, Macau, and Taiwan as well as an exclusive commercialization option in the rest of the world. Pimicotinib is an orally administered, highly selective and potent small-molecule antagonist of colony stimulating factor-1 receptor (CSF-1R).

Merck agreed to make an upfront cash payment of US$ 70 million (€ 64 million) for acquired rights and future development activities to be performed by the seller. An option fee will also be payable to Abbisko if the option is exercised. Abbisko will receive additional payments for the achievement of certain regulatory and commercial milestones as well as tiered royalties on net sales by Merck. The acquisition of the rights resulted in the recognition of an intangible asset not yet available for use in the amount of € 45 million.

Operating Activities

(8) Segment Reporting

Accounting and measurement policies

Segment reporting

The Merck Group's business activities are broken down into the three operational business sectors of Life Science, Healthcare, and Electronics, as well as the central Group functions. This segment structure reflects the internal organizational and reporting structure. The Life Science business sector encompasses business with tools, chemicals, and equipment for academic labs, biotech, and pharmaceutical manufacturers, as well as the industrial sector. The Healthcare business sector discovers, develops, manufactures, and markets prescription drugs and biopharmaceuticals. The Electronics business sector supplies materials for the semiconductor and display industries and surface design. The three business sectors differ in terms of their products and services, their customers, their sales structures and processes, and the regulatory environment in which they operate. However, the activities that are bundled in each individual business sector are extremely similar in terms of these criteria. The central Group functions also encompass service activities that are the same for all business sectors, such as procurement and human resources, as well as other central Group functions that are not allocated to any of the business sectors. Resource allocation and the assessment of business development are performed at the level of the business sectors by the Executive Board of Merck KGaA as the chief operating decision-maker.

In addition to the direct activities of the central Group functions, Corporate and Other includes income and expenses, assets, and liabilities, as well as cash flows that cannot be allocated to the reportable segments as they are managed at Group level in central Group functions. This relates in particular to expenses and income for the foreign currency hedging of transactions in operating business, financial expenses, and financial income, which include interest expenses and interest income, and income tax expenses and income. Financial liabilities, pension provisions and income tax assets and liabilities are also allocated to Corporate and Other. Moreover, the column serves as the reconciliation to the Group figures.

Apart from net sales, the success of a segment is mainly determined by EBITDA pre (segment result). EBITDA pre is a key figure that is not defined by International Financial Reporting Standards (IFRS). However, it represents the most important variable used to steer the Merck Group. To permit a better understanding of operational performance, EBITDA pre excludes depreciation and amortization, impairment losses, and reversals of impairment losses in addition to specific adjustments presented below.

The segment information is derived from the financial figures, which are based on the IFRSs applied in the Consolidated Financial Statements. Transfer prices for intragroup net sales were determined on an arm's-length basis for all of the business sectors. Fixed assets are allocated to the segments on the basis of the degree of utilization. Depreciation expenses are allocated on the same basis. Fixed assets are always recognized by the buyer at the amortized Group cost following intragroup transactions. Services performed by the Group functions are allocated on the basis of planning data. Any deviations in the actual costs incurred are not allocated to the reportable operating segments but continue to be recognized in the Corporate and Other column.

Information by business sector – 2023

€ million	Life Science	Healthcare	Electronics	Total of reportable operating segments	Corporate and Other	Group
Net sales[1]	**9,281**	**8,053**	**3,659**	**20,993**	**–**	**20,993**
Intersegment sales	77	–	–	77	-77	–
Operating result (EBIT)[2]	**1,850**	**2,225**	**248**	**4,322**	**-713**	**3,609**
Depreciation	848	299	526	1,673	109	1,782
Impairment losses[3]	34	27	42	103	1	104
Reversals of impairment losses	–	-6	–	-6	–	-6
EBITDA[4]	**2,731**	**2,545**	**816**	**6,092**	**-603**	**5,489**
Adjustments[2]	88	-1	97	184	206	390
EBITDA pre (segment result)[2]	**2,820**	**2,543**	**913**	**6,276**	**-397**	**5,879**
EBITDA pre margin (in % of net sales)[2]	30.4%	31.6%	25.0%	–	–	28.0%
Assets by business sector	23,476	8,522	10,275	42,273	6,222	48,495
Liabilities by business sector	-1,843	-3,146	-636	-5,626	-16,115	-21,741
Investments in property, plant and equipment[5]	953	316	394	1,663	145	1,807
Investments in intangible assets[5]	54	69	58	181	35	216
Non-cash changes in provisions(according to consolidated cash flow statement)[6]	33	94	100	227	154	381

[1] Excluding intersegment sales.
[2] Not defined by International Financial Reporting Standard (IFRS).
[3] Without impairments on financial assets and inventories.
[4] Not defined by International Financial Reporting Standards (IFRS); EBITDA corresponds to operating result (EBIT) adjusted by depreciation, amortization, impairment losses, and reversals of impairment losses.
[5] According to the consolidated cash flow statement.
[6] Excluding provisions for pensions and other post-employment benefits.

Information by business sector – 2022

€ million	Life Science	Healthcare	Electronics	Total of reportable operating segments	Corporate and Other	Group
Net sales[1]	**10,380**	**7,839**	**4,013**	**22,232**	**–**	**22,232**
Intersegment sales	61	–	–	61	-61	–
Operating result (EBIT)[2]	**2,808**	**1,895**	**572**	**5,275**	**-801**	**4,474**
Depreciation	845	303	545	1,693	105	1,798
Impairment losses[3]	24	187	20	232	–	232
Reversals of impairment losses	–	–	–	–	–	–
EBITDA[4]	**3,678**	**2,385**	**1,138**	**7,200**	**-696**	**6,504**
Adjustments[2]	82	92	55	228	117	345
EBITDA pre (segment result)[2]	**3,760**	**2,477**	**1,192**	**7,428**	**-579**	**6,849**
EBITDA pre margin (in % of net sales)[2]	36.2%	31.6%	29.7%	–	–	30.8%
Assets by business sector[5]	24,203	8,135	10,857	43,195	5,341	48,535
Liabilities by business sector[5]	-2,094	-3,111	-744	-5,949	-16,571	-22,521
Investments in property, plant and equipment[6]	694	344	397	1,435	97	1,531
Investments in intangible assets[6]	107	136	13	256	20	275
Non-cash changes in provisions (according to consolidated cash flow statement)[7]	72	174	28	274	3	277

[1] Excluding intersegment sales.
[2] Not defined by International Financial Reporting Standard (IFRS).
[3] Without impairments on financial assets and inventories.
[4] Not defined by International Financial Reporting Standards (IFRS); EBITDA corresponds to operating result (EBIT) adjusted by depreciation, amortization, impairment losses, and reversals of impairment losses.
[5] Previous-year figures have been adjusted, see note (6) "**Acquisitions and divestments**".
[6] According to the consolidated cash flow statement.
[7] Excluding provisions for pensions and other post-employment benefits.

Information by country and region – 2023

€ million	Europe	thereof: Germany	thereof: Switzerland	North America	thereof: USA	Asia-Pacific	thereof: China	Latin America	Middle East and Africa	Group
Net sales by customer location[1]	6,037	1,000	369	5,952	5,632	6,936	2,708	1,331	737	20,993
Net sales by company location[1]	6,334	1,420	512	6,198	5,911	6,658	2,477	1,267	535	20,993
Goodwill and other intangible assets[2]	5,121	1,783	1,780	18,794	18,783	480	47	2	–	24,396
Property, plant and equipment	4,878	2,215	1,097	2,576	2,571	1,315	444	225	62	9,056
Research and development costs	-2,004	-1,042	-827	-349	-348	-63	-25	-18	-11	-2,445
Number of employees	28,304	13,531	2,648	14,718	14,496	15,259	4,433	3,458	1,169	62,908

[1] Excluding intersegment sales.

[2] Goodwill and other intangible assets are allocated by currency area.

Information by country and region – 2022

€ million	Europe	thereof: Germany	thereof: Switzerland	North America	thereof: USA	Asia-Pacific	thereof: China	Latin America	Middle East and Africa	Group
Net sales by customer location[1]	6,248	1,108	469	6,361	6,025	7,697	3,157	1,231	695	22,232
Net sales by company location[1]	6,648	1,532	592	6,596	6,302	7,297	2,818	1,175	516	22,232
Goodwill and other intangible assets[2, 3]	4,930	1,568	1,768	20,163	20,152	629	57	2	–	25,724
Property, plant and equipment[3]	4,302	1,911	1,059	2,368	2,363	1,266	423	211	57	8,204
Research and development costs	-2,051	-1,081	-835	-372	-371	-69	-26	-17	-12	-2,521
Number of employees	28,243	13,620	2,574	15,847	15,634	15,412	4,904	3,487	1,243	64,232

[1] Excluding intersegment sales.

[2] Goodwill and other intangible assets are allocated by currency area.

[3] Previous-year figures have been adjusted, see note (6) "**Acquisitions and divestments**".

No single customer accounted for more than 10% of the Group's total net sales in fiscal 2023 or 2022.

The following table presents the reconciliation of segment results of all operating businesses to the profit before income tax of the Merck Group:

€ million	2023	2022
EBITDA pre of the operating businesses[1]	**6,276**	**7,428**
Corporate and Other	-397	-579
EBITDA pre of the Merck Group[1]	**5,879**	**6,849**
Depreciation/amortization/impairment losses/reversals of impairment losses	-1,880	-2,030
Adjustments[1]	-390	-345
Operating result (EBIT)[1]	**3,609**	**4,474**
Financial result	-125	-187
Profit before income tax	**3,484**	**4,287**

[1] Not defined by International Financial Reporting Standard (IFRS). Please refer to the following table for the components of the adjustments.

The adjustments comprised the following:

€ million	2023	2022
Restructuring expenses	-249	-198
Integration expenses/IT expenses	-118	-88
Gains (+)/losses (-) on the divestment of businesses	51	38
Acquisition-related adjustments	-18	-29
Other adjustments	-56	-68
Adjustments before impairment losses/reversals of impairment losses[1]	**-390**	**-345**
Impairment losses[2]	-88	-232
Reversals of impairment losses	1	–
Adjustments (total)[1]	**-477**	**-577**

[1] Not defined by International Financial Reporting Standard (IFRS).

[2] Without impairments on financial assets and inventories.

Restructuring expenses in the year under review primarily related to a program to further improve processes and align the Group functions more closely with the businesses (€ 126 million; 2022: € 20 million; see Note (27) "**Other provisions**").

As in the previous year, integration and IT expenses in fiscal 2023 related to expenses for the enhancement of ERP systems.

Other adjustments include the losses on the net position of monetary assets and liabilities resulting from hyperinflationary accounting in Argentina and Turkey, which are reported in other operating expenses (see Note (2) "**Reporting principles**" and Note (14) "**Other operating expenses**").

Impairment losses were attributable in particular to intangible assets in the Electronics and Life Science business sectors (see Note (14) "**Other operating expenses**" and Note (19) "**Other intangible assets**").

The adjustments are reported in the consolidated income statement as part of the respective functional costs and allocated to them as follows:

2023

€ million	thereof: cost of sales	thereof: marketing and selling expenses	thereof: administration expenses	thereof: research and development expenses	thereof: other operating income and expenses	**Total**
Restructuring expenses	-42	-44	-135	-6	-21	-249
Integration expenses/IT expenses	-1	–	-110	-1	-6	-118
Gains (+)/losses (-) on the divestment of businesses	–	–	–	–	51	51
Acquisition-related adjustments	–	–	–	–	-18	-18
Other adjustments	–	–	–	–	-56	-56
Adjustments before impairment losses/reversals of impairment losses[1]	**-43**	**-44**	**-246**	**-7**	**-50**	**-390**
Impairment losses[2]	–	–	–	–	-88	-88
Reversals of impairment losses	–	–	–	–	1	1
Adjustments in the operating result (total)[1]	**-43**	**-44**	**-246**	**-7**	**-138**	**-477**

[1] Not defined by International Financial Reporting Standards (IFRS).

[2] Without impairments on financial assets and inventories.

2022

€ million	thereof: cost of sales	thereof: marketing and selling expenses	thereof: administration expenses	thereof: research and development expenses	thereof: other operating income and expenses	Total
Restructuring expenses	-27	-32	-38	-74	-28	-198
Integration expenses/IT expenses	2	–	-77	-1	-12	-88
Gains (+)/losses (-) on the divestment of businesses	–	–	–	–	38	38
Acquisition-related adjustments	-7	–	–	–	-22	-29
Other adjustments	–	–	–	–	-68	-68
Adjustments before impairment losses/reversals of impairment losses[1]	**-32**	**-32**	**-115**	**-75**	**-91**	**-345**
Impairment losses[2]	–	–	–	–	-232	-232
Reversals of impairment losses	–	–	–	–	–	–
Adjustments in the operating result (total)[1]	**-32**	**-32**	**-115**	**-75**	**-323**	**-577**

[1] Not defined by International Financial Reporting Standards (IFRS).

[2] Without impairments on financial assets.

(9) Net sales

Accounting and measurement policies

Nature and timing of revenue recognition

Net sales are recognized when (or as) the customer obtains control of the asset. For sales of goods, the customer typically obtains control as soon as delivery is made, given that the customer is generally not able to obtain any benefits from the asset before that point in time. In the case of equipment sales, the criteria for revenue recognition are only met after installation has been successfully completed – to the extent that the installation requires specialized knowledge, does not represent a clear ancillary service and the relevant equipment can only be used by the customer once successfully set up.

For service contracts and customer-specific contract manufacturing of goods and equipment, Merck recognizes revenue over time based on the progress toward complete satisfaction of the performance obligation, if there is a contractual claim for payment against the customer for the services already performed and there is no alternative use. Input- and output-oriented methods are used to appropriately determine progress on a contract-specific basis. Although progress is ideally measured using input-oriented methods, output-oriented methods are always applied when the input cannot be reliably determined, for example. Specifically, the appropriate degree of progress is mainly calculated on the basis of milestones reached, time elapsed, units delivered, or costs incurred in proportion to the anticipated total costs.

Licenses for intellectual property are granted to a limited extent in the Life Science and Healthcare business sectors. Unlike in the Life Science business sector, these transactions do not usually form part of ordinary activities in the Healthcare business sector, meaning that the corresponding income is reported in other operating income (see Note (7) "**Collaboration and licensing agreements**" and Note (13) "**Other operating income**").

Net sales from contracts comprising several separate performance obligations are recognized on a pro rata basis when the respective performance obligation has been fulfilled. Multiple-element arrangements of this nature only exist to a very limited extent in the Life Science business sector.

Determining the transaction price

Merck grants customers various kinds of rebates and discounts. These, as well as anticipated customer refund claims, state compulsory charges, and rebates from health plans and programs, are deducted from sales. The most significant portion of these deductions from sales is attributable to the Healthcare business sector and, in particular, sales in the United States.

Sales deductions provided on the invoice as price-reducing items, which will likely be applied by customers when making the respective payments, are recognized as reduction of trade accounts receivable. Expected refunds, such as bonus payments, reimbursements for rights of return or rebates from health plans and programs, are reported in the consolidated balance sheet under refund liabilities.

The measurement of sales deductions and refund liabilities arising from expected rebates and discounts takes account of past experience, specific knowledge of expected sales volume growth rates, contractual conditions, pricing information, and external information from distributors and industry services.

The measurement of sales deductions and refund liabilities resulting from rights of return takes into account historical rates of return for individual product groups, information from distributors on inventory levels, and publicly available information on product sales from sector-specific service providers (in the Healthcare business sector).

Contractual payment terms

Given that the Merck Group generates the large majority of its net sales through transactions with simple structures, the company usually has an enforceable right to payment after the performance obligation has been

fulfilled. The payment targets contractually agreed between Merck Group and its customers usually range between 30 and 60 days.

Practical expedients

Merck uses the practical expedient of IFRS 15 in which the promised amount of consideration is not adjusted for the effects of a significant financing component if the period between the fulfillment of a performance obligation and the payment by the customer only amounts to up to one year.

Significant discretionary decisions and sources of estimation uncertainty

Sales deductions

The measurement of sales deductions and the corresponding refund liabilities requires extensive estimates. Uncertainties exist in particular concerning the extent to which past experience serves as a reliable basis for estimating the future development of expected refunds, such as bonus payments, reimbursements for rights of return, or rebates from health plans and programs. External information from distributors and industry services outside of Merck's control, which are also subject to uncertainty, are used to determine sales deductions.

Due to a lack of past experience, the estimation uncertainty referenced above is particularly relevant for product launches in the Healthcare business sector.

Any changes in estimates of the parameters listed above have a cumulative impact on the net sales for the respective adjustment period.

If the carrying amount of refund liabilities had been 10% higher as of the reporting date, this would have resulted in a € 88 million (2022: € 91 million) reduction in profit before tax.

The following tables present a breakdown of net sales by key product lines/products:

Life Science[1]

€ million	2023		2022	
Science & Lab Solutions	4,706	51%	4,898	47%
Process Solutions	3,782	41%	4,540	44%
Life Science Services	792	8%	943	9%
Total	**9,281**	**100%**	**10,380**	**100%**

[1] Prior-year figures have been adjusted owing to realignment in the Life Science business sector.

Healthcare

€ million	2023		2022	
Oncology	**1,819**	**22%**	**1,683**	**22%**
thereof: Erbitux®	1,025	13%	1,023	13%
thereof: Bavencio®	713	9%	611	8%
Neurology & Immunology	**1,665**	**21%**	**1,743**	**22%**
thereof: Mavenclad®	956	12%	856	11%
thereof: Rebif®	709	9%	887	11%
Fertility	**1,547**	**19%**	**1,446**	**18%**
thereof: Gonal-f®	847	11%	825	11%
Cardiovascular, Metabolism & Endocrinology	**2,786**	**35%**	**2,805**	**36%**
thereof: Glucophage®	882	11%	930	12%
thereof: Concor®	571	7%	590	8%
thereof: Euthyrox®	565	7%	553	7%
thereof: Saizen®	332	4%	266	3%
Other	**235**	**3%**	**161**	**2%**
Total	**8,053**	**100%**	**7,839**	**100%**

Electronics

€ million	2023		2022	
Semiconductor Solutions	2,479	68%	2,674	67%
Display Solutions	770	21%	900	22%
Surface Solutions	411	11%	439	11%
Total	**3,659**	**100%**	**4,013**	**100%**

The following tables present a more detailed breakdown of net sales from contracts with customers in the individual business sectors by product type and region.

2023

€ million

Net sales by nature of the products	**Life Science**		**Healthcare**		**Electronics**		**Group**	
Goods	8,074	87%	8,004	99%	2,952	81%	19,030	91%
Equipment	411	5%	–	–	593	16%	1,004	5%
Services	778	8%	33	1%	111	3%	922	4%
License income	17	–	–	–	3	–	19	–
Commission income	1	–	15	–	–	–	17	–
Income from co-commercialization agreements	–	–	–	–	–	–	–	–
Total	**9,281**	**100%**	**8,053**	**100%**	**3,659**	**100%**	**20,993**	**100%**
Net sales by region (customer location)								
Europe	3,178	34%	2,541	31%	318	9%	6,037	29%
North America	3,372	36%	1,793	22%	787	21%	5,952	28%
Asia-Pacific	2,263	25%	2,232	28%	2,440	67%	6,936	33%
Latin America	352	4%	941	12%	39	1%	1,331	6%
Middle East and Africa	116	1%	546	7%	75	2%	737	4%
Total	**9,281**	**100%**	**8,053**	**100%**	**3,659**	**100%**	**20,993**	**100%**

2022

€ million

Net sales by nature of the products	Life Science		Healthcare		Electronics		Group	
Goods	9,097	88%	7,804	100%	3,481	87%	20,382	92%
Equipment	463	4%	1	–	417	10%	881	4%
Services	804	8%	16	–	110	3%	930	4%
License income	16	–	–	–	4	–	20	–
Commission income	1	–	17	–	–	–	18	–
Income from co-commercialization agreements	–	–	1	–	–	–	1	–
Total	**10,380**	**100%**	**7,839**	**100%**	**4,013**	**100%**	**22,232**	**100%**
Net sales by region (customer location)								
Europe	3,445	33%	2,433	31%	371	9%	6,248	28%
North America	3,931	38%	1,781	23%	649	16%	6,361	29%
Asia-Pacific	2,536	25%	2,261	29%	2,901	72%	7,697	35%
Latin America	353	3%	838	10%	40	1%	1,231	5%
Middle East and Africa	116	1%	527	7%	53	2%	695	3%
Total	**10,380**	**100%**	**7,839**	**100%**	**4,013**	**100%**	**22,232**	**100%**

Group net sales amounted to € 20,993 million in fiscal 2023 (2022: € 22,232 million). Around 5% of this figure was recognized over time (2023: € 1,119 million; 2022: € 933 million). This mainly related to net sales from

services in the Life Science business sector and net sales from the project business of the Semiconductor Solutions business unit in the Electronics business sector.

Orders already received by the reporting date that will result in net sales in future periods amounted to around € 4 billion as of December 31, 2023 (December 31, 2022: around € 6 billion), of which around € 3 billion related to the Life Science business sector (December 31, 2022: around € 4 billion). Based on past experience, around 13% of orders received are not expected to result in net sales until fiscal 2025 or later (December 31, 2022: around 10% in fiscal 2024 or later).

The following table shows the change in refund liabilities:

2022

	Rebates/Bonus payments		Rights of return		
€ million	Total	thereof: United States	Total	thereof: United States	Total
Jan. 1, 2022	**784**	**445**	**55**	**35**	**839**
Additions due to business combinations	–	–	–	–	**–**
Other additions	2,470	1,902	56	40	**2,526**
Disposals due to divestments/Reclassification to assets held for sale	–	–	–	–	**–**
Utilizations	-2,270	-1,739	-43	-29	**-2,313**
Cumulative increase (-)/decrease (+) in net sales	-159	-147	-9	-6	**-168**
thereof: attributable to performance obligations satisfied in prior periods	-118	-115	–	0	**-118**
Currency translation	29	31	2	2	**31**
Other	-3	–	–	–	**-3**
Dec. 31, 2022	**850**	**492**	**62**	**43**	**912**

2023

	Rebates/Bonus payments		Rights of return		
€ million	Total	thereof: United States	Total	thereof: United States	**Total**
Jan. 1, 2023	**850**	**492**	**62**	**43**	**912**
Additions due to business combinations	–	–	–	–	**–**
Other additions	2,596	1,945	52	31	**2,648**
Disposals due to divestments/Reclassification to assets held for sale	–	–	–	–	**–**
Utilizations	-2,485	-1,855	-60	-37	**-2,545**
Cumulative increase (-)/decrease (+) in net sales	-121	-120	8	10	**-113**
thereof: attributable to performance obligations satisfied in prior periods	-118	-116	9	10	**-109**
Currency translation	-26	-18	-2	-2	**-28**
Other	2	–	–	–	**2**
Dec. 31, 2023	**816**	**443**	**60**	**44**	**877**

The development in contract assets and contract liabilities is shown in Note (26) "**Contract assets**" and in Note (29) "**Other non-financial liabilities**".

(10) Cost of sales

Accounting and measurement policies

Cost of sales

The cost of sales primarily includes the cost of manufactured products sold and the merchandise sold.

Cost comprises the following items: directly attributable costs, such as cost of materials; personnel and energy costs; depreciation and amortization; overheads attributable to the production process; and inventory impairment losses and their reversals.

The cost of sales included amortization of intangible assets (excluding amortization of internally generated or separately acquired software) in the amount of € 173 million (2022: € 207 million). Material costs amounted to € 3,709 million in fiscal 2023 (2022: € 3,996 million) and were largely reported under cost of sales. For the first time, the cost of sales also included royalties of € 55 million for Bavencio® as a result of the agreement terminating the strategic alliance with Pfizer Inc., United States, which came into force on June 30, 2023 (see Note (7) "**Collaboration and licensing agreements**").

Impairment losses on inventories amounted to € 424 million (2022: € 279 million) in the reporting period, while reversals of impairment losses amounted to € 237 million (2022: € 197 million).

(11) Marketing and selling expenses

Accounting and measurement policies

Marketing and selling expenses

Marketing and selling expenses within logistics costs also include expenses for transportation services performed on behalf of customers. The corresponding income from these services is reported under net sales.

Amortization of the intangible assets under marketing and selling expenses is mainly attributable to customer relationships, licenses and similar rights, brands, and trademarks.

Marketing and selling expenses comprised the following items:

€ million	2023	2022
Sales force	-950	-971
Internal sales services	-923	-972
Sales promotion	-515	-476
Logistics	-1,061	-1,193
Amortization of intangible assets[1]	-596	-616
Royalty and license expenses	-126	-137
Other marketing and selling expenses	-339	-348
Marketing and selling expenses	**-4,510**	**-4,714**

[1] Excluding amortization of internally generated or separately acquired software.

The reduction in logistics costs was due to lower freight rates in international goods transportation and the lower sales volume in the Life Science and Electronics business sectors. Savings also resulted in lower expenses for the internal and external sales force.

Of the royalty and license expenses, € 51 million (2022: € 53 million) related to the commercialization of Erbitux®.

(12) Research and development costs

Accounting and measurement policies

Research and development costs

The item comprises the costs of the Group's own research and development departments, the expenses incurred as a result of research and development collaborations as well as the costs of clinical trials in the Healthcare business sector (both before and after approval is granted).

For information on the capitalization of development costs and their separation from research and development services agreed in conjunction with in-licensing, see Note (19) "**Other intangible assets**".

Cost reimbursements for research and development are offset against research and development costs.

The net income from repayments of subsidies received and reimbursements recognized within research and development costs amounted to € 21 million in fiscal 2023 (2022: € 23 million).

Research and development costs include a high double-digit million-euro amount for the expected acceptance and follow-on obligations in connection with the discontinuation of the development program for evobrutinib as a result of not meeting their primary endpoints of the two Phase III clinical trials.

(13) Other operating income

Accounting and measurement policies

Other operating income

Other operating income comprises all income that cannot be allocated to net sales or finance income on account of its character.

Income from upfront payments, milestone payments, and royalties

Income from upfront payments, milestone payments, and royalties comprises consideration received by Merck from contract partners that are not customers. This relates in particular to collaboration and out-licensing agreements in the Healthcare business sector (see Note (7) "**Collaboration and licensing agreements**").

Income from the revaluation of contingent considerations

The accounting treatment of contingent consideration agreed at the sale of a business as defined in IFRS 3 is shown in Note (36) "**Other financial assets.**"

Other operating income was broken down as follows:

€ million	**2023**	2022
Income from the disposal of assets	137	54
Income from the revaluation of contingent considerations	71	6
Income from upfront payments, milestone payments and royalties	53	105
Currency effects from operating activities	37	–
Income from fair value measurement of assets	27	47
Income from the reversal of provisions for litigation	25	24
Realized gains from currency translation	15	71
Income from miscellaneous services	13	7
Reversal of impairment losses on non-financial asset	6	–
Remaining other operating income	66	132
Other operating income	**445**	**486**

Income from asset disposals included income from the disposal of a non-strategic brand in the Healthcare business sector and a portfolio of licenses and patents in the Electronics business sector.

The increase in income from contingent consideration was due in particular to a revaluation following the achievement of milestones in connection with the biosimilars business that was sold to a subsidiary of Fresenius SE & Co. KGaA, Bad Homburg vor der Höhe, in 2017.

The reduction in upfront payments, milestone payments, and royalties was mainly due to the lower level of royalties for interferon beta products (Biogen Inc., United States) of € 45 million (2022: € 55 million) and the fact that no license income was recognized in the United States for the antidepressant Viibryd® (AbbVie Inc., United States) after income of € 27 million in the previous year.

For information on income from the reversal of provisions for litigation, see Note (27) “**Other provisions**”.

(14) Other operating expenses

Accounting and measurement policies

Other operating expenses

Other operating expenses comprise all expenses that cannot be reasonably allocated to a functional cost type or finance costs.

The breakdown of other operating expenses was as follows:

€ million	2023	2022
Profit share agreements	-171	-275
Impairment losses on non-financial assets	-104	-232
Non-income related taxes and expenses from tax audits	-102	-68
Loss from hyperinflation accounting	-56	-67
Premiums, fees and contributions	-47	-45
Project expenses (including integration and IT projects)	-46	-67
Non-allocable personnel expenses	-39	-45
Infrastructure expenses	-26	-16
Expenses from Litigation	-26	-30
Expenses from a donation to the World Health Organization	-23	-7
Expenses from claims	-23	-9
Restructuring expenses	-20	-12
Expenses from fair value measurement of assets and liabilities at fair value	-19	-8
Expenses from disposal of businesses and assets	-5	-9
Expenses for miscellaneous services	-4	-11
Currency effects from operating activities	–	-154
Remaining other operating expenses	-120	-114
Other operating expenses	**-830**	**-1,170**

The reduction in profit transfer expenses was due in particular to the termination of the strategic alliance with Pfizer Inc., United States, for Bavencio® in the field of immuno-oncology with effect from June 30, 2023 (see Note (7) "**Collaboration and licensing agreements**").

Impairments of non-financial assets were attributable to intangible assets (see Note (19) "**Other intangible assets**") in the amount of € 81 million (2022: € 211 million) and to property, plant, and equipment (see Note (20) "**Property, plant, and equipment**") in the amount of € 23 million (2022: € 21 million).

Currency effects from operating activities in the previous year primarily resulted from cash flow hedges in U.S. dollars.

(15) Income tax

Accounting and measurement policies

Current income taxes

Current income taxes for the reporting period and, where applicable, for prior periods, are calculated in the amounts that the tax authorities are expected to demand or reimburse. The calculation is based on the company-specific tax rate applicable in the relevant tax year.

Uncertain income tax assets and liabilities

Factual assessments are made to calculate uncertain income tax assets and liabilities. Uncertain income tax matters are recognized depending on the likelihood that the responsible tax authorities will accept the respective income tax treatment. If recognition by the tax authorities is considered unlikely, the respective uncertain tax asset or uncertain tax liability is measured at the most likely amount. Uncertain income tax liabilities are reported within income tax liabilities. Expected income tax-related penalties and interest that do not fall within the scope of IAS 12 are treated as provisions in line with IAS 37.

Deferred taxes

Deferred tax assets resulting from deductible temporary differences that exceed deferred tax liabilities relating to the same taxation authority and the same taxable entity are recognized if it is considered probable that taxable profit will be available against which they can be utilized. This corresponds to the recognition of deferred tax assets on unused tax credits and tax loss and interest carryforwards.

The recognition of deferred tax assets requires an estimate of the probability of future use. The influencing factors considered as part of this assessment include the following:

- temporary differences relating to the same taxation authority and the same taxable entity that will be subject to taxation in the future,
- results history,
- results planning, and
- existing tax planning of the respective Group company.

Deferred tax liabilities for planned dividend payments within the next twelve months of profits already generated are recognized.

Significant discretionary decisions and sources of estimation uncertainty

Income taxes

The calculation of the reported assets and liabilities from current and deferred income taxes requires extensive discretionary judgments, assumptions, and estimates.

When assessing income tax assets and liabilities, the interpretation of tax provisions may be subject to particular uncertainty. The possibility that the relevant tax authorities will take a differing view concerning the application and interpretation of tax standards cannot be ruled out. Changes to the assumptions underlying the interpretation of tax standards, for example as a result of changes in legislation, are recognized in the balance sheet when the change comes into force.

With regard to deferred tax items, there is uncertainty as to when an asset will be realized or a liability settled. This applies in particular to deferred taxes recognized in the course of company acquisitions. Assessing the recoverability, particularly of tax credits and tax loss and interest carryforwards, requires assumptions and estimates concerning the future taxable income of the respective Group company. Furthermore, the extent to which a subsidiary's planned dividend distribution is probable within the next twelve months is discretionary.

Income taxes in the consolidated income statement were broken down as follows:

€ million	**2023**	2022
Current income taxes in the period	-1,140	-1,344
Income taxes for previous periods	167	28
Deferred taxes in the period	323	369
thereof: from temporary differences	290	338
thereof: from changes in tax rates	-7	12
thereof: from tax loss carryforwards	40	19
Income taxes	**-650**	**-948**

Tax reconciliation

The following table presents the reconciliation from the theoretical income tax expense to the income tax expense according to the consolidated income statement. The theoretical income tax expense is determined by applying the statutory tax rate of a corporation headquartered in Darmstadt of 31.7% (2022: 31.7%).

€ million	**2023**	2022
Profit before income tax	3,484	4,287
Tax rate	31.7%	31.7%
Theoretical income tax expense	-1,105	-1,360
Tax rate differences	495	568
Tax effect of companies with a negative contribution to consolidated profit	-7	-71
Income tax for previous periods	167	28
Tax credits	-103	-79
Tax effect on tax loss carryforwards	32	14
Tax effect of non-deductible expenses/Tax-free income/Other tax effects	-129	-48
Income tax expense according to consolidated income statement	**-650**	**-948**
Tax ratio according to consolidated income statement	**18.7%**	**22.1%**

Income taxes consisted of corporation and trade taxes for the German companies and comparable income taxes for non-German companies. Income taxes relating to previous periods recognized in fiscal 2023 resulted in particular from completed tax audits, changes in income tax liabilities for risks from tax audits, and tax assessments for previous years.

Deferred taxes

The allocation of deferred tax assets and liabilities to the balance sheet items and the reconciliation of deferred taxes in the consolidated income statement and the consolidated balance sheet are presented in the following table:

	Jan 1, 2022				Dec. 31, 2022		
€ million	Deferred tax assets/liabilities (net)	Deferred taxes (consolidated income statement)	Deferred taxes credited/debited to equity	Changes in scope of consolidation/ Currency translation/ Other changes[1]	Deferred tax assets/liabilities (net)	Assets	Liabilities[1]
Intangible assets	-1,428	302	–	-135	-1,261	112	1,374
Property, plant and equipment	-68	-59	–	-3	-129	39	168
Current and non-current financial assets	-6	-4	-22	–	-32	–	32
Inventories	737	84	–	2	823	846	23
Current and non-current receivables/Other assets	81	-27	–	-3	51	66	15
Current and non-current provisions	803	-37	-296	6	475	526	51
Current and non-current liabilities	17	93	13	-2	122	170	49
Tax loss carryforwards	11	19	–	–	30	30	–
Tax refund claims/Other	-57	-2	1	3	-55	41	96
Deferred taxes (before offsetting)	**91**	**369**	**-305**	**-132**	**23**	**1,829**	**1,807**
Offset deferred tax assets and liabilities	–				–	-520	-520
Deferred taxes (consolidated balance sheet)	**91**				**23**	**1,310**	**1,287**

[1] Previous-year figures have been adjusted, please refer to Note (6) "**Acquisitions and Divestments**".

	Jan. 1, 2023				Dec. 31, 2023		
€ million	Deferred tax assets/liabilities (net)	Deferred taxes (consolidated income statement)	Deferred taxes credited/ debited to equity	Changes in scope of consolidation/ Currency translation/ Other changes	Deferred tax assets/liabilities (net)	Assets	Liabilities
Intangible assets	-1,261	235	–	47	-979	111	1,090
Property, plant and equipment	-129	5	–	5	-119	103	222
Current and non-current financial assets	-32	13	-17	–	-36	2	38
Inventories	823	42	–	-44	821	835	15
Current and non-current receivables/Other assets	51	9	–	-1	59	92	33
Current and non-current provisions	475	-10	50	-6	510	633	122
Current and non-current liabilities	122	-6	9	-6	119	181	62
Tax loss carryforwards	30	40	–	-2	67	67	–
Tax refund claims/Other	-55	-5	–	3	-57	117	174
Deferred taxes (before offsetting)	**23**	**323**	**42**	**-3**	**385**	**2,142**	**1,757**
Offset deferred tax assets and liabilities	–				–	-627	-627
Deferred taxes (consolidated balance sheet)	**23**				**385**	**1,514**	**1,130**

As in the previous year, the item "Changes in scope of consolidation/Currency translation/Other changes" mainly comprised exchange rate effects for items translated from U.S. dollars to the reporting currency (euro).

Furthermore, a non-recurring deferred tax income on intangible assets impacted in the amount of € 95 million.

Given the positive earnings forecasts, it was assumed that it will be possible to realize recognized deferred tax assets of € 597 million (December 31, 2022: € 191 million), which exceeded deferred tax liabilities relating to the same taxation authority and the same taxable entity, even though there was a loss in the current or previous period.

No deferred tax assets were recognized in the balance sheet for deductible temporary differences and other interest carryforwards in the amount of € 13,220 million (December 31, 2022: € 71 million). The increase in deductible temporary differences for which no deferred tax assets were recognized in the balance sheet is due to the change in the exercise of different tax-related options abroad compared with the previous year. The majority of these differences can only be utilized until 2029. Their utilization for tax purposes is not expected during this period.

Deferred tax liabilities from outside basis differences for planned dividend payouts were recognized in the amount of € 157 million (December 31, 2022: € 79 million). Retained earnings of subsidiaries for which no deferred taxes were recognized amounted to € 10,627 million as of December 31, 2023 (December 31, 2022: € 10,249 million). The resulting temporary differences that will be taxable in future periods in the event of dividend payments would amount to € 603 million as of December 31, 2023 (December 31, 2022: € 582 million).

Changes in tax loss carryforwards

Tax loss carryforwards were structured as follows:

	Dec. 31, 2023			Dec. 31, 2022[1]		
€ million	**Germany**	**Outside Germany**	**Total**	Germany	Outside Germany	Total
Tax loss carryforwards	**257**	**536**	**793**	**161**	**677**	**838**
Tax loss carryforwards for which a deferred tax asset is recognized	156	95	251	–	136	136
Tax loss carryforwards for which no deferred tax asset is recognized	101	441	542	161	541	702
Potential deferred tax assets for tax loss carryforwards	**78**	**124**	**202**	**49**	**165**	**214**
Recognized deferred tax assets on tax loss carryforwards	49	18	67	–	30	30
Not recognized deferred tax assets on tax loss carryforwards	29	106	135	49	135	184

[1] Prior year's figures for Germany were adjusted.

The majority of the tax loss carryforwards either had no expiry date or can be utilized for up to 20 years. This also applies to losses for which no deferred taxes were recognized.

Deferred tax assets resulting from tax loss carryforwards that exceed deferred tax liabilities relating to the same taxation authority and the same taxable entity are not recognized if it is not considered probable that taxable profit will be available against which they can be utilized.

Income tax receivables and income tax liabilities

Income tax receivables amounted to 482 million € as of December 31, 2023 (December 31, 2022: 456 million €) and mainly resulted from tax prepayments that exceeded the actual amount of tax payable for the past fiscal year and earlier fiscal years from refund claims for previous years and from withholding tax claims. As of December 31, 2023, income tax liabilities including liabilities for uncertain tax obligations totaled 1,473 million € (December 31, 2022: 1,522 million €).

(16) Operating cash flow

Accounting and measurement policies

Operating cash flow

The operating cash flow is calculated and presented based on the following principles:

- The operating cash flow is presented using the indirect method based on profit after taxes.
- The option to recognize interest received and interest payments made is exercised to the extent that such transactions are recognized in cash flow from operating activities.
- Tax payments are reported in operating cash flow. Only significant transactions where the associated tax payments can be practically calculated are recognized in the relevant item of the consolidated cash flow statement.

Tax payments made totaled € 1,053 million in fiscal 2023 (2022: € 1,344 million). Tax refunds received amounted to € 38 million (2022: € 145 million).

Interest paid totaled € 181 million (2022: € 185 million). Interest received amounted to € 77 million (2022: € 25 million).

The changes in provisions included a mid-double-digit million-euro amount for the recognition of restructuring provisions to align the Group functions more closely with the businesses, and a high double-digit million-euro amount for the recognition of provisions for acceptance and follow-on obligations in connection with the results of the two Phase III clinical trials to evaluate the efficacy and safety of evobrutinib (see Note (27) "**Other provisions**").

The item "Neutralization of gains/losses on disposal of fixed assets" included the effects recognized in income of the disposal of a non-strategic brand in the Healthcare business sector and a portfolio of licenses and patents in the Electronics business sector. The corresponding cash inflows are recognized in the cash flow from investing activities.

The change in other non-cash income and expenses contained the neutralization of revaluations of contingent consideration recognized in income (see Note (36) "**Other financial assets**"). The corresponding cash inflows are also recognized in the cash flow from investing activities.

(17) Earnings per share

Accounting and measurement policies

Earnings per share

Basic earnings per share is calculated by dividing the profit after taxes attributable to the shareholders of Merck KGaA (net income) by the weighted average number of theoretical shares outstanding. The calculation of the theoretical number of shares is based on the fact that the general partner's equity is not represented by shares. Corresponding to the division of the subscribed capital of € 168 million into 129,242,252 shares (see Note (34) "**Equity**"), the general partner's equity of € 397 million equates to 305,535,626 theoretical shares. Overall, equity capital amounted to € 565 million or 434,777,878 theoretical shares outstanding.

As in the previous year, equity capital remained unchanged in fiscal 2023. The weighted average (basic) number of shares was 434,777,878 and thus corresponded to the number of theoretical shares outstanding. In fiscal 2023 and 2022, there were no shares with a potential diluting effect; as a result, the diluted earnings per share were equivalent to basic earnings per share.

Operating Assets, Liabilities, and Contingent Liabilities

(18) Goodwill

Accounting and measurement policies

Goodwill

In the course of business combinations, goodwill is recognized on the acquisition date. The option to measure non-controlling interests at fair value on the date of their acquisition (full goodwill method) is not utilized.

The purpose of impairment testing in accordance with IAS 36 is to ensure that the carrying amount of assets in the balance sheet is not higher than their recoverable amount. The recoverable amount is the higher of the fair value less costs of disposal and the value in use.

Method for impairment testing

Impairment testing for goodwill takes place at the level of the Life Science, Healthcare, and Electronics business sectors. These groups of cash-generating units (CGUs) are the lowest level at which goodwill at Merck is monitored for internal management purposes.

Impairment testing is performed on a scheduled basis in the third quarter of every year and on an ad hoc basis where there are indications of impairment. The existence of indications of impairment is monitored using various factors such as changes in medium-term planning, analyst forecasts, validation multiples, and Merck's average market capitalization compared to its balance sheet equity.

In the 2023 reporting year, the recoverable amount for all CGUs was primarily determined on the basis of the fair value less costs of disposal (2022: Life Science and Electronics on the basis of the fair value less costs of disposal; Healthcare on the basis of the value in use).

For both fair value less costs of disposal and value in use, the recoverable amount is calculated in accordance with the discounted cash flow method (Level 3 in the IFRS 13 fair value hierarchy).

In calculating the fair value, the expected post-tax cash flows are derived from the medium-term plans prepared by the business sectors. Due to extensive investments in the Life Science and Electronics CGUs, the fourth planning year after the detailed planning period for both of these CGUs is extrapolated for an additional four years in line with business-specific assumptions before being converted to the terminal value by applying a long-term growth rate. In the Healthcare CGU, the transition to the terminal value takes place after four years starting from the following year. Sales planning was based on internal past experience and largely non-observable input factors in the market, such as future market shares, selling prices and volumes, and new products from the development pipeline and expansion investments. Profit margins are based on past experience adjusted for expected profitability developments.

In calculating the value in use in the previous year, the most recent medium-term plan approved by the Executive Board, with a detailed planning period of four years starting from the following year, served as the basis for planning. Sales planning was based on past experience and assumptions regarding future market shares, selling prices, and volumes. Expected cash inflows and outflows from new products from the Healthcare development pipeline and expansion investments were not included in the calculation of value in use. Profit margins were based on past experience adjusted for expected profitability developments.

The discount factor after taxes is derived on the basis of the following input parameters:

Risk-free interest rate	Derived from the returns of long-term government bonds based on the Svensson method
Beta factor	Derived from the respective sector-specific peer group
Market risk premium	Based on a combination of different estimating methods, for example, historical and implied stock yields
Cost of debt and capital structure	Derived from the market data of the respective peer group companies

The long-term growth rate after the detailed planning period is determined taking into account expected long-term growth and long-term inflation expectations.

Significant measurement assumptions

In the Life Science CGU, the expected average sales growth in the period until the transition to the terminal value was a higher single-digit percentage (2022: higher single-digit percentage). The sales expectation for the Life Science CGU is supported primarily by the anticipated long-term positive development in the Process Solutions and Life Science Services business units, based on ongoing high market growth and the continuing expansion of the portfolio and production capacities. Taking into account Group costs allocated on a pro rata basis, the EBITDA pre margin applied in the period until the transition to the terminal value was around 31% (2022: around 34%).

The expected average sales growth in the Healthcare CGU in connection with the calculation of fair value less costs of disposal amounted to a mid-single-digit percentage rate in the detailed planning period (2022: mid-single-digit percentage rate). The sales performance reflected the probability of regulatory approval of drug candidates in the existing research and development programs. Taking into account Group costs allocated on a pro rata basis, the EBITDA pre margin for fair value less costs of disposal applied in the period until the transition to the terminal value in the impairment test for fiscal 2023 was around 30%.

The calculation of the recoverable amount of the Electronics CGU included the expected average sales growth in the period until the transition to the terminal value at a higher single-digit percentage (2022: higher single-digit percentage). The sales expectation for the Electronics CGU is primarily based on the long-term growth trend in the market for semiconductor materials and positive sales contributions from the Level Up growth program with an initial investment volume exceeding € 3 billion by the end of 2025. Taking into account Group costs allocated on a pro rata basis, the EBITDA pre margin applied in the period until the transition to the terminal value in the impairment test for fiscal 2023 was around 29% (2022: around 30%).

The additional significant value-relevant assumptions underlying the goodwill impairment tests are quantified below.

	Long-term growth rate		Weighted cost of capital after tax	
in %	**2023**	2022	**2023**	**2022**
Life Science	2.00%	2.00%	8.2%	7.5%
Healthcare[1]	1.00%	0.00%	6.3%	5.6%
Electronics	2.00%	2.00%	8.1%	7.1%

[1] The weighted cost of capital before taxes to determine the value in use of the CGU Healthcare for the previous year was 7.3%.

Net cash flows were discounted using the cost of capital after taxes. For the calculation of the value in use, which was applied in the Healthcare business sector in the previous year, the cost of capital before taxes as shown below the table was derived iteratively.

Significant discretionary decisions and sources of estimation uncertainty

Goodwill

The determination of the recoverable amount is subject to discretion and significant estimation uncertainty. Assumptions regarding the amount of net cash flows, long-term growth rates, and discount factors are considered a material source of estimation uncertainty due to their inherent uncertainty. Although Merck assumes that the assumptions applied in calculating the recoverable amount are appropriate, changes to these assumptions could result in goodwill impairment with an adverse impact on the net assets, financial position, and results of operations. In the Electronics CGU in particular, there is a high degree of dependence on the assumptions concerning the long-term growth trend in the market for semiconductor materials.

As in the previous year, the recoverable amount in impairment testing in fiscal 2023 was well above the carrying amount of the respective CGU – more than 15% higher, in fact. Regardless of this, the results of the valuation were checked for plausibility against externally available "sum of the parts" calculations and validated using multiples based on peer group information.

In addition, sensitivity analyses of the key assumptions were performed as part of the scheduled impairment tests. The following table presents the minimum amount by which individual key assumptions could have changed when viewed in isolation before the impairment test triggered the recognition of an impairment loss.

	Decrease in net cash flows		**Decrease in long-term growth rate**		**Increase in cost of capital after tax**	
	%		percentage points		percentage points	
	2023	2022	**2023**	2022	**2023**	2022
Life Science	>10	>10	>2	>2	>2	>2
Healthcare	>10	>10	>2	>2	>2	>2
Electronics	>10	>10	>2	>2	>2	>2

The goodwill shown below mainly resulted from the following acquisitions: Exelead Inc., United States; Versum Materials Inc., United States; Sigma-Aldrich Corporation, United States; AZ Electronic Materials S.A., Luxembourg; Millipore Corporation, United States; and Serono SA, Switzerland.

	Goodwill			
€ million	Life Science	Healthcare	Electronics	**Total**
Net carrying amounts, Jan. 1, 2022[1]	**11,059**	**1,525**	**4,420**	**17,004**
Other additions	515	–	42	557
Disposals due to divestments/Reclassification to assets held for sale	–	–	–	–
Transfers	–	–	–	–
Impairment losses	–	–	–	–
Currency translation difference	619	–	209	828
Net carrying amounts as of Dec. 31, 2022[1,2]	**12,193**	**1,525**	**4,671**	**18,389**
Net carrying amounts, Jan. 1, 2023[1]	**12,193**	**1,525**	**4,671**	**18,389**
Additions	–	–	–	–
Disposals due to divestments/Reclassification to assets held for sale	–	–	–	–
Transfers	–	–	–	–
Impairment losses	–	–	–	–
Currency translation difference	-406	–	-138	-544
Net carrying amounts as of Dec. 31, 2023[1]	**11,787**	**1,525**	**4,532**	**17,845**

[1] Net carrying amounts equal the gross amount.

[2] Previous year has been adjusted, please refer to Note (6) "**Acquisitions and Divestments**".

The changes in goodwill caused by foreign exchange rates resulted almost exclusively from translating the goodwill from the acquisitions of Versum Materials, Inc., United States; the Sigma-Aldrich Corporation, United States; AZ Electronic Materials S.A., Luxembourg; and the Millipore Corporation, United States, which were mostly denominated in U.S. dollars.

Goodwill impairment testing did not give rise to the need to recognize any impairment losses in either fiscal 2022 or fiscal 2023.

The additions in fiscal 2022 resulted in particular from the acquisition of Exelead Inc., United States (see Note (6) "**Acquisitions and divestments**").

(19) Other intangible assets

Accounting and measurement policies

Recognition and initial measurement of purchased intangible assets

In in-licensing, the portion of the consideration paid by Merck to acquire intellectual property is recognized as an intangible asset. If research and development services to be performed by the seller are also agreed in conjunction with the transaction, the related share of consideration is separated and recognized in research and development expenses in line with the service performance.

Contingent consideration linked to milestone payments in connection with the purchase of intangible assets arising outside a business combination is recognized as an intangible asset and as a financial liability once the milestone is reached. Contingent consideration in the form of sales-based royalties is expensed when incurred.

Intangible assets acquired in business combinations are recognized at fair value on the acquisition date.

Recognition and initial measurement of internally generated intangible assets

Owing to the high level of uncertainty until pharmaceutical products are approved, the criteria for the capitalization of development costs in accordance with IAS 38 are not met in the Healthcare business sector for the development of drug candidates. Costs incurred after regulatory approval are insignificant and are therefore not recognized as intangible assets. In the Life Science and Electronics business sectors, development expenses are capitalized as soon as all the recognition criteria are met and can be verified accordingly. This also includes expenses that are required for REACH registration. Furthermore, development expenses for internal software projects and the enhancement of purchased ERP programs are capitalized providing that the relevant criteria have been fulfilled.

Subsequent measurement

Subsequent measurement is at amortized cost.

Purchased and internally generated intangible assets with finite useful lives are amortized using the straight-line method over their useful lives. The useful lives of customer relationships, brand names, and trademarks, as well as marketing authorizations, acquired patents, licenses and similar rights, and software, are usually between three and 24 years. In determining these useful lives, Merck considers factors including the typical product life cycles for each asset and publicly available information about the estimated useful lives of similar assets. The amortization expense is allocated to the respective functional costs or, if this is not possible, recognized under other operating expenses.

The identification of indications of impairment takes place with the involvement of the responsible departments, taking external and internal information sources into consideration. Merck examines the existence of indications of impairment using various factors, particularly deviations from sales forecasts and the analysis of changes in medium-term planning. An impairment test is performed if there are indications of impairment. In the event of impairment, an impairment loss is recognized under other operating expenses. Impairment losses are reversed up to amortized cost and reported in other operating income if the original reasons for impairment no longer apply.

Intangible assets with indefinite useful lives and purchased, as well as internally generated intangible assets not yet available for use, are not amortized, but rather tested for impairment when a triggering event arises or at least once a year.

Significant discretionary decisions and sources of estimation uncertainty

Purchased intangible assets

The identification and measurement of intangible assets acquired in the course of business combinations are subject to significant discretion and estimation uncertainty.

In connection with in-licensing agreements in the Healthcare business sector, a discretionary estimate is made of the extent to which upfront payments and milestone payments are remuneration for development services yet to be performed or whether such payments are acquisition costs of an intangible asset to be capitalized.

Determination of amortization

Significant assumptions and estimates are required to determine the appropriate amount of amortization of other intangible assets. This relates in particular to the determination of the underlying useful life.

If the amortization of intangible assets from customer relationships, brands, trademarks, marketing authorizations, patents, licenses and similar rights, and other had been 10% higher, for example, due to shortened useful lives, profit before income tax would have been € 78 million lower in fiscal 2023 (2022: € 83 million).

Identification of a need to recognize impairment loss and reverse impairment loss

Discretionary decisions are required in assessing substantial evidence of impairment as well as in identifying the need to reverse the impairment of other intangible assets. Significant valuation-related assumptions and estimates are also required to calculate the appropriate write-down amount in impairment testing.

	Customer relationships, brands, and trademarks	Marketing authorizations, patents, licenses, similar rights, and other items		Software and software in development	**Total**
€ million		Finite useful life[1]	Not yet available for use		
Cost as of Jan. 1, 2022	**9,825**	**11,305**	**1,235**	**1,058**	**23,423**
Additions due to business combinations	97	97	–	–	194
Other additions	–	55	166	93	314
Disposals due to divestments/Reclassification to assets held for sale	–	–	–	–	–
Other disposals	-17	-236	-11	-83	-347
Transfers	0	23	-23	4	2
Currency translation	487	59	13	24	582
Dec. 31, 2022	**10,391**	**11,302**	**1,379**	**1,096**	**24,169**
Accumulated amortization and impairment losses as of Jan. 1, 2022	**-3,989**	**-10,443**	**-720**	**-659**	**-15,810**
Depreciation, amortization, and write-downs	-602	-229	–	-102	-932
Impairment losses	-9	-18	-180	-3	-211
Reversals of impairment losses	–	–	–	–	–
Disposals due to divestments/Reclassification to assets held for sale	–	–	–	–	–
Other disposals	17	231	–	83	331
Transfers	–	-14	15	-1	–
Currency translation	-160	-36	-1	-13	-211
Dec. 31, 2022	**-4,743**	**-10,509**	**-887**	**-695**	**-16,833**
Net carrying amounts as of Dec. 31, 2022	**5,648**	**793**	**493**	**401**	**7,336**

	Customer relationships, brands, and trademarks	Marketing authorizations, patents, licenses, similar rights, and other items		Software and software in development	Total
Cost as of Jan. 1, 2023	**10,391**	**11,302**	**1,379**	**1,096**	**24,169**
Additions due to business combinations	–	–	–	–	–
Other additions	–	20	284	92	396
Disposals due to divestments/Reclassification to assets held for sale	–	–	–	–	–
Other disposals	3	-25	-9	-13	-44
Transfers	–	16	-14	5	6
Currency translation	-351	-112	-3	-16	-482
Dec. 31, 2023	**10,043**	**11,200**	**1,637**	**1,165**	**24,045**
Accumulated depreciation and impairment losses as of Jan. 1, 2023	**-4,743**	**-10,509**	**-887**	**-695**	**-16,833**
Depreciation, amortization, and write-downs	-581	-202	–	-104	-887
Impairment losses	-26	-24	-31	–	-81
Reversals of impairment losses	–	–	5	–	5
Disposals due to divestments/Reclassification to assets held for sale	–	–	–	–	–
Other disposals	-3	25	3	12	37
Transfers	–	–	–	–	–
Currency translation	156	91	2	16	265
Dec. 31, 2023	**-5,196**	**-10,619**	**-908**	**-770**	**-17,493**
Net carrying amounts as of Dec. 31, 2023	**4,847**	**580**	**729**	**395**	**6,551**

[1] Previous year has been adjusted, please refer to Note (6) "**Acquisitions and Divestments**".

Additions and disposals

The additions from business combinations in the previous year resulted in particular from the acquisition of Exelead Inc., United States (see Note (6) "**Acquisitions and divestments**").

Additions for intangible assets not yet available for use essentially related to the Healthcare business sector and mainly concerned the in-licensing from Jiangsu Hengrui Pharmaceuticals Co. Ltd., China, and Abbisko Therapeutics Co. Ltd., China; see Note (7) "**Collaboration and licensing agreements**". In the previous year, this item included an upfront payment in a mid-double-digit million-euro amount in connection with the acquisition of Chord Therapeutics SA, Switzerland, in the Healthcare business sector.

Software additions primarily related to the internal development of IT applications. The gross carrying amounts and accumulated amortization for the capitalized software primarily related to purchased software as well as internally generated applications and enhancements of purchased ERP programs that were already available for use.

Loss allowances

Impairment losses amounting to € 81 million (2022: € 211 million) were recognized on an ad hoc basis for other intangible assets in fiscal 2023. These were mainly attributable to the Life Science and Electronics business sectors. In the previous year, a high-double-digit million-euro amount related to the Healthcare business sector for the rights to the drug candidate berzosertib.

Other significant information

As in the previous year, the currency translation effects essentially resulted from the translation of other intangible assets denominated in U.S. dollars.

Marketing authorizations, patents, licenses, similar rights, and other items not yet available for use involved ongoing development projects that were not yet in the commercialization phase and thus did not yet have a defined useful life. These primarily related to the Healthcare business sector.

Overview of material other intangible assets

The carrying amounts of customer relationships, brands, and trademarks, as well as marketing authorizations, patents, licenses, similar rights, and other items, were attributable to the business sectors as follows:

€ million	Remaining useful life in years	Life Science	Healthcare	Electronics	**Total Dec. 31, 2023**	Total Dec. 31, 2022
Customer relationships, brands, and trademarks		**3,175**	**–**	**1,672**	**4,847**	**5,648**
Customer relationships	2.5–14.8	2,879	–	1,663	4,542	5,216
thereof from the following acquisitions:						
Sigma-Aldrich Corporation	12.8–13.8	2,608	–	118	2,726	3,048
Versum Materials, Inc.	2.8–14.8	–	–	1,545	1,545	1,798
Millipore Corporation	2.5–3.5	170	–	–	170	239
Brands and trademarks	0.5–3.9	296	–	9	305	432
thereof from the following acquisition:						
Sigma-Aldrich Corporation	3.9	281	–	–	281	366
Marketing authorizations, patents, licenses and similar rights, and other						
Finite useful life[1]	**–**	**213**	**124**	**243**	**580**	**793**
Patents, licenses, and similar rights	0.3–9.3	212	–	235	447	657
thereof from the following acquisitions:						
AZ Electronic Materials S.A.	0.3–9.3	–	–	87	87	170
Versum Materials, Inc.	0.8–2.8	–	–	107	107	164
Others	–	2	124	8	134	135
Not yet available for use	**–**	**13**	**583**	**133**	**729**	**493**
thereof from the following acquisition:						
Versum Materials, Inc.	–	–	–	102	102	115

[1] Previous year has been adjusted, please refer to Note (6) "**Acquisitions and Divestments**".

(20) Property, plant, and equipment

Accounting and measurement policies

Recognition and initial measurement

In the course of determining cost, government grants received within the scope of IAS 20 are deducted. Grants receivable for financial support that are no longer linked to future costs are recognized in profit or loss.

Advance payments are disclosed together with the assets under construction.

Subsequent measurement

Subsequent measurement is based on amortized cost.

Property, plant, and equipment is depreciated using the straight-line method over the useful life of the asset concerned, and the corresponding expenses are allocated to the respective functional costs. Depreciation of property, plant, and equipment is based on the following useful lives:

	Useful life
Production buildings	No more than 33 years
Administration buildings	No more than 40 years
Plant and machinery	6 to 25 years
Operating and office equipment, other facilities	3 to 10 years

The useful lives of the assets are reviewed regularly and adjusted if necessary.

An impairment test is performed if there are indications of impairment. External and internal information is used in this context. In the event of impairment, an impairment loss is recognized under other operating expenses. Impairment losses are reversed up to amortized cost and reported in other operating income if the original reasons for impairment no longer apply.

Significant discretionary decisions and sources of estimation uncertainty

Determination of depreciation

Assumptions and estimates are required in determining the appropriate useful life and the expected residual value in order to calculate the amount of depreciation on property, plant, and equipment. This applies in particular to the determination of the underlying remaining useful life. In making these estimates, Merck considers the useful lives of the property, plant, and equipment derived from past experience.

Identification of a need to recognize impairment loss and reverse impairment loss

Discretionary decisions are required in the identification of objective evidence of impairment as well as in identifying the need to reverse impairment of property, plant, and equipment.

€ million	Land, land rights, and buildings[1]	Plant and machinery[1]	Other facilities, operating and office equipment	Construction in progress	**Total[1]**
Cost as of Jan. 1, 2022	**5,464**	**5,687**	**1,754**	**1,905**	**14,810**
Additions due to business combinations	48	19	4	11	82
Other Additions	182	42	77	1,429	1,730
Disposals due to divestments/Reclassification to assets held for sale	–	–	–	–	–
Other Disposals	-88	-94	-95	-6	-282
Transfers	290	512	127	-930	-1
Currency translation difference	80	63	12	20	175
Dec. 31, 2022	**5,976**	**6,228**	**1,879**	**2,429**	**16,513**
Accumulated depreciation and impairment losses as of Jan. 1, 2022	**-2,304**	**-3,987**	**-1,287**	**-15**	**-7,593**
Depreciation	-319	-374	-173	–	-866
Impairment losses	–	-19	–	-3	-21
Reversals of impairment losses	–	–	–	–	–
Disposals due to divestments/Reclassification to assets held for sale	–	–	–	–	–
Disposals	67	84	91	1	244
Transfers	-6	11	-1	-5	-1
Currency translation difference	-26	-35	-10	–	-70
Dec. 31, 2022	**-2,588**	**-4,319**	**-1,380**	**-21**	**-8,308**
Net carrying amounts as of Dec. 31, 2022	**3,389**	**1,909**	**499**	**2,408**	**8,204**
Cost as of Jan. 1, 2023	**5,976**	**6,228**	**1,879**	**2,429**	**16,513**
Changes in the scope of consolidation	–	–	–	–	–
Additions	169	32	56	1,723	1,981
Reclassification to assets held for sale	–	–	–	–	–
Disposals	-85	-93	-82	-18	-278
Transfers	385	542	120	-1,053	-6
Currency translation difference	-119	-84	-27	-37	-266
Dec. 31, 2023	**6,326**	**6,625**	**1,946**	**3,045**	**17,943**
Accumulated depreciation and impairment losses as of Jan. 1, 2023	**-2,588**	**-4,319**	**-1,380**	**-21**	**-8,308**
Depreciation	-332	-389	-173	–	-895
Impairment losses	-1	-8	-2	-12	-23
Reversals of impairment losses	–	1	–	–	1
Disposals due to divestments/Reclassification to assets held for sale	–	–	–	–	–
Disposals	67	88	77	–	233
Transfers	-9	1	5	3	1
Currency translation difference	43	43	19	1	106
Dec. 31, 2023	**-2,820**	**-4,584**	**-1,454**	**-29**	**-8,887**
Net carrying amounts as of Dec. 31, 2023	**3,506**	**2,042**	**492**	**3,016**	**9,056**

[1] Previous year's figures have been adjusted, see Note (6) "**Acquisitions and divestments**".

The individual additions to construction in progress in fiscal 2023 with an investment volume of more than € 50 million each are presented below:

Business sector	**Investment project**	**Country**
Life Science	Filtration plant	Ireland
Life Science	Capacity expansion for drug safety testing	USA
Life Science	Membrane factory	Ireland
Healthcare	Research center	Germany
Life Science	Filling and logistics center	Germany

(21) Leasing

Accounting and measurement policies

Leasing

Scope of IFRS 16

Merck exercises the option provided by IFRS 16 to not recognize leases of intangible and low-value assets as leases. Right-of-use assets under leases are reported in the balance sheet item "Property, plant, and equipment" (see Note (20) "**Property, plant, and equipment**").

Where the provision of company cars to employees qualifies as an employee benefit within the meaning of IAS 19, IFRS 16 is not applied. In this case, its balance-sheet treatment is governed solely by IAS 19.

Separation of lease and non-lease components

Leases for land, land rights, and buildings are separated into lease and non-lease components. Merck otherwise elects to exercise the option not to separate non-lease components from lease components.

Depreciation of the right-of-use assets arising from leases

Basically, right-of-use assets are depreciated over the lease term. If it is considered sufficiently probable that an existing purchase option will be exercised or ownership will be automatically transferred at the end of the lease term, however, depreciation takes place over the period that applies for corresponding assets under property, plant, and equipment (see Note (20) "**Property, plant, and equipment**").

Determining the incremental borrowing rate

If the interest rate for the lease cannot be reliably determined, the incremental borrowing rate is applied in measuring the lease liability. At Merck, the incremental borrowing rate is determined on the basis of the risk-free interest rate of the respective Group company over a similar term and in the same currency. This interest rate is adjusted using a risk surcharge specific to Merck. Merck applies the repayment model to determine the current portion of the lease. The current portion of the lease corresponds to the repayment share of the next 12 months.

Determining the lease term

Where renewal or termination options are available, their exercise is assessed on a case-by-case basis, considering factors such as location strategies, leasehold improvements, and the degree of specificity.

Significant discretionary decisions and sources of estimation uncertainty

Leasing

Identification of a lease

Discretionary decisions can arise during the identification of leases in answering the question of whether a lessor's right of substitution is substantive. Merck classifies rights of substitution as not substantive if the facts and circumstances of the case do not support a different assessment.

Measurement of lease and non-lease components

In the case of leases for land, land rights, and buildings, separating the lease into lease and non-lease components is subject to discretion and estimation uncertainty if observable prices are not available from the contract partner or other potential lessors.

Determining the lease term

When determining the lease term, existing renewal and termination options must be evaluated to determine the probability that such options will be exercised. The assessment of the probability of exercise may be discretionary even though it relies on existing and material information on the general economic context, such as location strategies, leasehold improvements, or the degree of specificity. If the available information does not allow a reliable assessment, Merck uses historical experience for comparable situations.

The largest 30 leases accounted for around 50% of total lease liabilities in fiscal 2023 and 2022. They are essentially for right-of-use assets for office, warehouse, and laboratory buildings. If options to renew these leases were exercised in future, which is not yet considered likely, this would result in additional potential undiscounted cash outflows of up to € 235 million (2022: € 219 million).

Where individual contracts include termination options, it was considered unlikely that these would be exercised so that additional lease payments were already considered in the corresponding lease liability.

Determining the incremental borrowing rate

Determining the risk-free interest rate and determining the risk surcharge are both discretionary.

Initial measurement of the lease liability and the right-of-use asset

In measuring the lease liability, there is discretionary scope and significant estimation uncertainty regarding

- measuring any payments in the course of promised residual value guarantees, and
- assessing the probability that existing purchase, termination, and renewal options will be exercised.

In measuring right-of-use assets under leases, Merck is subject to estimation uncertainty regarding any demolition obligations and their resulting payments.

The reconciliation of net carrying amounts of right-of-use assets from leases was as follows:

	Right-of-use assets			
€ million	Land, land rights, and buildings	Plant and machinery	Other facilities, operating and office equipment	Total
Net carrying amounts as of Jan. 1, 2022	**382**	**9**	**56**	**447**
Changes in the scope of consolidation	7	–	–	7
Additions	160	–	43	203
Disposals	-16	-1	-3	-19
Depreciation	-112	-3	-37	-152
Impairment losses	–	–	–	–
Reversal of impairment losses	–	–	–	–
Other	-6	2	-1	-5
Dec. 31, 2022	**415**	**8**	**58**	**481**

	Right-of-use assets			
€ million	Land, land rights, and buildings	Plant and machinery	Other facilities, operating and office equipment	**Total**
Net carrying amounts as of Jan. 1, 2023	**415**	**8**	**58**	**481**
Changes in the scope of consolidation	–	–	–	–
Additions	157	4	45	206
Disposals	-23	–	-1	-25
Depreciation	-108	-2	-37	-147
Impairment losses	–	–	–	–
Reversal of impairment losses	–	–	–	–
Other	-13	1	-1	-14
Dec. 31, 2023	**427**	**10**	**64**	**500**

The net carrying amounts of other facilities, operating and office equipment mainly included the right-of-use assets for vehicles.

The additions to land, land rights, and buildings primarily related to newly agreed right-of-use assets for laboratories, office buildings, and warehouses as well as agreed lease renewals.

The expenses and income and the payments under the leases in accordance with IFRS 16 were reported in the consolidated income statement and the consolidated statement of cash flows as follows:

€ million	**2023**	2022
Right-of-use assets		
Depreciation	-147	-152
Impairment losses	–	–
Reversals of impairment losses	–	–
Expenses for leasing low-value assets	-11	-14
Expenses for leases with variable lease payments	–	–
Income from subleasing right-of-use assets	–	–
Income from sale-and-lease-back transactions	–	–
Interest expenses for lease liabilities	-14	-13
Total	**-173**	**-179**

€ million	**2023**	2022
Operating cash flow	-25	-26
Financing cash flow	-149	-150
Total	**-174**	**-176**

At the reporting date, the future lease payments were distributed over the following periods:

December 31, 2023

€ million	Within 1 year	1-5 years	After more than 5 years	**Total**
Future lease payments	130	278	152	560
Interest portion of future payments	-11	-22	-15	-47
Present value of future lease payments	**120**	**256**	**137**	**513**

December 31, 2022

€ million	Within 1 year	1-5 years	After more than 5 years	Total
Future lease payments	132	281	111	524
Interest portion of future payments	-9	-17	-9	-35
Present value of future lease payments	**123**	**264**	**101**	**488**

(22) Other non-financial assets

Accounting and measurement policies

Other non-financial assets

Other non-financial assets are carried at amortized cost. Impairments are recognized for any credit risks.

Other non-financial assets are broken down as follows:

	Dec. 31, 2023			Dec. 31, 2022		
€ million	**Current**	**Non-current**	**Total**	Current	Non-current	Total
Receivables from non-income-related taxes	323	2	325	346	3	349
Prepaid expenses	182	37	219	210	29	239
Assets from defined benefit plans	33	–	33	46	–	46
Remaining other assets	95	76	171	103	67	170
Other non-financial assets	**633**	**115**	**748**	**705**	**99**	**804**

(23) Cash flow from investing activities

In the previous year, payments for investments in intangible assets included an upfront payment in a mid-double-digit million-euro amount in connection with the acquisition of Chord Therapeutics SA, Switzerland.

Payments from the disposal of intangible assets in fiscal 2023 primarily resulted from the disposal of the rights to a non-strategic brand in the Healthcare business sector and a portfolio of licenses and patents in the Electronics business sector.

Payments for acquisitions less acquired cash and cash equivalents in the previous year were primarily attributable to the acquisition of Exelead Inc., United States; M Chemicals Inc., Korea; and Erbi Biosystems Inc., United States (see Note (6) "**Acquisitions and divestments**").

Net cash outflows for investments in financial assets mainly resulted from short-term investments in securities and term deposits that did not meet the requirements for classification as cash and cash equivalents.

Net cash inflows from the disposal of other financial assets primarily resulted from repayments of short-term investments in securities and term deposits as well as from contingent consideration (see Note (36) "**Other financial assets**").

The payments made for and received from the acquisition and the disposal of non-financial assets resulted from the short-term investment of available funds in marketable greenhouse gas emissions certificates.

(24) Inventories

Accounting and measurement policies

Inventories

In addition to directly attributable unit costs, the cost of sales also includes overheads attributable to the production process, which are determined on the basis of normal capacity utilization of the production facilities. Goods for resale are recognized at cost. The "first-in, first-out" (FIFO) method is used to determine the amortized cost of manufactured, finished, and unfinished materials, raw materials, and merchandise. The weighted average cost formula is applied for items such as supplies.

Inventories are tested for impairment using a business-sector-specific method. Under this method, cost is compared to the net realizable values. If the net realizable value is lower than the amortized cost, the asset is written down by a corresponding amount, which is recognized as an expense in the cost of sales.

Impairments may be due to factors relating to the sales market, qualitative reasons, a lack of usability of the items, or their limited remaining shelf life. If the reason for impairment no longer applies, the carrying amount is adjusted to the lower of cost or the new net realizable value.

Since inventories are, for the most part, not manufactured within the scope of long-term production processes, borrowing costs are not included.

Inventory prepayments are reported under other non-financial assets.

Significant discretionary decisions and sources of estimation uncertainty

Identification of impairments or reversal of impairments

Discretionary decisions are required in the identification of impairment as well as in identifying the need to reverse impairment of inventories. There are estimation uncertainties with respect to the calculation of the net realizable value. In particular, changes in selling prices and expected costs of completion are considered in calculating this value.

Inventories consisted of the following:

€ million	**Dec. 31, 2023**	Dec. 31, 2022
Raw materials and supplies	1,164	1,076
Work in progress	1,428	1,418
Finished goods/goods for resale	2,045	2,139
Inventories	**4,637**	**4,632**

Measures to optimize inventory levels contributed to the reduction in inventories in the Life Science business sector. This was offset by an increase in the Healthcare business sector and in the Electronics business sector.

Impairment losses included in the cost of sales are shown in Note (10) "**Cost of sales**".

(25) Trade and other receivables

Accounting and measurement policies

Trade and other receivables

Trade accounts receivable without significant financing components that are not the subject of a factoring agreement are measured at the amount of the unconditional claim for consideration on initial recognition. For additions to trade accounts receivable, loss allowances are recognized to allow for expected credit losses.

At initial recognition, other receivables are measured at fair value plus the direct transaction costs incurred upon acquisition of the asset.

Trade accounts receivable that are potentially designated to be sold on account of a factoring agreement are measured at fair value through other comprehensive income.

The measurement policies applied in determining loss allowances for trade and other receivables are shown in Note (42) "**Management of financial risks**" in the "**Credit risks**" section.

Loss allowances and reversals of loss allowances are reported under "Impairment losses and reversals of impairment losses on financial assets (net)" in the consolidated income statement if the asset is used in ordinary activities and hence has an operative nature. If the asset is not used in ordinary activities and hence can be characterized as financial, it is recognized in financial income or financial expenses.

Further information on the accounting and measurement policies governing financial assets can be found in Note (36) "**Other financial assets**".

Significant discretion and sources of estimation uncertainty

Trade and other receivables

Information on the significant discretion and estimation uncertainty concerning trade and other receivables can be found in Note (42) "**Management of financial risks**".

Trade and other receivables were measured as follows:

	Dec. 31, 2023			Dec. 31, 2022		
€ million	Subsequently measured at amortized cost	Subsequently measured at fair value through other comprehensive income	**Total**	Subsequently measured at amortized cost	Subsequently measured at fair value through other comprehensive income	Total
Gross trade accounts receivable	3,945	25	3,969	4,046	22	4,069
Gross other receivables	160	–	160	136	–	136
Gross trade and other receivables	**4,105**	**25**	**4,130**	**4,182**	**22**	**4,204**
Loss allowances on trade accounts receivable	-97	–	-97	-63	–	-63
Loss allowances on other receivables	-1	–	-1	-1	–	-1
Net trade and other receivables	**4,007**	**25**	**4,031**	**4,119**	**22**	**4,141**
thereof: current	3,979	25	4,004	4,091	22	4,114
thereof: non-current	28	–	28	27	–	27

The reduction in trade and other receivables is mainly attributable to foreign exchange effects and general operational performance.

In 2023, trade accounts receivable in Italy with a nominal value of € 69 million (2022: € 68 million) were sold for € 69 million (2022: € 68 million). These receivables did not involve any further rights of recourse against Merck.

(26) Contract assets

Accounting and measurement policies

Contract assets

Contract assets represent contractual claims to receive payment from customers for whom the contractual performance obligation has already been fulfilled, although an unconditional claim to payment has yet to arise.

The following table shows the change in contract assets:

€ million	2023	2022
Jan. 1	**128**	**207**
Additions due to business combinations	–	10
Other additions	339	360
thereof: attributable to performance obligations satisfied in prior periods	–	2
Disposals due to divestments/Reclassification to assets held for sale	–	–
Reclassification to trade accounts receivable	-361	-451
Currency differences	-3	1
Other	–	1
Dec. 31	**104**	**128**

Contract assets resulted in particular from rendering services and manufacturing of products in the Life Science and Electronics business sectors.

(27) Other provisions

Other provisions developed as follows:

€ million	Litigation	Restructuring	Environmental protection	Acceptance and follow-on obligations	Interest and penalties related to income taxes	Other	Total
Jan. 1, 2023	**85**	**134**	**148**	**127**	**88**	**91**	**672**
Additions	10	173	3	124	80	89	479
Utilizations	-10	-45	-4	-12	-1	-22	-95
Release	-25	-51	-3	-59	-39	-29	-205
Interest effect	–	–	5	–	–	–	6
Currency translation	–	-1	–	–	-1	-2	-4
Changes in scope of consolidation/Other	–	–	–	–	–	–	–
Dec. 31, 2023	**59**	**210**	**149**	**181**	**127**	**127**	**852**
thereof: current	42	139	19	166	127	82	575
thereof: non-current	17	71	130	15	–	45	277

Accounting and measurement policies

Provisions for litigation

To assess a recognition obligation in relation to provisions for litigation and to quantify future outflows of resources, Merck draws on the knowledge of the legal department as well as outside counsel.

Assessing the need for recognizing provisions for litigation is based on the likelihood of possible outcomes for proceedings. In particular, the factors influencing this likelihood are:

- the validity of the arguments brought forward by the opposing party, and
- the legal situation and current court rulings in comparable proceedings in the jurisdiction(s) in question.

The following factors are also relevant in measuring provisions for litigation:

- the duration of proceedings in pending legal disputes,
- the applicable license rate plus an expected infringement surcharge,
- the usual damages and fines for comparable legal disputes, and
- the discount factor to be used.

Provisions for restructuring

Merck uses formal restructuring plans and the expectations of the affected employees concerning the performance of the restructuring measures to assess the recognition obligation for provisions for restructuring projects and the amount of the expected outflow of resources.

Provisions for environmental protection

To assess a recognition obligation in relation to provisions for environmental protection and to quantify future outflows of resources, Merck draws on appraisals by independent external experts and the knowledge of in-house specialists.

The following are key parameters in calculating the present value of the future settlement amount of the provisions for environmental protection:

- the future settlement date,
- the extent of environmental damage,
- the applicable remediation methods,
- the associated future costs, and
- the discount factor.

Provisions for acceptance and follow-on obligations

The assessment of the recognition obligation for provisions for acceptance and follow-on obligations and the quantification of future outflows of resources is based on internal project plans as well as on the assessment of the respective matters by in-house and external specialists.

The main parameters in determining the amount of the provision are:

- the ability to use or potential for modification of secured manufacturing capacities at third-party providers, particularly for pharmaceutical compounds,
- the number of affected patients and the expected duration of their continued treatment in clinical development programs,
- the expected date or period of the outflow of resources, and
- the expectations concerning future events influencing the obligations.

Provisions for interest and penalties related to income taxes

Objective assessments are performed to determine the need to recognize provisions for interest and penalties related to income taxes not covered by IAS 12.

Significant discretion and sources of estimation uncertainty

Provisions for litigation

Like the measurement of provisions, the assessment of a recognition obligation for provisions for litigation is to a particular extent subject to a degree of estimation uncertainty. The uncertainties relate, in particular, to the assessment of the likelihood and the amount of the outflow of resources.

Provisions for restructuring

Estimation uncertainty about the provisions for restructuring primarily relates to determining the amount of the expected outflow of resources. This is largely influenced by the assumptions made concerning the change in or termination of the employment relationships of the affected employees and the planned implementation date of the restructuring plan.

Provisions for environmental protection

The assessment of a recognition obligation and the measurement of the provisions for environmental protection are subject to discretionary decisions and estimation uncertainties to a particular degree.

The estimation uncertainties relate in particular to the assessment of the timing and likelihood of a future outflow of resources and the extent of necessary remediation measures as well as the related calculation of the amount of the liability.

Provisions for acceptance and follow-on obligations

Estimation uncertainty regarding the provisions for acceptance and follow-on obligations primarily relates to determining the amount of the expected outflow of resources.

Provisions for interest and penalties related to income taxes

Estimation uncertainty concerning the provisions for interest and penalties related to income taxes mainly relates to the interpretation of tax codes and the effects of amended case law.

Antitrust and other proceedings

In connection with the generics business that was divested in 2007, Merck was accused of breaching EU antitrust law through agreements entered into by its former subsidiary Generics (UK) Ltd., United Kingdom, relating to the antidepressant Citalopram patented by Lundbeck A/S, Denmark. The European Commission imposed a fine in June 2013. Appeals against the decision were unsuccessful. Following the payment of the fine of around € 18 million, British health authorities brought legal claims for damages against Merck and other companies in a mid-triple-digit million-euro amount in fiscal 2023 due to alleged infringements of competition law. In addition, there were further claimants from various other jurisdictions who have not yet quantified their claims. In response to the latest developments in the proceedings, the provision was adjusted as of December 31, 2023, and is now recognized in a high-single-digit million-euro amount. A cash outflow within the next 12 months is considered possible.

Restructuring

The restructuring provisions recognized as of December 31, 2023, primarily relate to obligations for workforce reduction measures in connection with communicated restructuring plans.

A program to continuously improve processes and align the Group functions more closely with the businesses was launched in 2023. The implementation of this program will take until at least the end of fiscal 2024. Provisions in a mid-double-digit million-euro amount were recognized for the program in the current fiscal year. Furthermore, additional programs to improve efficiency and increase customer focus in the Electronics and Healthcare business sectors were initiated during the current fiscal year. This resulted in the recognition of provisions in a mid-double-digit million-euro amount that are largely expected to be utilized within the next two years.

Environmental protection

Provisions for environmental protection resulted in particular from obligations for soil remediation and groundwater protection in connection with the crop protection business in Germany and Latin America that was discontinued in 1987.

Acceptance and follow-on obligations

Provisions for acceptance and follow-on obligations primarily related to costs in connection with discontinued development projects in the Healthcare business sector as well as obligation surpluses from onerous contracts.

A significant proportion of the provisions for acceptance and follow-on obligations are attributable to the results of the two Phase III clinical trials to evaluate the efficacy and safety of evobrutinib. This resulted in the recognition of a provision for follow-on obligations in a high-double-digit million-euro amount in 2023. The outflow of resources is predominantly expected within the next 12 months.

Part of the provision is also attributable to the discontinuation of development projects under the strategic alliance with GlaxoSmithKline, United Kingdom (GSK), and relates to the winding up of clinical trials. On February 5, 2019, Merck entered into a global agreement in the field of immuno-oncology with a subsidiary of GSK to co-develop and co-commercialize the drug candidate bintrafusp alfa. In the third quarter of 2021, it was amicably decided with GSK that the agreement on bintrafusp alfa would end effective September 30, 2021. The provisions recognized in a mid-double-digit million-euro amount included expected expenses for follow-on obligations. The outflow of resources is mainly expected within the next 12 months.

Interest and penalties related to income taxes

Provisions for interest and penalties related to income taxes mainly included penalties arising from tax audits as well as interest payables associated with or resulting from tax payables.

Miscellaneous other provisions

Miscellaneous other provisions included provisions for asset retirement obligations, other tax risks not constituting income tax in accordance with IAS 12, risks in connection with employee participation programs and warranty obligations.

(28) Contingent liabilities

Accounting and measurement policies

Contingent liabilities

To identify contingent liabilities from litigation and tax matters, Merck draws on the knowledge of the legal department and the tax department as well as the opinions of external consultants and attorneys.

The key factors in the identification of contingent liabilities are:

- the validity of the arguments brought forward by the opposing party or the tax authority, and
- the legal situation and current court rulings in comparable proceedings in the jurisdiction in question.

The amount of the contingent liability is based on the best-possible estimate, which in turn is based on the likelihood of possible outcomes of proceedings and on the applicable license rate in patent disputes.

Significant discretionary decisions and sources of estimation uncertainty

Contingent liabilities

The identification and the measurement of contingent liabilities are both subject to considerable uncertainty.

This applies with regard to assessing the likelihood of an outflow of resources as well as determining its amount.

Contingent liabilities in the amount of € 204 million (December 31, 2022 (adjusted): € 231 million) related almost exclusively to litigation and tax matters.

Contingent liabilities from litigation mainly related to obligations under labor law and tort law. The contingent liabilities from tax matters primarily related to the determination of earnings under tax law, customs regulations, and excise tax matters.

In addition, there were contingent liabilities from various legal disputes with Merck & Co., Inc., Rahway, NJ, United States (outside the United States and Canada: MSD), among other things due to breach of the coexistence agreement entered into between the two companies and/or trademark/name right infringement regarding the use of the designation “Merck”. In this context, Merck has sued MSD in various countries and has been sued by MSD in the United States. An outflow of resources – except costs for legal defense – was not deemed sufficiently probable as of the balance sheet date to justify the recognition of a provision. Since the contingent liability from these legal disputes could not be reliably quantified as of the balance sheet date, this matter was not included in the total figure for contingent liabilities.

(29) Other non-financial liabilities

Accounting and measurement policies

Other non-financial liabilities

Accruals for personnel expenses reported in other non-financial liabilities include, in particular, liabilities resulting from vacation entitlements, variable and performance-related compensation components, and social security contributions.

Contract liabilities include payments received by Merck prior to completion of contractual performance.

Other non-financial liabilities comprises the following:

	Dec. 31, 2023			Dec. 31, 2022		
€ million	**Current**	**Non-current**	**Total**	Current	Non-current	Total
Accruals for personnel expenses[1]	916	–	916	1,156	–	1,156
Payroll-related liabilities[1]	122	4	126	121	5	127
Liabilities from non-income-related taxes	163	1	164	200	1	202
Contract liabilities	249	3	252	282	3	285
Other accruals	29	8	38	26	10	36
Other non-financial liabilities[1]	**1,479**	**17**	**1,496**	**1,786**	**19**	**1,805**

[1] Previous year's figures have been adjusted, see Note (2) "**Reporting principles**".

The reduction in accruals for personnel expenses is due in particular to lower accruals for annual bonus payments for the past fiscal year and for the tranche of the Merck Long-Term Incentive Plan that is payable in the months following the reporting date.

The following table shows the development of contract liabilities in the period under review:

	2023			2022		
€ million	**Current**	**Non-current**	**Total**	Current	Non-current	Total
Jan. 1	**282**	**3**	**285**	**198**	**3**	**202**
Additions due to business combinations	–	–	–	1	–	1
Other additions	1,290	–	1,290	1,276	1	1,277
Disposals due to divestments/Reclassification to assets held for sale	–	–	–	–	–	–
Recognition of income/reversal	-1,313	–	-1,313	-1,194	–	-1,195
Cumulative catch-up adjustments to revenue	–	–	–	–	–	–
Reclassification from non-current to current	–	–	–	1	-1	–
Currency translation	-11	–	-11	–	–	–
Other	–	–	–	–	–	–
Dec. 31	**249**	**3**	**252**	**282**	**3**	**285**

As of January 1, 2023, contract liabilities amounted to € 285 million (January 1, 2022: € 202 million), of which a total of € 253 million (2022: € 181 million) was recognized through profit or loss in fiscal 2023.

(30) Trade and other payables

Accounting and measurement policies

Trade and other payables

Trade and other payables are subsequently measured at amortized cost.

Trade and other payables as of December 31, 2023, included accrued amounts of € 775 million (December 31, 2022: € 903 million) from outstanding invoices.

Employees

(31) Number of employees

The number of employees was 62,908 as of December 31, 2023 (December 31, 2022: 64,232 employees).

The following table shows the average number of employees broken down by function.

	2023	2022
Production	24,105	22,086
Administration	11,938	11,886
Research and development	6,516	7,334
Supply chain	4,971	4,850
Marketing and sales	14,436	15,087
Other	1,676	1,309
Average number of employees	**63,642**	**62,552**

(32) Personnel expenses

Personnel expenses comprised the following:

€ million	**2023**	2022
Wages and salaries	5,299	5,340
Compulsory social security contributions and other costs	853	844
Pension expenses	365	460
Personnel expenses	**6,517**	**6,644**

Personnel expenses comprised expenses of € 212 million (2022: € 200 million) for defined contribution plans, which are funded exclusively using external funds and therefore do not represent any obligation for Merck other than making contribution payments. In addition, employer contributions amounting to € 93 million (2022: € 92 million) were transferred to the German statutory pension insurance system, and contributions amounting to € 122 million (2022: € 105 million) were transferred to statutory pension insurance systems abroad.

(33) Provisions for employee benefits

Provisions for employee benefits are composed as follows:

€ million	Dec. 31, 2023	Dec. 31, 2022
Provisions for pensions and other post-employment benefits	1,975	1,731
Non-current other employee benefit provisions	217	299
Non-current provisions for employee benefits	**2,192**	**2,030**
Current provisions for employee benefits[1]	**83**	**81**
Provisions for employee benefits	**2,275**	**2,111**

[1] Previous year's figures have been adjusted, see Note (2) "**Reporting principles**".

Provisions for other employee benefits included provisions for share-based payments, which are discussed in greater detail in the section on share-based payments in this note.

Provisions for pensions and other post-employment benefits

Accounting and measurement policies

Provisions for pensions and other post-employment benefits

In addition to retirement benefit obligations, provisions for pensions and other post-employment benefits include obligations for other post-employment benefits, such as medical care.

The present value of the defined benefit obligation is determined by expert third parties according to the actuarial projected unit credit method.

The discount rates for defined benefit pension plans are generally determined by reference to discount rates for similar durations and currencies calculated by external actuaries. This was based on bonds with ratings of at least "AA" or a comparable rating from at least one of the leading rating agencies as of the reporting date.

The other actuarial assumptions used as the basis for calculating the defined benefit obligation, such as rates of salary increases and pension trends, were determined on a country-by-country basis in line with the economic conditions prevailing in each country. The latest country-specific mortality tables are also applied (Germany: Heubeck 2018G; Switzerland: BVG 2020G; United Kingdom: S3PA).

Apart from the net balance of interest expense for the defined benefit obligations and interest income from the plan assets, which is reported in financial income and financial expenses, the expenses for defined benefit plans are allocated to the individual functional areas in the consolidated income statement.

The calculation of the defined benefit obligations was based on the following actuarial parameters and durations:

	Germany		Switzerland		United Kingdom		Other countries	
	2023	2022	**2023**	2022	**2023**	2022	**2023**	2022
Discount rate	3.32%	3.74%	1.34%	2.15%	4.80%	4.95%	4.52%	4.49%
Future salary increases	2.75%	2.76%	3.84%	2.70%	–	–	3.81%	3.76%
Future pension increases	2.14%	2.14%	0.02%	0.03%	2.90%	2.89%	1.75%	2.20%
Duration	19	17	16	15	13	15	12	11

The lower interest rate level in the euro area and Switzerland resulted in an increase in the present value of the defined benefit obligations as well as in the duration of the obligations.

These were average values weighted by the present value of the respective defined benefit obligation.

Significant discretionary decisions and sources of estimation uncertainty

Provisions for pensions and other post-employment benefits

The determination of the present value of the obligation from defined benefit pension plans primarily requires discretionary judgment regarding the selection of methods to determine the discount rate, the selection of suitable mortality tables, and estimates of future salary and pension increases.

The following overview shows how the present value of all defined benefit obligations would have been impacted by changes to relevant actuarial assumptions:

December 31, 2023

€ million	Germany	Switzerland	United Kingdom	Other countries	Total
Increase (+)/decrease (-) in present value of all defined benefit obligations if					
the discount rate were 50 basis points lower	295	91	23	18	**426**
the discount rate were 50 basis points higher	-256	-80	-21	-16	-373
the expected rate of future salary increase were 50 basis points lower	-73	-17	–	-9	-98
the expected rate of future salary increase were 50 basis points higher	82	18	–	9	109
the expected rate of future pension increase were 50 basis points lower	-141	-3	-8	-5	-157
the expected rate of future pension increase were 50 basis points higher	155	44	9	5	212
the life expectancy were 1 year lower	-110	-28	-10		
the life expectancy were 1 year higher	109	27	10		

December 31, 2022

€ million	Germany	Switzerland	United Kingdom	Other countries	**Total**
Increase (+)/decrease (-) in present value of all defined benefit obligations if					
the discount rate were 50 basis points lower	256	69	26	18	**370**
the discount rate were 50 basis points higher	-224	-61	-24	-17	-325
the expected rate of future salary increase were 50 basis points lower	-66	-5	–	-9	-80
the expected rate of future salary increase were 50 basis points higher	74	5	–	10	89
the expected rate of future pension increase were 50 basis points lower	-128	-2	-12	-5	-148
the expected rate of future pension increase were 50 basis points higher	140	35	16	5	197
the life expectancy were 1 year lower	-96	-22	-9		
the life expectancy were 1 year higher	95	21	9		

Sensitivities are determined on the basis of the respective parameters in question, with all other measurement assumptions remaining unchanged.

Both the benefit obligations and the plan assets are subject to fluctuations over time. The reasons for such fluctuations could include changes in market interest rates and thus the discount rate, as well as adjustments to other actuarial assumptions (such as life expectancy or expected future increases in pension). This could lead to – or cause an increase in – underfunding. Depending on statutory regulations, it may become necessary in some countries to reduce underfunding and provide additional funding.

In order to minimize fluctuations of the net defined benefit liability, Merck, in managing its plan assets, also pays attention to potential fluctuations in liabilities. The portfolio is structured in such a way that, in the ideal scenario, the impact of exogenous factors on the plan assets and the defined benefit obligations offset each other.

Depending on the legal, economic, and fiscal circumstances prevailing in each country, different retirement benefit systems are provided for employees. Newly hired employees are only offered plans whose benefits are based on contributions and the return on their investments. Some of these plans require the employer to guarantee a minimum return on investment. Other plans are generally based on the employee's years of service and salary. Pension obligations comprise both obligations from current pensions and accrued benefits for pensions payable in the future.

The value recognized in the consolidated balance sheet for pensions and other post-employment benefits was derived as follows:

€ million	**Dec. 31, 2023**	Dec. 31, 2022
Present value of all defined benefit obligations	**4,787**	**4,287**
Fair value of the plan assets	-2,848	-2,634
Funded status	**1,939**	**1,652**
Effects of the asset ceilings	4	33
Net defined benefit liability	**1,943**	**1,685**
Assets from defined benefit plans	33	46
Provisions for pensions and other post-employment benefits	**1,975**	**1,731**

The increase in provisions was mainly due to the reduction in the discount rates in the euro area and Switzerland.

The defined benefit obligations were based on the following types of benefits provided by the respective plan:

	Dec. 31, 2023				
€ million	Germany	Switzerland	United Kingdom	Other countries	**Total**
Benefit based on final salary					
Annuity	2,429	1	354	72	2,856
Lump sum	–	–	–	127	127
Installments	1	–	–	–	1
Benefit not based on final salary					
Annuity	613	1,060	–	59	1,732
Lump sum	10	–	4	29	43
Installments	4	–	–	–	4
Other	–	–	–	4	4
Medical plan	–	–	–	18	18
Present value of defined benefit obligations	**3,058**	**1,061**	**358**	**310**	**4,787**
Fair value of the plan assets	**1,281**	**1,022**	**384**	**160**	**2,848**

	Dec. 31, 2022				
€ million	Germany	Switzerland	United Kingdom	Other countries	Total
Benefit based on final salary					
Annuity	2,186	1	327	72	2,586
Lump sum	–	–	–	130	130
Installments	2	–	–	–	2
Benefit not based on final salary					
Annuity	555	879	–	62	1,496
Lump sum	4	–	4	33	41
Installments	5	–	–	–	5
Other	–	–	–	5	5
Medical plan	–	–	–	22	22
Present value of defined benefit obligations	**2,752**	**881**	**332**	**323**	**4,287**
Fair value of the plan assets	**1,202**	**909**	**372**	**152**	**2,634**

The vast majority of defined benefit obligations of German entities were attributable to plans that encompass old-age, disability, and surviving-dependent pensions. These obligations were based on benefit rules comprising benefit commitments dependent on years of service and final salary, as well as two different direct commitments for employees newly hired since January 1, 2005, that are not based on final salary. The benefit entitlement for new members from January 1, 2005, to December 31, 2020, resulted from the cumulative total of annually determined pension components calculated on the basis of a defined benefit expense and an age-based annuity table. The benefit entitlement for new members from January 1, 2021, resulted from the performance of salary-based employer contributions and voluntary employee contributions, topped up by the employer, to an external fund. A minimum return on contributions has been guaranteed by Merck. There were no statutory minimum funding obligations in Germany.

Pension obligations in Switzerland mainly comprised retirement, disability, and surviving-dependent benefits regulated by law. The employer and the employees made contributions to the plans. Statutory minimum funding obligations existed.

Pension obligations in the United Kingdom resulted primarily from benefit plans which are based on years of service and final salary and were closed to newly hired employees from 2006 onward. The agreed benefits comprised retirement, disability, and surviving-dependent benefits. The employer and the employees made contributions to the plans. Statutory minimum funding obligations existed.

The development of the net defined benefit liability was as follows:

2022

€ million	Present value of the defined benefit obligations	Fair value of the plan assets	Effects of asset ceilings	**Net defined benefit liability**
January 1, 2022	**-5,995**	**2,999**	**–**	**-2,996**
Current service cost	-203	–	–	-203
Interest expense	-73	–	–	-73
Interest income	–	34	–	34
Plan administration costs recognized in income	–	-3	–	-3
Past service cost	-1	–	–	-1
Gains (+) or losses (-) on settlement	–	–	–	–
Currency effects recognized in income	-30	30	–	–
Other effects recognized in income	1	-2	–	-1
Items recognized in income	**-306**	**59**	**–**	**-247**
Remeasurements of defined benefit obligations				
Actuarial gains (+)/losses (-) arising from changes in demographic assumptions	7	–	–	7
Actuarial gains (+)/losses (-) arising from changes in financial assumptions	2,099	–	–	2,099
Actuarial gains (+)/losses (-) arising from experience adjustments	-205	–	–	-205
Remeasurements of plan assets				
Actuarial gains (+)/losses (-) arising from experience adjustments	–	-429	–	-429
Changes in the effects of the asset ceilings				
Actuarial gains (+)/losses (-)	–	–	-32	-32
Actuarial gains (+)/losses (-)	**1,901**	**-429**	**-32**	**1,440**
Pension payments	140	-52	–	88
Employer contributions	–	42	–	42
Employee contributions	-20	19	–	-1
Payment transactions	**120**	**9**	**–**	**129**
Changes in the scope of consolidation	-1	1	–	–
Currency translation recognized in equity	-3	-6	-1	-10
Other changes	-2	1	–	-1
Other	**-6**	**-4**	**-1**	**-11**
December 31, 2022	**-4,287**	**2,634**	**-33**	**-1,685**

2023

€ million	Present value of the defined benefit obligations	Fair value of the plan assets	Effects of asset ceilings	**Net defined benefit liability**
January 1, 2023	**-4,287**	**2,634**	**-33**	**-1,685**
Current service cost	-109	–	–	-109
Interest expense	-150	–	–	-150
Interest income	–	89	–	89
Plan administration costs recognized in income	–	-3	–	-3
Past service cost	5	–	–	5
Gains (+) or losses (-) on settlement	–	–	–	–
Currency effects recognized in income	-37	37	–	–
Other effects recognized in income	–	–	–	–
Items recognized in income	**-291**	**123**	**–**	**-168**
Remeasurements of defined benefit obligations				
Actuarial gains (+)/losses (-) arising from changes in demographic assumptions	17	–	–	17
Actuarial gains (+)/losses (-) arising from changes in financial assumptions	-350	–	–	-350
Actuarial gains (+)/losses (-) arising from experience adjustments	10	–	–	10
Remeasurements of plan assets				
Actuarial gains (+)/losses (-) arising from experience adjustments	–	58	–	58
Changes in the effects of the asset ceilings				
Actuarial gains (+)/losses (-)	–	–	29	29
Actuarial gains (+)/losses (-)	**-323**	**58**	**29**	**-236**
Pension payments	147	-61	–	86
Employer contributions	–	57	–	57
Employee contributions	-22	21	–	-1
Payment transactions	**125**	**17**	**–**	**142**
Changes in the scope of consolidation	–	–	–	–
Currency translation recognized in equity	-16	20	–	4
Other changes	5	-4	–	1
Other	**-11**	**16**	**–**	**5**
December 31, 2023	**-4,787**	**2,848**	**-4**	**-1,943**

The actual income from plan assets amounted to € 147 million in the year under review (2022: loss of € 395 million).

Covering the benefit obligations with financial assets represents a means of providing for future cash outflows, which are required by law in some countries (for example, Switzerland and the United Kingdom) and voluntarily in other countries (for example, Germany).

The fair value of the plan assets was allocated to the following categories:

	Dec. 31, 2023			Dec. 31, 2022		
€ million	Quoted market price in an active market	No quoted market price in an active market	**Total**	Quoted market price in an active market	No quoted market price in an active market	**Total**
Cash and cash equivalents	74	–	74	58	–	58
Equity instruments	620	–	620	636	–	636
Debt instruments	1,219	–	1,219	968	–	968
Real estate	180	193	373	179	321	500
Investment funds	48	392	439	140	204	344
Insurance contracts	–	61	61	–	64	64
Other	62	–	62	59	5	64
Fair value of the plan assets	**2,202**	**646**	**2,848**	**2,040**	**594**	**2,634**

Plan assets did not directly include financial instruments issued by Group companies or assets used by Group companies.

Employer contributions to plan assets and direct payments to plan beneficiaries for the next year are expected to amount to € 48 million (2022: € 42 million) and € 96 million (2022: € 95 million) respectively.

The expected payments of undiscounted benefits under the plans were as follows:

December 31, 2023

	Expected payments of undiscounted benefits				
€ million	**Germany**	**Switzerland**	**United Kingdom**	**Other countries**	**Total**
2024	88	26	17	22	153
2025	95	24	17	24	160
2026	99	25	18	29	171
2027	103	27	19	21	170
2028	108	27	19	21	175
2029-2033	607	151	103	133	994

December 31, 2022

	Expected payments of undiscounted benefits				
€ million	Germany	Switzerland	United Kingdom	Other countries	**Total**
2023	85	23	19	38	165
2024	91	22	19	22	155
2025	95	22	20	26	163
2026	99	22	20	23	164
2027	103	22	21	22	168
2028-2032	583	112	116	130	940

The weighted duration of defined benefit obligations amounted to 17 years (2022: 16 years).

Other employee benefit provisions

Accounting and measurement policies

Other employee benefit provisions

Other employee benefit provisions include obligations from share-based compensation programs. However, they do not contain the tranche of the Merck Long-Term Incentive Plan (LTIP) that is payable in the months following the reporting date, as this is no longer subject to value fluctuations following the reporting date. More information on these compensation programs can be found below.

Obligations for partial retirement programs and other severance payments not recognized in connection with restructuring programs, as well as obligations in connection with long-term working hour accounts and anniversary bonuses, are also included in other employee benefit provisions.

Other employee benefit provisions developed as follows:

€ million	Non-current other employee benefit provisions	Current other employee benefit provisions[1]	Total
Jan. 1, 2023	**299**	**81**	**380**
Additions	78	161	239
Utilizations	-26	-99	-125
Release	-41	-89	-130
Interest effect	2	–	2
Currency translation	-5	-3	-9
Reclassification from non-current to current/liabilities[1]	-90	32	-57
Changes in scope of consolidation/Other	–	–	–
Dec. 31, 2023	**217**	**83**	**299**

[1] Previous year's figures have been adjusted, see Note (2) "**Reporting principles**".

Share-based payments

Accounting and measurement policies

Share-based payments

Provisions are recognized for the share-based compensation program with cash settlement at Merck ("Merck Long-Term Incentive Plan") and reported in other employee benefit provisions.

The fair value of the obligations is calculated by an external expert using a Monte Carlo simulation as of the balance sheet date. The main parameters in the measurement of the share-based compensation programs with cash settlement are long-term indicators of company performance and the price movement of Merck shares in relation to the DAX®. A sustainability factor is also included in the valuation parameters for tranches issued from fiscal 2022 onward.

The expected volatilities are based on the implicit volatility of Merck shares and the DAX® in accordance with the remaining term of the respective tranche. The dividend payments incorporated into the valuation model are based on medium-term dividend expectations.

Changes to the intrinsic value of share-based compensation programs are allocated to the respective functional costs according to the causation principle. Time value changes are recognized in financial income or finance costs.

Significant discretionary decisions and sources of estimation uncertainty

Share-based payments

The measurement of long-term share-based compensation programs implies extensive estimation uncertainty. The following overview shows the amounts by which the non-current provisions from share-based compensation programs (carrying amount as of December 31, 2023: € 7 million/carrying amount as of December 31, 2022: € 97 million) would have been impacted by changes in the DAX® or the closing price of the Merck share on the balance sheet date. The amounts stated would have led to a corresponding reduction or increase in profit before income tax.

		Increase (+)/decrease (-) of the provision	
€ million		**Dec. 31, 2023**	Dec. 31, 2022
Variation of Merck share price	10%	1	20
	-10%	-1	-18
Change in the DAX®	10%	–	-10
	-10%	–	8

Sensitivities were determined on the basis of the respective parameters in question, with all other measurement assumptions remaining unchanged. The 2021 tranche will not be subject to any value fluctuations between December 31, 2023, and the payout date, and was therefore excluded from the sensitivity analysis (December 31, 2022: exclusion of 2020 tranche).

These share-based compensation programs with cash settlement in place at Merck are aligned with target achievement based on key performance indicators as well as the long-term performance of Merck shares. Certain employees are eligible to receive a certain number of virtual shares – Merck share units (MSUs) – at the end of a three-year performance cycle. The number of MSUs that could be received depends on the individual grant defined for the respective person and the average closing price of Merck shares in Xetra® trading during the last 60 trading days prior to January 1 of the respective performance cycle (reference price). When the three-year performance cycle ends, the number of MSUs to then be granted is determined based on the development of defined financial key performance indicators (KPIs). In addition to the financial KPIs, a sustainability factor is included in performance measurement for tranches issued from fiscal 2022 onward.

The calculation is based on the performance of the Merck share price compared to the performance of the DAX® with a weighting of 50%, the development of the EBITDA pre margin during the performance cycle as a proportion of a defined target value with a weighting of 25%, and the development of organic sales growth as a proportion of a defined target value, also with a weighting of 25%. Depending on the development of these financial KPIs, at the end of the respective performance cycle the eligible participants are granted between 0% and 150% of the MSUs they could be eligible to receive.

For tranches issued from fiscal 2022 onward, the MSUs measured on the basis of financial targets are multiplied by a sustainability factor composed of the three sustainability criteria: “Dedicated to human progress”, “Partnering for sustainable business impact”, and “Reducing our ecological footprint”.

The weighting of the three sustainability criteria for the 2023 LTIP tranche is as follows:

- “Dedicated to human progress” 30%
- “Partnering for sustainable business impact” 30%
- “Reducing our ecological footprint” 40%

The sustainability factor can range from 0.8 to 1.2. This means that, depending on the result of the financial KPIs (0% to -150%) and the sustainability factor, the eligible participants are granted between 0% and 180% of the MSUs they could be eligible to receive at the end of the respective performance cycle.

A cash payment is made based on the MSUs granted after the three-year performance cycle has ended. The value of a granted MSU, which is relevant for payment, corresponds to the average closing price of Merck shares in Xetra® trading during the last 60 trading days prior to the end of the performance cycle. The payout amounts of the respective tranches are limited to two and a half times the individual grant.

The following table presents the key parameters as well as the development of the potential number of Merck share units (MSUs) for the individual tranches:

	2021 tranche	2022 tranche	2023 tranche
Performance cycle	Jan. 1, 2021 - Dec. 31, 2023	Jan. 1, 2022 - Dec. 31, 2024	Jan. 1, 2023 - Dec. 31, 2025
Term	3 Years	3 Years	3 Years
Reference price of Merck shares in € (60-day average Merck share price prior to the start of the performance cycle)	132.43	212.16	173.46
DAX® value (60-day average of the DAX® prior to the start of the performance cycle)	12,995.23	15,684.57	13,722.30
Potential number of MSU			
Potential number offered for the first time in 2021	685,700	–	–
Forfeited	41,813	–	–
Paid out	–	–	–
Dec. 31, 2021	643,887	–	–
Potential number offered for the first time in 2022	–	509,033	–
Forfeited	40,704	20,282	–
Paid out	1,253	227	–
Dec. 31, 2022	601,930	488,524	–
Potential number offered for the first time in 2023	–	–	672,367
Forfeited	26,455	22,829	19,901
Paid out	2,016	1,673	1,266
Dec. 31, 2023	**573,459**	**464,022**	**651,200**

The value of the provisions as of December 31, 2023, was € 7 million (December 31, 2022: € 97 million). Net income of € 35 million was generated in fiscal 2023 (2022: net expenses of € 70 million). The three-year tranche issued in fiscal 2020 ended at the end of fiscal 2022; an amount of € 160 million was paid out in fiscal 2023. The three-year tranche issued in fiscal 2021 ended at the end of 2023 and was reclassified from current provisions for employee benefits to other current non-financial liabilities as of December 31, 2023. The tranche is expected to result in a payout of € 54 million in fiscal 2024. At the reporting date, the average closing price of Merck shares in Xetra® trading over the last 60 trading days was € 149.40.

Capital Structure, Investments, and Financing Activities

(34) Equity

Accounting and measurement policies

Accounting treatment of the general partner's equity

As a partnership limited by shares, Merck KGaA has two different shareholder groups who have contributed to the company: the general partner E. Merck KG, as the personally liable partner; and the shareholders.

From an accounting perspective, the contributions of both shareholder groups are treated as equity, regardless of the general partner's option to terminate its capital share. This treatment is based on the provision in the Articles of Association of Merck KGaA stating that the limited liability shareholders may decide on the conversion of the company into a stock corporation and thus limit the general partner's settlement claim to fulfillment in equity instruments.

Equity capital/Capital reserves

The equity capital of the company consisted of the subscribed capital composed of shares and the equity interest held by the general partner E. Merck KG (general partner's equity). As of the balance sheet date, the company's subscribed capital amounting to € 168 million was divided into 129,242,251 no-par value bearer shares plus one registered share. Each share therefore corresponded to € 1.30 of the subscribed capital. The amount resulting from the issue of shares by Merck KGaA exceeding the nominal amount was recognized in the capital reserves. The equity interest held by the general partner amounted to € 397 million. As in the previous year, there were no changes in subscribed capital in fiscal 2023.

Retained earnings

Retained earnings developed as follows:

€ million	Retained earnings/net retained profit	Remeasurement of defined benefit plans	Fair value reserve for equity instruments	**Retained earnings**
Jan. 1, 2022	**16,610**	**-1,539**	**63**	**15,134**
Profit after tax	3,326	–	–	3,326
Gains/losses recognized in equity	–	1,140	-31	1,109
Comprehensive income	**3,326**	**1,140**	**-31**	**4,435**
Dividend payments	-239	–	–	-239
Capital increases	–	–	–	–
Profit transfer to/from E. Merck KG including changes in reserves	-868	–	–	-868
Transactions with no change of control	–	–	–	–
Change in scope of consolidation/Other	-19	-2	21	–
Dec. 31, 2022	**18,811**	**-401**	**53**	**18,463**
Jan. 1, 2023	**18,811**	**-401**	**53**	**18,463**
Profit after tax	2,824	–	–	2,824
Gains/losses recognized in equity	–	-187	160	-28
Comprehensive income	**2,824**	**-187**	**160**	**2,796**
Dividend payments	-284	–	–	-284
Capital increases	–	–	–	–
Profit transfer to/from E. Merck KG including changes in reserves	-746	–	–	-746
Transactions with no change of control	-1	–	–	-1
Change in scope of consolidation/Other	31	-4	-27	–
Dec. 31, 2023	**20,635**	**-592**	**186**	**20,228**

Gains/losses recognized in equity

Gains/losses recognized in equity developed as follows (see also Note (39) "**Derivative financial instruments**"):

€ million	Cash flow hedge reserve	Cost of cash flow hedge reserve	Currency translation difference	**Gains/losses recognized in equity**
Jan. 1, 2022	**-145**	**-23**	**1,992**	**1,824**
Profit after tax	–	–	–	–
Gains/losses recognized in equity	**91**	**11**	**1,159**	**1,261**
Fair value adjustment	-98	-15	1,230	1,117
Reclassification to profit or loss	194	16	-71	139
Reclassification to assets	–	–	–	–
Tax effect	-5	10	–	5
Dec. 31, 2022	**-54**	**-12**	**3,151**	**3,086**
Jan. 1, 2023	**-54**	**-12**	**3,151**	**3,086**
Gains/losses recognized in equity	**-2**	**5**	**-1,016**	**-1,013**
Fair value adjustment	98	-17	-1,001	-920
Reclassification to profit or loss	-95	22	-15	-88
Reclassification to assets	–	–	–	–
Tax effect	-5	–	–	-5
Dec. 31, 2023	**-56**	**-7**	**2,136**	**2,073**

E. Merck KG's share of net profit

E. Merck KG and Merck KGaA engage in reciprocal net profit transfers. This makes it possible for E. Merck KG, the general partner of Merck KGaA, and the shareholders to participate in the net profit/loss of Merck KGaA in accordance with the ratio of the general partner's equity interest and the subscribed capital (70.274% or 29.726% of the equity capital).

The allocation of net profit/loss is based on the net income of both E. Merck KG and Merck KGaA, determined in accordance with the provisions of the German Commercial Code. These figures are adjusted for trade tax and/or corporation tax and create the basis for the allocation of net profit/loss. The adjustment for corporation tax is made to compensate for the difference in the tax treatment between the general partner and the limited liability shareholders. Corporation tax is only calculated on the income received by the limited liability shareholders. Its equivalent is the income tax applicable to the partners of E. Merck KG which must be paid by them directly. The adjustment thus ensures that the share in net profit corresponds to the respective interests held by the two shareholder groups.

The reciprocal net profit/loss transfer between E. Merck KG and Merck KGaA as stipulated by the Articles of Association was as follows:

		2023		2022	
€ million		**E. Merck KG**	**Merck KGaA**	E. Merck KG	Merck KGaA
Result of E. Merck KG before reciprocal profit transfer, adjusted for trade tax		-12	–	23	–
Net income of Merck KGaA before reciprocal profit transfer		–	980	–	919
Corporation tax		–	4	–	54
Basis for appropriation of profits	**(100%)**	**-12**	**985**	**23**	**974**
Profit transfer to E. Merck KG (ratio of general partner's equity to equity capital)	(70.274%)	692	-692	684	-684
Profit/loss transfer to Merck KGaA (ratio of subscribed capital to equity capital)	(29.726%)	4	-4	-7	7
Corporation tax		–	-4	–	-54
Net income		**683**	**285**	**700**	**242**

The result of E. Merck KG adjusted for trade tax, on which the appropriation of profits is based, amounted to € -12 million (2022: € 23 million). This resulted in a profit/loss transfer to Merck KGaA of € -4 million (2022: € 7 million). Merck KGaA's net income adjusted for corporation tax, on which the appropriation of its profit is based, amounted to € 985 million (2022: € 974 million). Merck KGaA transferred a profit of € 692 million to E. Merck KG (2022: € 684 million). In addition, an expense from corporation tax charges was reported in the amount of € 4 million (2022: expense of € 54 million).

Appropriation of profits

The profit distribution to be resolved by shareholders also defines the amount of that portion of net profit/loss freely available to E. Merck KG. If the shareholders resolve to carry forward or to allocate to retained earnings a portion of Merck KGaA's net retained profit to which they are entitled, E. Merck KG shall be obliged to allocate to the profit carried forward/retained earnings of Merck KGaA a comparable sum determined according to the ratio of subscribed capital to general partner's equity. This ensures that the retained earnings and the profit carried forward by Merck KGaA correspond to the ownership ratios of the shareholders on the one hand and E. Merck KG on the other hand. Consequently, for distributions to E. Merck KG, the available amount is the amount that results from netting the profit transfer of Merck KGaA with the amount either allocated or withdrawn by E. Merck KG from retained earnings/profit carried forward. This amount corresponds to the sum paid as a dividend to the shareholders and reflects their pro rata shareholding in the company.

Based on the profit transfer, the appropriation of profits by Merck KGaA was as follows:

	2023		2022	
€ million	**Portion E. Merck KG**	**Portion limited liability shareholders**	Portion E. Merck KG	Portion limited liability shareholders
Net income	683	285	700	242
Profit carried forward previous year	80	34	180	76
Withdrawal from revenue reserves	–	–	–	–
Transfer to revenue reserves	–	–	–	–
Retained earnings limited liability shareholders		**319**		**318**
Withdrawal by E. Merck KG	-682		-801	
Profit carried forward E. Merck KG	**81**		**80**	
Dividend proposal		-284		-284
Profit carried forward of limited liability shareholders (preliminary)		**34**		**34**

A dividend of € 2.20 per share was distributed for fiscal 2022. The dividend proposal for fiscal 2023 is unchanged at € 2.20 per share. With the proposed dividend payment to shareholders amounting to € 284 million (2022: € 284 million), the profit carried forward of the shareholders after the dividend payment would amount to € 34 million (2022: € 34 million). Based on the proposed dividend payment to the shareholders, E. Merck KG would be entitled to withdraw € 682 million (2022: € 801 million), meaning that E. Merck KG would be entitled to a profit brought forward of € 81 million (2022: € 80 million).

Appropriation of profits and changes in reserves

€ million	2023			2022		
	Merck & Cie KmG	**Merck KGaA**	**Total**	Merck & Cie KmG	Merck KGaA	Total
Profit transfer to E. Merck KG	-52	-692	-743	-90	-684	-774
Profit/loss transfer to Merck KGaA	–	-4	-4	–	7	7
Change in profit carried forward of E. Merck KG	–	1	1	–	-100	-100
Profit transfer to E. Merck KG including changes in reserves	**-52**	**-694**	**-746**	**-90**	**-778**	**-868**
Result of E. Merck KG before reciprocal profit transfer adjusted for trade tax		-12			23	
Profit transfer to E. Merck KG/ withdrawal by E. Merck KG	**-52**	**-682**		**-90**	**-801**	

Based on the proposed appropriation of profits, the profit transfer to E. Merck KG for fiscal 2023, including changes in reserves, amounted to € -746 million. This consisted of the profit/loss transfer to E. Merck KG (€ -692 million), the profit transfer to Merck KGaA (€ -4 million), the change in profit carried forward by E. Merck KG (€ 1 million) and the profit transfer from Merck & Cie KmG, Switzerland, to E. Merck KG (€ -52 million). In the previous year, the profit transfer to E. Merck KG including changes in reserves amounted to -868 million. This consisted of the profit transfer to E. Merck KG (€ -684 million), the profit transfer to Merck KGaA (€ 7 million), the change in profit carried forward by E. Merck KG (€ -100 million) and the profit transfer from Merck & Cie KmG to E. Merck KG (€ -90 million) and was paid to E. Merck KG in fiscal 2023. Merck & Cie KmG is a partnership under Swiss law that is controlled by Merck KGaA but distributes its operating result directly to E. Merck KG. This distribution is a payment to shareholders and is therefore also presented under changes in equity.

Non-controlling interests

The calculation of non-controlling interests was based on the reported equity of the subsidiaries concerned.

The non-controlling interests in consolidated equity and profit or loss essentially related to the non-controlling interests in Versum Materials Taiwan Co., Ltd., Taiwan; Merck Ltd., Thailand; and in the listed company PT Merck Tbk., Indonesia.

(35) Cash and cash equivalents

Accounting and measurement policies

Cash and cash equivalents

Cash and cash equivalents comprise short-term investments with a maximum maturity of up to three months, which can be readily converted to a determined amount of cash.

Cash and cash equivalents comprised the following items:

€ million	**Dec. 31, 2023**	Dec. 31, 2022
Cash, bank balances and cheques	501	610
Short-term cash investments (up to 3 months)	1,481	1,244
Cash and cash equivalents	**1,982**	**1,854**

Changes in cash and cash equivalents as defined by IAS 7 are presented in the consolidated cash flow statement.

Cash and cash equivalents included restricted cash amounting to € 404 million (December 31, 2022: € 456 million). This mainly related to cash and cash equivalents at subsidiaries that are subject to capital controls.

The maximum default risk was equivalent to the carrying amount of cash and cash equivalents.

(36) Other financial assets

Accounting and measurement policies

Other financial assets

This section does not cover the accounting and measurement policies for derivative financial instruments. They are presented separately in Note (39) "**Derivative financial instruments**".

Recognition and initial measurement

Financial assets are initially measured at fair value and recognized as of the settlement date. For financial assets not subsequently measured at fair value through profit or loss in subsequent periods, initial measurement also includes directly attributable transaction costs. Any difference between the fair value of a financial instrument on initial recognition (Level 2 and 3) and the transaction price is recognized in income using the straight-line method over the duration.

Detailed information on the measurement methods for financial assets measured at fair value are presented in Note (43) "**Information on fair value measurement**".

Classification and subsequent measurement

On initial recognition, financial assets are assigned to one of the following measurement categories which also correspond to the financial instrument classes as defined in IFRS 9:

- subsequent measurement at amortized cost,
- subsequent measurement at fair value through other comprehensive income, or
- subsequent measurement at fair value through profit or loss.

This classification is based on the business model and the structure of contractual payment flows. Financial assets subsequently measured at amortized cost are accounted for using the effective interest method and considering any impairment losses. The procedure for calculating impairment losses is described in Note (42) "**Management of financial risks**". Financial assets of this class are held in order to collect their contractual cash flows, which are exclusively principal repayments and interest payments on the outstanding capital amount.

Except for derivative financial instruments with positive market value, Merck only applies subsequent measurement at fair value through profit or loss for debt instruments with contractual properties resulting in cash flows that do not exclusively represent principal repayments and interest payments on the outstanding capital amount. In particular, this includes contingent consideration that was contractually agreed with the acquirer within the context of the disposal of businesses within the meaning of IFRS 3 (see Note (43) "**Information on fair value measurement**"). Merck does not utilize the option of the subsequent measurement of debt instruments at fair value through profit or loss.

Equity instruments not subject to mandatory subsequent measurement at fair value through profit or loss are measured at fair value through other comprehensive income in subsequent periods and if they are intended to be held for the longer term. Further details on the measurement of equity instruments at fair value are presented in Note (43) "**Information on fair value measurement**".

Financial assets are only reclassified in the rare event of Merck changing its business model with regard to the management of financial assets.

Derecognition

Financial assets are derecognized if the claim for compensation is fulfilled by the other counterparty, if there is no longer a reasonable expectation that the counterparty will fulfill its contractual obligations, or if Merck transfers the contractual rights including all material risks and rewards of the financial asset to another counterparty.

Recognition

Measurement effects of debt instruments are reported in the consolidated balance sheet and the consolidated income statement as follows:

Category	Asset type	Impairment losses/reversals of impairment losses	Net gain and net loss on disposal/value adjustments	Foreign currency gains or losses	Interest income or expenses
Subsequent measurement at amortized cost	Operational	Impairment losses, and reversals of impairment losses of financial assets (net)	Other operating income or other operating expenses	Other operating income or other operating expenses	Financial income and expenses (applying the effective interest method)
	Financial	Financial income and expenses	Financial income and expenses	Financial income and expenses	
Subsequent measurement at fair value through other comprehensive income	Operational	Impairment losses, and reversals of impairment losses of financial assets (net)	Group equity (upon derecognition: reclassification to other operating income or other operating expenses)	Other operating income or other operating expenses	Financial income and expenses
	Financial	Financial income and expenses	Group equity (upon derecognition: reclassification to financial income and expenses)	Financial income and expenses	
Subsequent measurement at fair value through profit or loss	Operational		Other operating income or other operating expenses	Other operating income or other operating expenses	Financial income and expenses
	Financial		Financial income and expenses	Financial income and expenses	

The recognition of income from the unwinding of discounts and income and expenses from interest rate-induced changes in contingent considerations measured at fair value through profit or loss subsequent to initial recognition are reported in financial income and expenses.

The following table provides details on the measurement effects of equity instruments on the consolidated balance sheet and the consolidated income statement:

Category	Asset type	Value adjustments	Foreign currency gains or losses	Dividend income
Subsequent measurement at fair value through other comprehensive income	Operational	Results recognized directly in equity (value adjustments)	Foreign currency gains and losses recognized directly in equity	Other operating income
		Reclassification of the cumulative results previously recognized directly in equity in the retained earnings when asset is disposed		
	Financial	Results recognized directly in equity (value adjustments)	Foreign currency gains and losses recognized directly in equity	Financial income
		Reclassification of the cumulative results previously recognized directly in equity in the retained earnings when asset is disposed		
Subsequent measurement at fair value through profit or loss	Operational	Other operating income or other operating expenses	Other operating income or other operating expenses	Other operating income
	Financial	Financial income and expenses	Financial income and expenses	Financial income

At the reporting date, other financial assets were composed as follows:

	Dec. 31, 2023			Dec. 31, 2022		
€ million	**current**	**non-current**	**Total**	current	non-current	Total
Subsequent measurement at amortized cost	**201**	**4**	**204**	**122**	**4**	**126**
Loans against third parties	1	4	4	–	4	4
Other	200	–	200	122	–	122
Subsequent measurement at fair value through other comprehensive income	**198**	**644**	**842**	**80**	**517**	**597**
Equity instruments	–	643	643	–	516	516
Debt instruments	198	1	199	80	1	81
Subsequent measurement at fair value through profit and loss	**63**	**333**	**396**	**66**	**436**	**502**
Contingent consideration	–	125	125	14	235	250
Other debt instruments	33	161	194	28	154	182
Derivatives without a hedging relationship (financial transactions)	27	–	27	16	–	16
Derivatives without a hedging relationship (operational)	3	47	50	7	46	53
Derivatives with a hedging relationship (operational)	**37**	**–**	**37**	**53**	**–**	**53**
Financial assets	**499**	**981**	**1,480**	**321**	**957**	**1,278**

The increase in other current financial assets with subsequent measurement at amortized cost related to deposits with banks. Debt instruments with subsequent measurement at fair value through other comprehensive income increased in the year under review due to the purchase of commercial papers.

As in the previous year, contingent consideration primarily included claims arising from the sale of the biosimilars business to Fresenius SE & Co. KGaA, Bad Homburg vor der Höhe, in 2017. The reduction in contingent consideration was mainly attributable to payments received.

Equity interests with subsequent measurement at fair value through other comprehensive income mainly related to shares in the following companies in particular:

€ million	**Fair value as of Dec. 31, 2023**	Fair Value: hierarchy level IFRS 13	Fair value as of Dec. 31, 2022	Fair Value: hierarchy level IFRS 13
M Ventures portfolio	**436**		**422**	
DNA Script S.A.S., France	<50	Level 3	<50	Level 3
Vera Therapeutics, Inc., United States	<50	Level 1	<50	Level 1
Precigen, Inc., United States	<50	Level 1	<50	Level 1
Artios Pharma Limited, UK	<25	Level 3	<50	Level 3
Wiliot Ltd., Israel	<25	Level 3	<25	Level 3
Celestial AI Inc., United States	<25	Level 3	<15	Level 3
Mosa Meat B.V., Netherlands	<25	Level 3	<50	Level 3
Storm Therapeutics Limited, UK	<15	Level 3	<15	Level 3
Asceneuron SA, Switzerland	<15	Level 3	<15	Level 3
ElectronInks Inc., United States	<15	Level 3	<15	Level 3
Formo Bio GmbH, Germany	<15	Level 3	<15	Level 3
Nouscom AG, Switzerland	<15	Level 3	-	-
Plexium Inc., United States	<15	Level 3	<15	Level 3
Other (notation in an active market)	1	Level 1	4	Level 1
Other (no notation in an active market)	200	Level 3	181	Level 3
Other minority interests	**207**		**94**	
MoonLake Immunotherapeutics Ltd., Cayman Islands	152	Level 1	0	Level 1
MoonLake Immunotherapeutics AG, Switzerland	0	Level 1	34	Level 1
IDRX, Inc., United States	17	Level 3	10	Level 3
InfraServ GmbH & Co. Wiesbaden KG, Germany	13	Level 3	22	Level 3
Telios Pharma, Inc., United States	9	Level 3	10	Level 3
Other (notation in an active market)	2	Level 1	–	Level 1
Other (no notation in an active market)	14	Level 3	18	Level 3
Total	**643**		**516**	

(37) Financial debt/Capital management

Accounting and measurement policies

Financial debt/capital management

Except for lease liabilities and derivatives with negative market values, financial debt is initially recognized at fair value and subsequently measured at amortized cost using the effective interest method.

The accounting and measurement policies for lease liabilities and derivatives are presented in Notes (21) "**Leasing**" and (39) "**Derivative financial instruments**".

The composition of financial debt as well as a reconciliation to net financial debt are presented in the following table:

					Nominal value	
	Dec. 31, 2023 € million	Dec. 31, 2022 € million	Maturity	Interest rate %	million	Currency
Eurobond 2019/2023	–	600	Dec. 2023	0.005	600	€
Bonds (current)	**–**	**600**				
Bank loans	277	203				
Liabilities to related parties	206	259				
Loans from third parties and other financial debt	20	11				
Liabilities from derivatives (financial transactions)	77	30				
Lease liabilities (IFRS 16)	122	125				
Current financial debt	**702**	**1,228**				
USD bond 2015/2025	1,444	1,498	March 2025	3.250	1,600	USD
Eurobond 2020/2025	748	747	July 2025	0.125	750	€
Eurobond 2022/2026	499	498	July 2026	1.875	500	€
Eurobond 2019/2027	598	598	July 2027	0.375	600	€
Eurobond 2020/2028	748	747	July 2028	0.500	750	€
Eurobond 2022/2030	497	497	July 2030	2,375	500	€
Eurobond 2019/2031	797	797	July 2031	0.875	800	€
Hybrid bond 2014/2074	499	499	Dec. 2074[1]	3,375	500	€
Hybrid bond 2019/2079	499	498	June 2079[2]	1.625	500	€
Hybrid bond 2019/2079	632	749	June 2079[3]	2.875	750	€
Hybrid bond 2020/2080	840	998	Sep. 2080[4]	1.625	1,000	€
Bonds (non-current)	**7,802**	**8,126**				
Bank loans	7	–				
Liabilities to related parties	990	660				
Loans from third parties and other financial debt	47	48				
Liabilities from derivatives (financial transactions)	–	–				
Lease liabilities (IFRS 16)	393	366				
Non-current financial debt	**9,239**	**9,200**				
Financial debt	**9,941**	**10,428**				
less:						
Cash and cash equivalents	1,982	1,854				
Current financial assets[5]	459	247				
Net financial debt[6]	**7,500**	**8,328**				

[1] Merck has the right to prematurely repay this tranche of the hybrid bond issued in December 2014 for the first time in December 2024.
[2] Merck has the right to prematurely repay this tranche of the hybrid bond issued in June 2019 for the first time in December 2024.
[3] Merck has the right to prematurely repay this tranche of the hybrid bond issued in June 2019 for the first time in June 2029.
[4] Merck has the right to prematurely repay this hybrid bond issued in September 2020 for the first time in September 2026.
[5] Excluding current derivatives (operational) and contingent considerations, which are recognized in the context of business combinations according to IFRS 3.
[6] Not defined by International Financial Reporting Standard (IFRS).

The hybrid bonds issued by Merck KGaA are bonds for which the leading rating agencies have given equity credit treatment to half of the issuances, thus making the issuances more favorable to Merck's credit rating than traditional bond issues. The bonds are recognized in full as financial liabilities in the balance sheet. Although Merck intends to repay them at the earliest possible date, these bonds are principally reported as non-current financial debt for accounting purposes.

A partial buyback of the nominal volume of € 250 million of a hybrid bond issued in 2019 took place on September 9, 2022.

A partial buyback of the nominal volume of € 275 million of hybrid bonds issued in 2019 and 2020 took place on November 20, 2023.

The financial debt was not secured by liens or similar forms of collateral. The loan agreements do not contain any financial covenants. The average borrowing cost on December 31, 2023, was 2.1% (December 31, 2022: 1.9%).

Non-current liabilities to related parties in the amount of € 990 million (December 31, 2022: € 660 million) consisted of liabilities to E. Merck Beteiligungen KG.

Information on liabilities to related parties can be found in Note (45) "**Related party disclosures**".

Capital management

The objective of capital management is to ensure the necessary financial flexibility in order to maintain long-term business operations and realize strategic options. Maintaining a stable investment grade rating, ensuring liquidity, limiting financial risks, as well as optimizing the cost of capital are the objectives of our financial policy and set important framework conditions for capital management. In this context, net financial debt as well as gearing, calculated as the ratio of EBITDA pre to net financial debt, are important capital management indicators at Merck.

Traditionally, the capital market represents a major source of financing for Merck, for instance via bond issues. As of December 31, 2023, there were liabilities of € 3.9 billion from a debt issuance program most recently renewed in fiscal 2023 (December 31, 2022: € 4.5 billion). In addition, Merck had access to a commercial paper program to meet short-term capital requirements with a volume of € 2.5 billion (December 31, 2022: € 2 billion), none of which was utilized as of December 31, 2023, or the prior-year reporting date.

Loan agreements represent another major source of financing for Merck. On the balance sheet date, the financing commitments from banks in respect of Merck were as follows:

	Dec. 31, 2023		Dec. 31, 2022			
€ million	**Financing commitments from banks**	**Utilization**	Financing commitments from banks	Utilization	Interest	Maturity of financing commitments
Syndicated loan	2,500	–	2,500	–	variable	2027
Bilateral credit agreement with banks	375	–	375	–	variable	<3 Jahre
Various bank credit lines	277	277	203	203	variable	< 1 year
Project financing	7	7	–	–	fix	2027
	3,158	**284**	**3,078**	**203**		

There were no indications that the availability of extended credit lines was restricted.

(38) Other financial liabilities

Accounting and measurement policies

Other financial liabilities

With the exception of liabilities from derivatives and contingent considerations, which are recognized in the context of business combinations according to IFRS 3, other financial liabilities are initially measured at fair value and in subsequent periods at amortized cost, applying the effective interest method. The accounting and measurement policies of derivatives are presented in Note (39) "**Derivative financial instruments**".

Other financial liabilities comprised the following:

	Dec. 31, 2023			Dec. 31, 2022		
in Mio. €	**Current**	**Non-current**	**Total**	Current	Non-current	Total
Miscellaneous other financial liabilities[1]	998	129	1,127	1,119	122	1,241
thereof: liabilities to related parties	732	–	732	861	–	861
thereof: interest accruals	47	–	47	50	–	50
Liabilities from derivatives (operational)	7	18	25	34	19	53
Other financial liabilities[1]	**1,005**	**147**	**1,152**	**1,153**	**141**	**1,294**

[1] Previous year has been adjusted, please refer to Note (2) "**Reporting principles**".

The liabilities to related parties primarily consist of liabilities to E. Merck KG.

(39) Derivative financial instruments

Accounting and measurement policies

Derivative financial instruments

The IFRS 9 provisions are applied for hedge accounting. Hedging transactions are entered into for highly probable forecast transactions in foreign currencies and for hedging fair values of assets on the balance sheet. Cash flow hedge accounting for forecast transactions in foreign currency means the hedged item is recognized at a fixed exchange rate on a net basis instead of being recognized at the spot exchange rate at the transaction date. As a result of hedging fair values of assets on the balance sheet, the compensating changes in value of the corresponding hedged item and hedging instrument offset each other.

Merck only uses derivatives as hedging instruments. Merck uses the dollar offset method as well as regression analyses to measure hedge effectiveness.

Hedging ineffectiveness may occur in the timing of forecast cash flows or if hedged items are dissolved. Derivatives that do not or no longer meet the documentation or effectiveness requirements for hedge accounting, whose hedged item no longer exists, or for which hedge accounting rules are not applied are classified as financial assets or liabilities at fair value through profit or loss depending on their balance.

Where options are used as hedging instruments, only their intrinsic value is designated as the hedging instrument. Changes in the fair value of the time value component of options that are used for hedge accounting are recognized in other comprehensive income and in the reserve for the cost of cash flow hedging within equity. The subsequent accounting of these amounts depends on the type of hedged transaction.

Where forward contracts are used as hedging instruments, only the spot element is designated as the hedging instrument. Changes in the fair value of the forward element in forward contracts are recognized in other comprehensive income in the reserve for the cost of cash flow hedging within equity. The subsequent accounting of these amounts depends on the type of hedged transaction.

Merck has concluded virtual power purchase agreements. As these agreements are designed as contracts for difference, they fulfill the definition of contracts to buy non-financial items that can be settled net in cash with the characteristics of derivative financial instruments and are measured at fair value through profit or loss in accordance with IFRS 9. As no physical electricity is purchased, the own use exemption that allows certain derivative financial instruments to be treated as executory contracts does not apply.

Derivative financial instruments are recognized in the consolidated balance sheet, the consolidated income statement, and the consolidated statement of comprehensive income – with the exception of the balance sheet treatment of amounts included directly from the reserve in the initial cost or in the other carrying amount of a non-financial asset or liability – as follows:

					Changes in fair value in the consolidated income statement and the consolidated statement of comprehensive income	
Hedging relationship	**Type of collateral**	**Type of hedged item**	**Market value**	**Presentation on the balance sheet**	**during the term**	**at maturity**
Derivatives with a cash flow hedging relationship	Currency	Transactions in operating business	Positive market values	Other financial assets	Fair value adjustments (in equity)	Other operating income
			Negative market values	Other financial liabilities	Fair value adjustments (in equity)	Other operating expenses
Derivatives without a hedging relationship	Currency	Financial transactions	Positive market values	Other financial assets	Financial income and expenses	
			Negative market values	Financial debt		
	Virtual power purchase agreements	Transactions in operating business	Positive market values	Other financial assets	Other operating income	
			Negative market values	Other financial liabilities	Other operating expenses	

The nominal amounts of the derivatives held by Merck at the respective reporting dates were as follows:

	Dec. 31, 2023		Dec. 31, 2022	
€ million	current	non-current	current	non-current
Cash flow hedge	2,075	–	4,760	–
Currency	2,075	–	4,760	–
No hedge accounting	7,412	–	5,255	–
Currency	7,412	–	5,255	–
Virtual power purchase agreements[1]				
	9,487	**–**	**10,014**	**–**

[1] The virtual power purchase agreements do not have fixed nominal amounts.

The fair values of the derivatives were as follows:

December 31, 2023

	Positive market values				Negative market values			
	Financial transactions		Transactions in operating business		Financial transactions		Transactions in operating business	
€ million	**current**	**non-current**	**current**	**non-current**	**current**	**non-current**	**current**	**non-current**
Cash flow hedge	**–**	**–**	**37**	**–**	**–**	**–**	**5**	**–**
Currency	–	–	37	–	–	–	5	–
No hedge accounting	**27**	**–**	**3**	**47**	**77**	**–**	**2**	**18**
Currency	27	–	–	–	77	–	–	–
Virtual power purchase agreements	–	–	3	47	–	–	2	18
	27	**–**	**40**	**47**	**77**	**–**	**7**	**18**

December 31, 2022

	Positive market values				Negative market values			
	Financial transactions		Transactions in operating business		Financial transactions		Transactions in operating business	
€ million	current	non-current	current	non-current	current	non-current	current	non-current
Cash flow hedge	**–**	**–**	**53**	**–**	**–**	**–**	**30**	**–**
Currency	–	–	53	–	–	–	30	–
No hedge accounting	**16**	**–**	**7**	**46**	**30**	**–**	**4**	**19**
Currency	16	–	–	–	30	–	–	–
Virtual power purchase agreements	–	–	7	46	–	–	4	19
	16	**–**	**60**	**46**	**30**	**–**	**34**	**19**

As in the previous year, all hedging relationships were transaction related. Netting of derivatives from an economic perspective was possible due to the existing framework agreements on derivatives trading that Merck had entered into with commercial banks. Actual netting only takes place in the case of insolvency of the contract partner. Derivatives were not offset on the face of the balance sheet.

The following table presents the potential netting volume of the reported derivative assets and liabilities:

December 31, 2023

				Potential netting volume		
€ million	**Gross presentation**	**Netting**	**Net presentation**	**due to master netting agreements**	**due to financial collateral**	**Potential net amount**
Derivative assets	114	–	114	40	–	74
Derivative liabilities	-102	–	-102	-40	–	-62

December 31, 2022

				Potential netting volume		
€ million	Gross presentation	Netting	Net presentation	due to master netting agreements	due to financial collateral	Potential net amount
Derivative assets	123	–	123	60	–	63
Derivative liabilities	-83	–	-83	-60	–	-23

The reserves for cash flow hedges and the cost of cash flow hedging of the Group related to the following hedging instruments (see also Note (34) "**Equity**"):

	Cost of cash flow hedge reserve			Cash flow hedge reserve			
€ million	Time value of options	Forward component of currency forwards	**Total**	Intrinsic value of options	Spot component of currency forwards	Interest rate swaps	**Total**
Jan. 1, 2022	**-11**	**-12**	**-23**	**-40**	**-93**	**-11**	**-145**
Fair value adjustment (directly recognized in equity)	11	-26	-15	-73	-26	–	-98
Reclassification to profit or loss	–	16	16	106	74	13	194
Reclassification to assets	–	–	–	–	–	–	–
Tax effect	-1	11	10	2	-5	-3	-5
Dec. 31, 2022	**-1**	**-11**	**-12**	**-4**	**-50**	**–**	**-54**
Jan. 1, 2023	**-1**	**-11**	**-12**	**-4**	**-50**	**–**	**-54**
Fair value adjustment (directly recognized in equity)	-5	-12	-17	31	67	–	98
Reclassification to profit or loss	–	22	22	-36	-59	–	-95
Reclassification to assets	–	–	–	–	–	–	–
Tax effect	–	–	–	–	-4	–	-5
Dec. 31, 2023	**-6**	**-1**	**-7**	**-10**	**-46**	**–**	**-56**

(40) Finance income and expenses/Net gains and losses from financial instruments

Finance income and expenses were as follows:

€ million	**2023**	2022
Interest income and similar income	153	69
Capital gain from disposal of debt instruments with subsequent measurement at amortized cost	1	1
Income from fair value changes from debt instruments with subsequent measurement at fair value through profit or loss	25	10
Income from the change of the fair value of share-based compensation programs	–	7
Other interest income	19	2
Finance income	**197**	**90**
Interest expense and similar expenses	-319	-235
Capital loss from disposal of debt instruments with subsequent measurement at amortized cost	–	–
Expenses from fair value changes from debt instruments with subsequent measurement at fair value through profit or loss	2	-15
Expenses from fair value changes of share-based compensation programs	-2	–
Currency differences from financing activities	-1	-26
Other interest expenses	-2	–
Finance costs	**-322**	**-277**
Financial result	**-125**	**-187**

Interest and similar income and expenses arose as follows:

	2023		2022	
€ million	**Interest income**	**Interest expenses**	Interest income	Interest expenses
Financial instruments	90	-203	33	-161
thereof: Financial assets				
Subsequent measurement at fair value at amortized cost	76	–	22	-3
Subsequent measurement at fair value through other comprehensive income	1	–	–	–
Subsequent measurement at fair value through profit or loss	14	–	11	-2
thereof: Financial debt				
Subsequent measurement at fair value at amortized cost	–	-202	–	-155
Subsequent measurement at fair value through profit or loss	–	–	–	-1
Leases	–	-14	–	-13
Pension provisions	–	-61	–	-39
Tax items	39	-50	12	-7
Other non-current provisions	–	-5	–	-2
Other interest income/expenses and similar income and expenses	24	-9	25	-30
Capitalized borrowing costs for		22		17
Property, plant and equipment		18		10
Other intangible assets		4		6
Interest income/expenses and similar income and expenses	**153**	**-319**	**69**	**-235**

The following table shows the development of net gains and losses, currency differences as well as dividend income from financial instruments (excluding items recognized in other comprehensive income) by measurement category:

				Net gains and losses			
€ million		**Currency differences**	**Dividends**	Impairment losses/reversal of impairment losses (net)	Fair value adjustments	Disposal gains/losses	**Total**
Financial assets							
Subsequent measurement at amortized cost	**2023**	-3		-51		1	-50
	2022	-4		-6		1	-5
Subsequent measurement at fair value through other comprehensive income							
Equity Instruments	**2023**		–				
	2022		–				
thereof: investments derecognized	**2023**		–				
	2022		–				
thereof: investments held	**2023**		–				
	2022		–				
Debt Instruments	**2023**	–		–		–	–
	2022	–		–		2	2
Subsequent measurement at fair value through profit or loss (without derivatives)	**2023**	–	–		95		95
	2022	1	–		30		30
Financial debt							
Subsequent measurement at amortized cost	**2023**	–				–	–
	2022	–				–	–
Subsequent measurement at fair value through profit or loss (without derivatives)	**2023**	–			1		1
	2022	–			30		30
Derivatives without a hedging relationship (net)	**2023**	–			-18		-18
	2022	–			-27		-27
Total	**2023**	**-3**	**–**	**-51**	**79**	**1**	**29**
	2022	**-3**	**–**	**-5**	**34**	**3**	**31**

In the table above, interest income or expenses relating to derivatives without a hedging relationship, with the exception of the virtual power purchase agreements, are reported as a component of fair value adjustments.

The currency result from equity instruments with subsequent measurement at fair value through other comprehensive income was recognized in other comprehensive income.

(41) Financing cash flow

Accounting and measurement policies

Financing cash flow

The option to recognize dividend payments and profit withdrawals in the cash flows from financing activities is exercised in determining the cash flows from financing activities.

Furthermore, the net reporting option has been exercised to report cash receipts and payments for items in which the turnover is quick, the amounts large, and the maturities short. This primarily relates to rolling financing by way of commercial paper and short-term bank loans reported under “Payments from new borrowings of other current and non-current financial debt” and “Repayment of other current and non-current financial debt”.

The change in financial debt was as follows:

2023

		Cash			Non-cash					
€ million	**Jan. 1, 2023**	Cash inflows	Repay-ments	Lease interest	Change in lease liabilities	Ex-change rate effects	Fair value adjust-ment	Other	Changes in scope of consoli-dation	**Dec. 31, 2023**
Financial liabilities to E. Merck KG and E. Merck Beteiligungen KG	918	697	-420	–	–	–	–	–	–	1,195
Other current and non-current financial liabilities	9,510	519	-1,973	-14	201	-83	603	-15	–	8,746
Financial debt	**10,428**	**1,216**	**-2,394**	**-14**	**201**	**-83**	**603**	**-15**	**–**	**9,941**
Derivative assets (current and non-current)	-16	609	–	–	–	–	-620	–	–	-27

2022

		Cash			Non-cash					
€ million	**Jan. 1, 2022**	Cash inflows	Repay-ments	Lease interest	Change in lease liabilities	Ex-change rate effects	Fair value adjust-ment	Other	Changes in scope of consoli-dation	**Dec. 31, 2022**
Financial liabilities to E. Merck KG and E. Merck Beteiligungen KG	894	1,637	-1,613	–	–	–	–	–	–	918
Other current and non-current financial liabilities[1]	9,906	1,281	-2,604	-12	187	97	663	-13	7	9,510
Financial debt	**10,801**	**2,917**	**-4,217**	**-12**	**187**	**97**	**663**	**-13**	**7**	**10,428**
Derivative assets (current and non-current)	-37	711	–	–	–	–	-691	–	–	-16

[1] The previous year's figures have been adjusted, see **consolidated cash flow statement**.

Interest payments for leases were recognized in operating cash flow but served as a reconciliation item in the above table as the underlying lease liabilities were a component of financial debt. Changes in lease liabilities included additions and retirements of right-of-use from leases and the effects from unwinding of the discount on lease liabilities.

Fair value adjustments of other current and non-current financial liabilities were entirely attributable to liabilities from derivatives. In the consolidated cash flow statement, cash changes of assets from derivatives of € 609 million (2022: € 711 million) were reported together with repayments of other current and non-current financial debt of € 1,973 million (2022: € 2,604 million) in the item "Repayments of other current and non-current financial debt" with a net amount of € 1,364 million (2022: € 1,893 million). In the above reconciliation, changes of assets from derivatives were reported separately, as they did not form part of financial liabilities.

The amount of unused credit lines that could be employed for future operating activities and to meet obligations and information on changes in financial debt can be found in Note (37) "**Financial debt/Capital management**".

(42) Management of financial risks

Market fluctuations with respect to foreign exchange and interest rates represent significant profit and cash flow risks for the Group. Merck aggregates these Group-wide risks and steers them centrally, partly by using derivative financial instruments. To estimate existing risks of foreign exchange and interest rate fluctuations, Merck uses scenario analyses. Merck is not subject to any material risk concentration from financial transactions.

Merck uses marketable forward exchange contracts, options and interest swaps as hedging instruments. The strategy to hedge interest rate and foreign exchange rate fluctuations arising from forecast transactions and transactions already recognized in the balance sheet is set by a risk committee, which meets on a regular basis. The use of derivatives is regulated by extensive guidelines and subject to ongoing risk controls by Group Treasury. Speculation is prohibited. The strict separation of functions between trading, settlement and control functions is ensured. Derivatives are only entered into with banks that have a good credit rating. Related default risks are continuously monitored.

The **Report on Risks and Opportunities** included in the combined management report provides further information on the management of financial risks.

Foreign exchange risks

Owing to the international nature of its business, Merck is exposed to transactional foreign exchange risks within the scope of both its business activities and financing activities. Foreign exchange risks are continuously analyzed, and different hedging strategies used to limit or eliminate these risks.

The entire foreign exchange exposure is divided into several defined subsets with different risk profiles and systematically hedged using suitable hedging instruments. Hedging is performed based on a regularly reviewed basket of currencies. The maximum time horizon for hedging is 12 months.

Foreign exchange risks from the following transactions are economically hedged through the use of foreign exchange contracts and currency options:

- intragroup financing in non-functional currency, and
- receivables from and liabilities to third parties in non-functional currency.

Foreign exchange risks from the following transactions are hedged using foreign exchange contracts and currency options applying hedge accounting:

- forecast transactions in non-functional currency, the expected probability of which is very high for the next 12 months, and
- firm purchase commitments over the next 12 months in non-functional currency.

The following table shows the net exposure and the effects of transactional exchange rate movements of the key currencies against the euro in relation to the net income and equity of the Group on the balance sheet date:

December 31, 2023

€ million		CHF	CNY	JPY	KRW	TWD	USD
Net exposure		**-593**	**474**	**31**	**294**	117	420
Exchange rate -10% (appreciation vs. €)	Consolidated income statement	-59	47	3	29	12	42
	Equity (other comprehensive income)	2	-93	-10	-9	-6	-58
Exchange rate +10% (depreciation vs. €)	Consolidated income statement	59	-47	-3	-29	-12	-42
	Equity (other comprehensive income)	-2	77	9	7	5	52

December 31, 2022

€ million		CHF	CNY	JPY	KRW	TWD	USD
Net exposure		**-591**	**997**	**163**	**216**	151	867
Exchange rate -10% (appreciation vs. €)	Consolidated income statement	-59	100	16	22	15	87
	Equity (other comprehensive income)	–	-61	-9	-17	-15	-182
Exchange rate +10% (depreciation vs. €)	Consolidated income statement	59	-100	-16	-22	-15	-87
	Equity (other comprehensive income)	–	42	7	14	12	141

In this presentation, effects of cash flow hedges are taken into consideration in the equity of the Group. The net exposure of each of the above currencies consisted of the following components:

- planned cash flows in the next 12 months in the respective currency, less
- the nominal values of hedging instruments of these planned cash flows.

The planned cash flows in the next 12 months are analyzed and divided into subsets in accordance with the risk management strategy. In the first subset, 25% of a regularly reviewed basket of currencies is hedged. The second subset hedges a more flexible basket of currencies selected on the basis of hedging costs and correlation with the euro. The hedging strategy achieves an economic hedge ratio of at least 40% across all hedging subsets. Depending on scenario analyses, this can be increased to up to 90% using a rule-based approach. As in the previous year, balance sheet items in the above currencies were economically hedged by derivatives in full if they did not correspond to the functional currency of the respective Group company. Accordingly, they do not affect the net exposure presented above.

The impact of cash flow hedge accounting for forecast transactions in foreign currency was as follows for the major currencies:

December 31, 2023

€ million	CNY	JPY	KRW	TWD	USD
Notional amount	922	114	78	52	839
thereof: current	922	114	78	52	839
thereof: non-current	–	–	–	–	–
Fair Value of the hedging instrument	22	5	1	–	6
thereof: positive market values	23	5	1	1	8
thereof: negative market values	-2	–	–	-1	-2
Maturity profile	January 2024 – December 2024	January 2024 – December 2024	January 2024 – December 2024	January 2024 – December 2024	January 2024 – December 2024
Hedge ratio[1]	1:1	1:1	1:1	1:1	1:1
Change in value of outstanding hedging instruments since January 1, 2023	22	5	1	–	6
Change in value of hedged item used to determine hedge effectiveness since January 1, 2023	-22	-5	-1	0	-6
Weighted average hedging rate	7.63	146.50	1,415.00	33.26	1.10

[1] The hedging instruments and the corresponding hedged items were denominated in the same currency, therefore the hedge ratio was 1:1.

December 31, 2022

€ million	CNY	JPY	KRW	TWD	USD
Notional amount	933	92	158	134	3,408
thereof: current	933	92	158	134	3,408
thereof: non-current	–	–	–	–	–
Fair value of the hedging instrument	8	2	-3	5	10
thereof: positive market values	10	2	–	5	45
thereof: negative market values	-2	–	-3	–	-34
Maturity profile	January 2023 – December 2023	January 2023 – December 2023	January 2023 – December 2023	January 2023 – December 2023	January 2023 – December 2023
Hedge ratio[1]	1:1	1:1	1:1	1:1	1:1
Change in value of outstanding hedging instruments since January 1, 2022	8	2	-3	5	10
Change in value of hedged item used to determine hedge effectiveness since January 1, 2022	-8	-2	3	-5	-10
Weighted average hedging rate	7.32	136.00	1,373.00	31.16	1.07

[1] The hedging instruments and the corresponding hedged items were denominated in the same currency, therefore the hedge ratio was 1:1.

In addition to the transactional foreign exchange risks described previously, currency translation risks resulted from the fact that many of Merck's subsidiaries are located outside the euro area and have functional currencies other than the reporting currency. Exchange differences resulting from translation of the assets and liabilities of these companies into euro, the reporting currency, are recognized in equity.

Interest rate risks

The Merck Group's net exposure to interest rate changes comprised the following:

€ million	**Dec. 31, 2023**	Dec. 31, 2022
Short-term or variable interest rate monetary deposits	2,403	2,083
Short-term or variable interest rate monetary borrowings	-625	-1,228
Net interest rate exposure	**1,778**	**855**

The effects of a parallel shift in the yield curve by +100 or -100 basis points on the consolidated income statement, as well as on equity relative to all short-term or variable monetary deposits and monetary borrowings within the scope of IAS 32, except contingent considerations, are presented in the following table. In the event of a downward shift, the interest rate for instruments subject to a contractual interest rate floor of zero percent was limited accordingly:

€ million	**2023**		2022	
Change in market interest rate	**+100 basis points**	**-100 basis points**	**+100 basis points**	**-100 basis points**
Effects on consolidated income statement	21	-21	17	-17
Effects on equity (other comprehensive income)	–	–	–	–

Electricity price risks

As part of the implementation of its sustainability strategy, Merck has concluded so-called virtual power purchase agreements in order to cover the purchased electricity volumes in Europe and the United States with energy certificates from renewable sources. At the reporting date, agreements were in place with wind and solar farm operators in the United States and Spain. With the exception of a wind farm in the United States, the other wind and solar farms in Spain and the United States were still under construction. The fundamental structure of all of the agreements was identical, involving a fixed exercise price for Merck and the assumption of the exposure from variable spot energy prices in the respective market regions. Merck receives green electricity certificates for the volumes of electricity produced and attributed to Merck. Merck uses the certificates it receives solely for itself. The agreements have remaining terms of between 10 and 17 years as of the reporting date.

In financial terms, the most important agreement is the one concluded between Merck and a wind energy project developer in the United States for an installed capacity attributable to Merck of 68 megawatts. The wind farm was commissioned in fiscal 2022. The fair value of the agreement was € 44 million as of the end of the reporting period (2022: € 50 million). The electricity price of around 40% of the expected production volume under this virtual power purchase agreement is hedged by a separate hedging instrument. Consequently, the net effect of the fixed price for the virtual power purchase agreement is zero for this quantity. The accounting provisions on hedge accounting were not applicable.

In total, the agreements including the hedging instrument resulted in a net gain on fair value measurement of € 3 million (2022: € 16 million) that was recognized in other operating income.

A change in the material valuation parameters would have had the following impact on the fair value of the agreements excluding the hedging instrument:

December 31, 2023

	Change in expected future electricity prices		Change in expected annual production volume		Change in cost of capital after tax	
	percentage points		percentage points		percentage points	
€ million	**+10**	-10	**+10**	-10	**+1**	-1
Change in the fair value of the virtual power purchase agreements	19	-19	6	-6	-3	3

December 31, 2022

	Change in expected future electricity prices		Change in expected annual production volume		Change in cost of capital after tax	
	percentage points		percentage points		percentage points	
€ million	+10	-10	+10	-10	+1	-1
Change in the fair value of the virtual power purchase agreements	9	-9	5	-5	-2	2

Liquidity risks

The risk that Merck cannot meet its payment obligations resulting from financial liabilities is limited by establishing the required financial flexibility and by Group-wide cash management. Information on issued bonds and other sources of financing can be found in Note (37) "**Financial debt/Capital management**".

Liquidity risks are monitored and reported to management on a regular basis.

The following liquidity risk analysis presents the undiscounted, contractually fixed cash flows such as repayments and interest on financial liabilities and the net cash flows of derivatives with a negative fair value:

December 31, 2023

€ million	Carrying amount	Cash flows < 1 year		Cash flows 1–5 years		Cash flows > 5 years	
		Interest	Repayment	Interest	Repayment	Interest	Repayment
Subsequent measurement at amortized cost							
Bonds and commercial paper[1]	7,802	-164	-1,000	-241	-4,888	-63	-1,934
Bank loans	283	-8	-277	-1	-7	–	–
Trade accounts payable	2,545	–	-2,545	–	–	–	–
Liabilities to related parties	1,928	-37	-938	-97	-550	-35	-440
Other financial liabilities	393	–	-266	–	-127	–	–
Loans from third parties and other financial debt	68	-5	-20	-9	-47	–	–
Subsequent measurement at fair value through profit or loss							
Contingent considerations	2	–	–	–	-2	–	–
Derivatives without a hedging relationship	96	–	-79	–	-8	–	-10
Derivatives with a hedging relationship	**5**	**–**	**-5**	**–**	**–**	**–**	**–**
Refund liabilities	**877**	**–**	**-877**	**–**	**–**	**–**	**–**
Lease liabilities	**515**	**-11**	**-120**	**-22**	**-256**	**-15**	**-137**
	14,515	**-225**	**-6,127**	**-370**	**-5,885**	**-113**	**-2,521**

[1] For the hybrid bonds, repayment is assumed at the earliest possible date.

December 31, 2022

€ million	Carrying amount	Cash flows <1 year		Cash flows 1–5 years		Cash flows >5 years	
		Interest	Repayment	Interest	Repayment	Interest	Repayment
Subsequent measurement at amortized cost							
Bonds and commercial paper[1]	8,726	-147	-600	-363	-5,352	-111	-2,801
Bank loans	203	-5	-203	–	–	–	–
Trade accounts payable[2]	2,499	–	-2,499	–	–	–	–
Liabilities to related parties	1,780	-25	-1,121	-81	-110	-53	-550
Other financial liabilities[2]	376	–	-258	–	-118	–	–
Loans from third parties and other financial debt	59	-5	-10	-10	-48	–	–
Subsequent measurement at fair value through profit or loss							
Contingent considerations	4	–	–	–	-4	–	–
Derivatives without a hedging relationship	53	–	-34	–	-7	–	-12
Derivatives with a hedging relationship	**30**	**–**	**-30**	**–**	**–**	**–**	**–**
Refund liabilities	**912**	**–**	**-912**	**–**	**–**	**–**	**–**
Finance lease liabilities	**491**	**-9**	**-123**	**-17**	**-264**	**-9**	**-101**
	15,134	**-191**	**-5,790**	**-471**	**-5,904**	**-173**	**-3,463**

[1] For the hybrid bonds, repayment is assumed at the earliest possible date.

[2] Previous year has been adjusted, please refer to Note (2) "**Reporting Principles**".

Credit risks

Credit risk for Merck means the risk of a financial loss if a customer or other contract partner is not able to meet its contractual payment obligations. Merck is exposed to credit risks mainly due to existing trade accounts receivable, other receivables, other debt instruments, derivatives and contract assets.

Credit risks are monitored on an ongoing basis. The risks arising from extending credit to customers and in the course of other business relationships are also managed.

Merck analyzes all trade accounts receivable that are more than 90 days past due in order to establish whether default exists. In addition, all other financial instruments that are more than 30 days past due are examined in order to establish whether there has been a significant increase in the credit risk. Both methods are used to examine whether there is objective evidence of an impairment requiring the recognition of additional loss allowances.

Accounting and measurement policies

Credit risks

Impairment of trade accounts receivable and contract assets

Merck uses the simplified impairment model for trade accounts receivable and contract assets, pursuant to which any credit losses expected to occur over the entire lifetime of an asset are taken into account. In order to measure expected credit losses, the assets are grouped based on the existing credit risk structure and the respective maturity structure.

The customer groups with comparable default risks to be considered are determined according to the specific business sector and the place of business of the respective customers.

The expected credit loss rates used in the simplified impairment model are derived on the basis of past default rates and current macroeconomic expectations. In doing so, country-specific ratings are taken into consideration since many of Merck's customers depend directly or indirectly on the economic trends in the country where their place of business is located (public and private healthcare systems, universities, and research companies from within the pharmaceutical industry, as well as industries subsidized under development plans, particularly in Asia). These country ratings are aggregated into three separate rating groups. Under the impairment model, past default rates and country ratings are used as an approximation of the defaults to be expected in the future.

When a country's rating changes, the historical default rates of the rating group to which the respective country has been reallocated have to be applied accordingly, rather than the historical default rates of the previous rating group.

If there is objective evidence that certain trade accounts receivable or contract assets are fully or partially impaired, additional loss allowances are recognized to account for expected credit losses.

A default generally exists when the debtor cannot fully meet its liabilities.

A debtor's creditworthiness is assumed to be impaired if there are objective indications that the debtor is in financial difficulties, such as the disappearance of an active market for its products or impending insolvency. The nominal amounts of trade accounts receivable considered as originated credit-impaired financial assets are recognized using the risk-adjusted effective interest rate, which reflects the expected credit losses over the original lifetime.

Impairment of other receivables

When recognizing impairment losses, the general three-stage impairment model is used for financial instruments included in other receivables, and the simplified approach is used for non-current leasing receivables. The individual credit rating of the contract partner is used to determine the impairment loss of other receivables. If there is considered to be a substantially increased risk of default, the expected credit loss is calculated over the entire lifetime.

Individual cases are also analyzed to ascertain whether objective findings suggest that the value of other receivables is impaired. Such suggestions may include, for example, economic difficulties of the debtor, contractual breaches, or the renegotiation of contractual payment obligations.

Impairment of other financial assets

Investments in debt instruments subsequently measured either at amortized cost or at fair value through other comprehensive income are fundamentally considered to be investments with low risk, meaning that the expected credit loss in the upcoming 12 months is used to determine the impairment loss.

For financial assets with only a minimal default risk, the rules concerning the mandatory recognition of a risk provision for the lifetime expected credit loss are not applied at initial recognition or during subsequent measurement. Therefore, no assessment of whether there has been a significant increase in the credit risk is carried out for such assets. Merck does not presume an increased credit risk as of the balance sheet date if the contract partner has an investment grade rating.

If there are indications that the debtor's creditworthiness has worsened but that this is not yet reflected in its existing credit rating, the credit risk assessment is adjusted and the impairment allowances recognized for expected credit losses are increased. In all other cases, there are no new risk assessments as of the balance sheet date and the risk profile initially assumed is maintained.

Wherever a considerable increase in the default risk is assumed, the lifetime expected credit loss of the financial asset is considered.

On the balance sheet date, the theoretical maximum default risk for all items referenced above corresponds to the net carrying amounts less any compensation from credit insurance.

Significant discretionary decisions and sources of estimation uncertainty

Credit risks

Impairment of trade accounts receivable and contract assets

In terms of the impairment of trade accounts receivable and of contract assets, there is significant discretion and estimation uncertainty regarding:

- the identification of customer groups with identical default risks,
- the identification of impaired creditworthiness, and
- the calculation of the expected credit losses.

Impairment of other financial assets

Discretionary judgment is applied in determining individual impairment allowances.

The following table shows impairments for financial assets from operative transactions and contract assets as well as gains from their reversals recognized in the consolidated income statement:

€ million	2023	2022
Impairment losses	**-51**	**-6**
of trade accounts receivable	-50	-7
of contract assets	–	–
of debt instruments subsequently measured at amortized cost	-1	1
of debt instruments subsequently measured at fair value through other comprehensive income	–	–

The loss allowances and reversals recognized for trade accounts receivable as shown above applied entirely to receivables resulting from contracts with customers. The increase in loss allowances for trade accounts receivable was mainly attributable to a distribution partner in the Healthcare business sector in a mid-double-digit million-euro amount.

Credit risks from trade accounts receivable

The credit risk from trade accounts receivable is largely impacted by the specific circumstances of individual customers. Merck also considers additional factors such as the general default risk in the respective industry and country in which the customer operates.

The credit risk of customers is assessed using established credit management processes. This is done in particular by analyzing the aging structure of trade accounts receivable.

Merck continuously reviews and monitors the open positions of all its customers in the corresponding countries and takes steps to mitigate credit risks if necessary.

The tables below contain an overview of the credit risk by business sector and country rating as established by leading rating agencies:

December 31, 2023

€ million	Life Science	Healthcare	Electronics	Other	Group
External rating of at least A- or comparable	1,260	1,003	565	10	2,838
External rating of at least BBB- or comparable	158	280	15	–	454
External rating lower than BBB- or comparable	66	609	2	–	676
Trade accounts receivable before loss allowances	**1,484**	**1,892**	**582**	**10**	**3,969**

December 31, 2022

€ million	Life Science	Healthcare	Electronics	Other	Group
External rating of at least A- or comparable	1,363	994	648	7	3,012
External rating of at least BBB- or comparable	153	302	17	–	471
External rating lower than BBB- or comparable	60	521	4	–	585
Trade accounts receivable before loss allowances	**1,575**	**1,817**	**669**	**7**	**4,069**

Goods were generally sold under retention of title so that a reimbursement claim existed in the event of default. Other guarantees generally were not demanded. The scope of credit-insured receivables was immaterial for Merck.

Loss allowances based on expected credit losses for trade accounts receivable as of December 31, 2023, were as follows:

December 31, 2023

€ million	Not yet due	Up to 90 days past due	Up to 180 days past due	Up to 360 days past due	More than 360 days past due	Total
Expected loss rate	0.4%	0.8%	7.4%	39.0%	72.4%	
Trade accounts receivable before loss allowances	3,342	432	67	55	73	3,969
thereof: credit impaired	10	1	4	18	46	80
Loss allowances	**-15**	**-3**	**-5**	**-22**	**-53**	**-97**
thereof credit impaired trade accounts receivable	-9	-1	-4	-18	-46	-78

Loss allowances based on expected credit losses for trade accounts receivable as of December 31, 2022, were as follows:

December 31, 2022

€ million	Not yet due	Up to 90 days past due	Up to 180 days past due	Up to 360 days past due	More than 360 days past due	Total
Expected loss rate	0.3%	0.8%	3.2%	19.6%	54.6%	
Trade accounts receivable before loss allowances	3,394	472	75	64	64	4,069
thereof: credit impaired	5	–	1	3	27	36
Loss allowances	**-9**	**-4**	**-2**	**-12**	**-35**	**-63**
thereof credit impaired trade accounts receivable	-3	–	–	-3	-26	-32

Credit risks from other receivables

Gross other receivables amounted to € 160 million as of December 31, 2023 (December 31, 2022: € 136 million). Other receivables of € 157 million were allocated to Level 1 of the three-level impairment model (December 31, 2022: € 126 million), meaning that the credit loss expected in the next 12 months was used to determine the amount of impairment when examining the individual credit risk of the respective contract partner. In addition, non-current leasing liabilities amounting to € 3 million (December 31, 2022: € 2 million) were allocated to Level 2 of the simplified impairment model. The next table shows the impairment losses recognized for other receivables.

Credit risks from other financial assets

Merck limits credit risks from other financial assets by entering into contracts almost exclusively with contract partners whose creditworthiness is good. The credit risk from financial contracts is monitored daily on the basis of market information on credit default swap rates and regularly on the basis of rating information.

Impairment losses on financial assets developed as follows:

2023

€ million	**Jan. 1**	Net Additions	Utilizations	Reclassification within levels	Effects of currency translation	Changes in scope of consolidation	**Dec. 31**
Trade and other receivables (including current leasing receivables)	-63	-50	11	–	4	–	-97
thereof: Level 1/2	-31	2	–	7	1	–	-20
thereof: Level 3	-31	-50	11	-7	2	–	-74
thereof: POCI[1]	-1	-2	–	–	–	–	-3
Contract Assets	–	–	–	–	–	–	–
thereof: Level 1/2	–	–	–	–	–	–	–
thereof: Level 3	–	–	–	–	–	–	–
Other Receivables (including non-current leasing receivables)	-1	-1	–	–	–	–	-1
thereof: Level 1	–	–	–	–	–	–	–
thereof: Level 2	–	–	–	–	–	–	–
thereof: Level 3	–	-1	–	–	–	–	-1
Loss allowances for financial assets	**-64**	**-51**	**11**	**–**	**4**	**–**	**-99**

[1] Purchased or originated credit-impaired receivables.

2022

€ million	Jan. 1	Net Additions	Utilizations	Reclassification within levels	Effects of currency translation	Changes in scope of consolidation	Dec. 31
Trade and other receivables (including current leasing receivables)	-59	-7	4	–	-2	–	-63
thereof: Level 1/2	-23	-7	–	–	-1	–	-31
thereof: Level 3	-34	-1	4	–	-1	–	-31
thereof: POCI[1]	-2	1	–	–	–	–	-1
Contract Assets	–	–	–	–	–	–	–
thereof: Level 1/2	–	–	–	–	–	–	–
thereof: Level 3	–	–	–	–	–	–	–
Other Receivables (including non-current leasing receivables)	-2	1	–	–	–	–	-1
thereof: Level 1	–	–	–	–	–	–	–
thereof: Level 2	–	–	–	–	–	–	–
thereof: Level 3	-1	1	–	–	–	–	–
Loss allowances for financial assets	**-61**	**-6**	**4**	**–**	**-2**	**–**	**-64**

[1] Purchased or originated credit-impaired receivables.

Changes in the expected credit loss rates used in the simplified impairment model did not result in any significant changes in the additions to and reversals of impairment losses in Level 2.

(43) Information on fair value measurement

Accounting and measurement policies

Information on fair value measurement

The measurement techniques and main input factors used to determine the fair value of financial instruments are as follows:

Fair value determined by official prices and quoted market values (Level 1)

	Financial instruments concerned	Description of the measurement technique	Main input factors used to determine fair values
Financial assets			
Subsequent measurement at fair value through other comprehensive income			
Equity instruments	Shares	Derived from active market	Quoted prices in an active market
Other debt instruments	Bonds		
	Other short-term cash investments		
Subsequent measurement at fair value through profit or loss			
Other debt instruments	Publicly-traded funds	Derived from active market	Quoted prices in an active market
	Other short-term cash investments		
Financial liabilities			
Subsequent measurement at amortized cost			
Financial debt	Bonds	Derived from active market	Quoted prices in an active market

Fair value determined using input factors observable in the market (Level 2)

	Financial instruments concerned	Description of the measurement technique	Main input factors used to determine fair values
Financial assets			
Subsequent measurement at fair value through profit or loss			
Derivatives (without a hedging relationship)	Forward exchange contracts and currency options	Use of recognized actuarial methods	Spot and forward rates observable on the market as well as exchange rate volatilities
	Interest rate swaps		Interest rate curves available on the market
Derivatives (with a hedging relationship)	Forward exchange contracts and currency options	Use of recognized actuarial methods	Spot and forward rates observable on the market as well as exchange rate volatilities
Financial liabilities			
Subsequent measurement at fair value through profit or loss			
Derivatives (without a hedging relationship)	Forward exchange contracts and currency options	Use of recognized actuarial methods	Spot and forward rates observable on the market as well as exchange rate volatilities
	Interest rate swaps		Interest rate curves available on the market
Derivatives (with a hedging relationship)	Forward exchange contracts and currency options	Use of recognized actuarial methods	Spot and forward rates observable on the market as well as exchange rate volatilities
Subsequent measurement at amortized cost			
Financial liabilities	Liabilities to banks and other loan liabilities	Discounting of future cash flows	Interest rates observable on the market

Fair value determined using input factors unobservable in the market (Level 3)

	Financial instruments concerned	Description of the measurement technique	Main input factors used to determine fair values
Financial assets			
Subsequent measurement at fair value through other comprehensive income			
Equity instruments	Equity investments in unlisted companies	Discounting of expected future cash flows	Expected cash flows from recent business planning, average cost of capital, expected long-term growth rate
		Derived from observable prices within the scope of equity refinancing sufficiently close to the balance sheet date, considered risk allowances	Observable prices derived from equity refinancing
		Cost-based determination	Acquisition cost
Trade and other receivables	Trade accounts receivable that are intended for sale due to a factoring agreement	Nominal value less factoring fees	Nominal value of potentially sold trade accounts receivable, average fees for sales of trade accounts receivable
Subsequent measurement at fair value through profit or loss			
Derivatives (without a hedging relationship)	Virtual power purchase agreements	Discounting of expected future cash flows	Electricity future price curves, expected electricity production volumes, discount factors
Contingent consideration	Contingent considerations from the sale of businesses or shares in corporations	Discounting of probability-weighted future milestone payments and license fees	Sales planning, milestone payments, probabilities of regulatory and commercial events, discount rates
Other debt instruments	Loans with variable repayments	Discounting of expected future cash flows	Expected cash flows from recent business planning, discount rates
	Interests in unlisted funds	Consideration of the fair value of companies in which the funds are invested	Net asset values of the fund interests
	Bonds with embedded settlement option for equity in an unlisted company	Use of recognized actuarial methods	Interest rates observable on the market
Financial liabilities			
Subsequent measurement at fair value through profit or loss			
Derivatives (without a hedging relationship)	Hedging instrument for virtual power purchase agreements	Use of recognized actuarial methods	Electricity future price curves, expected electricity production volumes, discount factors
Contingent consideration	Contingent considerations from the purchase of businesses	Discounting of probability-weighted future milestone payments and license fees	Sales planning,milestone payments,probabilities of regulatory and commercial events, discount rates

Counterparty credit risk is taken into consideration for measurements of financial instruments at fair value. In the case of non-derivative financial instruments, such as other liabilities or interest-bearing securities, this is reflected using risk premiums on the discount rate, while discounts on market value (credit valuation adjustments and debit valuation adjustments) are used for derivatives. Transfers between the individual hierarchy levels at fair value are made at the end of the month in which the triggering event – for example an initial public offering – took place.

Assets from contingent considerations (Level 3)

The fair values of assets from contingent considerations are calculated by weighting the expected future cash flows from milestone payments and royalties using their probability of occurrence and discounting them. The main parameters when determining contingent considerations are:

- the estimated probability of reaching the individual milestone events,
- the underlying sales planning used to derive royalties, and
- the discount factor used.

When determining the probability of occurrence of the individual milestone events in connection with the development of drug candidates, the focus is on empirically available probabilities of success of development programs in comparable phases of clinical development in the relevant therapeutic areas. To determine the sales plan, internal sales plans and sales plans of external industry services are used. The discount rate (after tax) of 6.6% as of December 31, 2023 (December 31, 2022: 6.3% to 7.3%) was calculated using the weighted average cost of capital.

Income and expenses from the discounting of probability-weighted future milestone payments and license fees and from changes in discount rates are reported in the financial result.

Significant discretionary decisions and sources of estimation uncertainty

Equity investments in unlisted companies

Determining the parameters that are to be included in discounted cash-flow-methods and deriving the fair value from observable prices within the scope of equity refinancing are both subject to discretionary decisions and estimation uncertainty.

Assets from contingent consideration

The calculation of the fair value of assets from contingent considerations is subject to significant discretionary judgment.

The most significant contingent consideration was the future purchase price claim from the sale of the biosimilars business to a subsidiary of Fresenius SE & Co. KGaA, Bad Homburg vor der Höhe, Germany, on August 31, 2017. It was calculated by an external valuation expert on initial recognition in 2017 and continued on this basis. As of December 31, 2023, the carrying amount was € 118 million (December 31, 2022: € 219 million).

If, in the context of determining the fair value of this contingent consideration at the balance sheet date, the probability of approval as well as the discount factor of the most important development programs had been estimated to be lower or higher, this would have led to the following changes in the measurement and the corresponding effects on the profit before income tax:

December 31, 2023

		Change in probability of regulatory approval		
€ million		-10%	unchanged	10%
Change of discount rate	6.1%	-3	3	9
	6.6% (unchanged)	-6	–	6
	7.1%	-8	-3	3

December 31, 2022

		Change in probability of regulatory approval		
€ million		-10%	unchanged	10%
Change of discount rate	5.8%	-18	3	24
	6.3% (unchanged)	-21	–	20
	6.8%	-24	-3	17

The following table presents the carrying amounts and the fair values of the individual financial assets and liabilities as of December 31, 2023, for each individual financial instrument class pursuant to IFRS 9:

December 31, 2023

		Carrying amount			Fair value[1]			
€ million	Consolidated notes	Current	Non-current	Total	Fair value determined by official prices and quoted market values (Level 1)	Fair value determined using input factors observable in the market (Level 2)	Fair value determined using input factors not observable in the market (Level 3)	**Total**
Financial assets								
Subsequent measurement at amortized cost								
Cash and cash equivalents	35	1,982	–	1,982				
Trade and other receivables (excluding leasing receivables)	25	3,973	25	3,998				
Other debt instruments	36	201	4	204				
Subsequent measurement at fair value through other comprehensive income								
Equity instruments	36	–	643	643	207	–	436	643
Trade and other receivables	25	25	–	25	–	–	25	25
Other debt instruments	36	198	1	199	199	–	–	199
Subsequent measurement at fair value through profit or loss								
Contingent considerations	36	–	125	125	–	–	125	125
Other debt instruments	36	33	161	194	98	–	95	194
Derivatives without a hedging relationship	36, 39	30	47	77	–	27	50	77
Derivatives with a hedging relationship	36, 39	37	–	37	–	37	–	37
Lease receivables (measured in accordance with IFRS 16)[2]	25	6	3	9				
Total		**6,485**	**1,008**	**7,493**	**505**	**65**	**731**	**1,300**
Financial liabilities								
Subsequent measurement at amortized cost								
Trade payables and other liabilities	30	2,545	–	2,545				
Financial debt	37	503	8,846	9,349	7,367	2,665	–	10,032
Other financial liabilities	38	998	127	1,125				
Subsequent measurement at fair value through profit or loss								
Contingent considerations	38	–	2	2	–	–	2	2
Derivatives without a hedging relationship	37, 38, 39	79	18	96	–	77	20	96
Derivatives with a hedging relationship	38, 39	5	–	5	–	5	–	5
Refund liabilities	9	877	–	877				
Lease liabilities (measured in accordance with IFRS 16)[2]	37	122	393	515				
Total		**5,129**	**9,387**	**14,515**	**7,367**	**2,747**	**22**	**10,136**

[1] The simplification option under IFRS 7.29(a) was used for disclosures of certain fair values. IFRS 7.29(d) explicitly does not require disclosure of the fair value of lease liabilities.

[2] Measurements within the scope of IFRS 16 are exempted from the requirements of IFRS 13 (IFRS 13.6(b)).

The following table presents the carrying amounts and the fair values of the individual financial assets and liabilities as of December 31, 2022, for each individual financial instrument class pursuant to IFRS 9:

December 31, 2022

		Carrying amount			Fair value[1]			
€ million	Consolidated notes	Current	Non-current	**Total**	Fair value determined by official prices and quoted market values (Level 1)	Fair value determined using input factors observable in the market (Level 2)	Fair value determined using input factors not observable in the market (Level 3)	**Total**
Financial assets								
Subsequent measurement at amortized cost								
Cash and cash equivalents	35	1,854	–	1,854				
Trade accounts receivable and other receivable (excluding leasing receivables)	25	4,087	25	4,112				
Other debt instruments	36	122	4	126				
Subsequent measurement at fair value through other comprehensive income								
Equity instruments	36	–	516	516	102	–	415	516
Trade accounts receivable and other receivable	25	22	–	22	–	–	22	22
Debt instruments	36	80	1	81	81	–	–	81
Subsequent measurement at fair value through profit or loss								
Contingent consideration	36	14	235	250	–	–	250	250
Other debt instruments	36	28	154	182	89	–	93	182
Derivatives without a hedging relationship	36, 39	23	46	69	–	17	53	69
Derivatives with a hedging relationship	36, 39	53	–	53	–	53	–	53
Finance lease receivables (to be measured in accordance with IFRS 16)[2]	25	5	2	7				
Total		**6,289**	**984**	**7,273**	**271**	**70**	**833**	**1,174**
Financial liabilities								
Subsequent measurement at amortized cost								
Trade accounts payable[3]	30	2,499	–	2,499				
Financial debt	37	1,073	8,834	9,907	7,989	1,188	–	9,177
Other financial liabilities[4]	38	1,119	118	1,237				
Subsequent measurement at fair value through profit or loss								
Contingent consideration	38	–	4	4	–	–	4	4
Derivatives without a hedging relationship	37, 38, 39	34	19	53	–	30	23	53
Derivatives with a hedging relationship	38, 39	30	–	30	–	30	–	30
Refund liabilities	9	912	–	912				
Finance lease liabilities (to be measured in accordance with IFRS 16)[2]	37	125	366	491				
Total		**5,792**	**9,342**	**15,134**	**7,989**	**1,248**	**27**	**9,265**

[1] The simplification option under IFRS 7.29(a) was used for disclosures of certain fair values. IFRS 7.29(d) explicitly does not require disclosure of the fair value of lease liabilities.

[2] Measurements within the scope of IFRS 16 are exempted from the requirements of IFRS 13 (IFRS 13.6(b)).

[3] Previous year's figures have been adjusted, see Note (6) "**Acquisitions and Divestments**".

[4] Previous year's figures have been adjusted, see Note (2) "**Reporting Principles**".

The changes in financial assets and liabilities for each of the individual classes of financial instruments allocated to Level 3 and measured at fair value were as follows in the previous year:

2022

	Financial assets					Financial liabilities		
	Subsequent measurement at fair value through profit or loss			Subsequent measurement at fair value through other comprehensive income		Subsequent measurement at fair value through profit or loss		
€ million	Other debt instruments	Contingent consideration	Derivatives without a hedging relationship	Equity instruments	Trade and other receivables	Contingent consideration	Derivatives without a hedging relationship	**Total**
Net carrying amounts as of Jan. 1, 2022	**78**	**271**	**24**	**345**	**20**	**-39**	**-10**	**689**
Additions	27	–	–	87	70	–	–	184
Transfers into Level 3 from Level 1/Level 2	–	–	–	–	–	–	–	–
Fair value changes								
Gains (+)/losses (-) recognized in the consolidated income statement (other operating result)	17	15	30		–	30	-13	79
thereof: attributable to assets/liabilities held as of the balance sheet date	17	7	30		–	4	-13	44
Gains (+)/losses (-) recognized in the consolidated income statement (financial income and expenses)	-4	10	1		–	-1	–	6
thereof: attributable to assets/liabilities held as of the balance sheet date	-4	9	1		–	–	–	6
Gains (+)/losses (-) recognized in other comprehensive income				-11	–			-11
Currency translation difference	2	–	2	-1	–	-3	–	–
Disposals	-21	-46	-4	-1	-68	10	–	-131
Transfers out of Level 3 into Level 1/Level 2	–	–	–	-11	–	–	–	-11
Other	-7	–	–	7	–	–	–	–
Net carrying amounts as of Dec. 31, 2022	**93**	**250**	**53**	**415**	**22**	**-4**	**-23**	**806**

The changes in financial assets and liabilities for each of the individual classes of financial instruments allocated to Level 3 and measured at fair value were as follows in fiscal 2023:

2023

	Financial assets					Financial liabilities		
	Subsequent measurement at fair value through profit or loss			Subsequent measurement at fair value through other comprehensive income		Subsequent measurement at fair value through profit or loss		
€ million	Other debt instruments	Contingent consideration	Derivatives without a hedging relationship	Equity instruments	Trade and other receivables	Contingent consideration	Derivatives without a hedging relationship	**Total**
Net carrying amounts as of Jan. 1, 2023	**93**	**250**	**53**	**415**	**22**	**-4**	**-23**	**806**
Additions	21	–	–	59	72	–	–	**152**
Transfers into Level 3 from Level 1/Level 2	–	–	–	–	–	–	–	**–**
Fair value changes								
Gains (+)/losses (-) recognized in the consolidated income statement (other operating result)	10	56	2		–	–	1	**69**
thereof: attributable to assets/liabilities held as of the balance sheet date	10	6	-2		–	–	1	**16**
Gains (+)/losses (-) recognized in the consolidated income statement (financial income and expenses)	5	10	–		–	–	–	**14**
thereof: attributable to assets/liabilities held as of the balance sheet date	5	10	–		–	–	–	**14**
Gains (+)/losses (-) recognized in other comprehensive income				47	–			**47**
Currency translation difference	-2	–	-3	-1	–	–	–	**-5**
Disposals	-21	-190	-2	-29	-69	2	3	**-307**
Transfers out of Level 3 into Level 1/Level 2	–	–	–	-3	–	–	–	**-3**
Other	-11	–	–	-51	–	–	–	**-62**
Net carrying amounts as of Dec. 31, 2023	**95**	**125**	**50**	**436**	**25**	**-2**	**-20**	**710**

Disposals during the reporting period related in particular to payments received in connection with the contingent consideration arising from the sale of the biosimilars business to Fresenius SE & Co. KGaA, Bad Homburg vor der Höhe, as well as trade accounts receivable under factoring agreements. The reclassification of the fair value of Calypso Biotech B.V., Netherlands, to assets held for sale is included in the “Other” line item. The gains and losses from Level 3 assets recognized in other comprehensive income were reported in the consolidated statement of comprehensive income under the item “Fair value adjustments”.

The following equity instruments measured at fair value through other comprehensive income were disposed of in 2023 and 2022:

€ million	Reasons for the disposal	Fair value on the date of derecognition	The cumulative gain (+) or loss (-) on disposal recognized in other comprehensive income	Transfer of the cumulative gains (+) or losses (-) within group equity to retained earnings
2023[1]				
M Ventures Portfoliogesellschaften	Portfolio adjustment/restructuring and full acquisition by third parties	29	18	17
MoonLake Immunotherapeutics Ltd., Cayman Islands	Partial sale	11	10	10
2022[1]				
M Ventures Portfoliogesellschaften	Portfolio adjustment/restructuring and full acquisition by third parties	4	-19	-19

[1] Disposals due to liquidations are not included.

M Ventures portfolio companies mainly include minority interests in listed and unlisted companies. The mandate of M Ventures is to invest in innovative technologies and products.

(44) Other financial obligations

Other financial obligations comprised the following:

€ million	**Dec. 31, 2023**	Dec. 31, 2022
Acquisition of intangible assets	1,431	1,050
Acquisition of property, plant, and equipment	483	280
Other financial obligations	**1,914**	**1,330**

Obligations to acquire intangible assets existed in particular owing to contingent considerations within the scope of in-licensing and research and development collaborations. In these agreements, Merck has entered into an obligation to make milestone payments once specific targets have been reached. In the unlikely event that all of the milestones are achieved, Merck would be obligated to pay up to € 1,431 million (December 31, 2022: € 1,050 million) for the acquisition of intangible assets. The table above does not contain any other financial obligations from possible future sales-based license fees and milestone payments.

The expected maturities of the obligations to acquire intangible assets were as follows:

€ million	**Dec. 31, 2023**	Dec. 31, 2022
Within 1 year	278	48
In 1-5 years	548	326
After more than 5 years	604	676
Obligations to acquire intangible assets	**1,431**	**1,050**

Other financial obligations were recognized at nominal value.

Other Disclosures

(45) Related party disclosures

Accounting and measurement policies

Related party disclosures

Related parties in respect of the Merck Group are E. Merck KG, Emanuel-Merck-Vermögens-KG and E. Merck Beteiligungen KG. Furthermore, direct or indirect subsidiaries of Merck KGaA, associates of the Merck Group, joint ventures of the Merck Group, as well as pension funds that are classified as defined benefit plans in accordance with IAS 19 are also related parties within the meaning of IAS 24. Members of the Executive Board and the Supervisory Board of Merck KGaA, the Executive Board and the Board of Partners of E. Merck KG as well as close members of their families are also related parties, as are companies controlled or jointly controlled by this group of persons.

Transactions were conducted with related parties as follows:

	Income		Expenses		Receivables		Liabilities	
€ million	**2023**	2022	**2023**	2022	**Dec. 31, 2023**	Dec. 31, 2022	**Dec. 31, 2023**	Dec. 31, 2022
E. Merck KG	2.3	1.9	11.3	4.0	0.1	0.0	826.5	1,118.8
E. Merck Beteiligungen KG	0.4	0.5	32.4	0.6	0.0	0.0	1,100.1	660.1
Engel-Apotheke, Darmstadt[1]	0.1	0.1	0.0	0.2	0.0	0.0	0.0	0.0
Joint ventures	2.3	3.2	0.0	0.0	0.6	0.5	0.0	0.0
Associated companies	0.9	0.1	0.0	0.0	19.5	3.0	0.0	0.0
Majority interest in non-controlled companies	0.3	0.4	0.0	0.0	0.0	6.7	0.9	1.2
Non-consolidated subsidiaries	0.2	0.1	0.6	0.6	2.9	1.8	0.2	0.4

[1] The owner of Engel-Apotheke, Darmstadt, is a member of the Supervisory Board of Merck KGaA.

As in the previous year, the liabilities of Group companies in respect of E. Merck KG primarily resulted from mutual profit transfers between Merck KGaA and E. Merck KG as well as the profit transfer by Merck & Cie KmG, Switzerland, to E. Merck KG. They included financial debt of € 94.7 million (December 31, 2022: € 258.0 million), subject to standard market interest rates. The financial debt in respect of E. Merck Beteiligungen KG in the amount of € 1,100.0 million (December 31, 2022: € 660.0 million) were also subject to standard market interest rates. There was no collateral or guarantees either in favor of or at the expense of Merck.

Loss allowances on receivables from non-consolidated subsidiaries recognized in the reporting period and previous periods amounted to € 19.0 million in total as of December 31, 2023 (December 31, 2022: € 12.0 million). The expense from impairment losses recognized in 2023 amounted to € 7.0 million (2022: € 0.0 million).

Information on pension funds that are classified as defined benefit plans in accordance with IAS 19 can be found in Note (33) "**Provisions for employee benefits**".

Information on Executive Board and Supervisory Board compensation can be found in Note (46) "**Executive Board and Supervisory Board compensation**". Above and beyond this, no material activities between companies of the Merck Group and members of the Executive Board or the Supervisory Board of Merck KGaA, the Executive Board or the Board of Partners of E. Merck KG, or members of their immediate families took place in either fiscal 2023 or the previous year.

(46) Executive Board and Supervisory Board compensation

The compensation of the Executive Board of Merck KGaA is recognized by the general partner, E. Merck KG, which is not included in these consolidated financial statements. It was composed as follows:

€ million	2023	2022
Fixed compensation	6.3	6.3
Variable compensation	18.5	17.7
Other compensation	0.6	0.4
Additional benefits	0.2	0.2
Short-term benefits	**25.6**	**24.6**
Post-employment benefits	2.6	2.4
Other long-term benefits	0.7	0.0
Termination benefits	0.0	0.0
Share-based payments	3.8	5.8
Total compensation pursuant to IAS 24.17	**32.7**	**32.7**

The total compensation granted to members of the Executive Board as referred to by section 314 (1) no. 6 a) HGB amounted to € 30.1 million in fiscal 2023 (2022: € 30.4 million). In addition to the short-term benefits shown in the table above, this also includes compensation under the standalone long-term incentive plan for the Executive Board, the structure of which is essentially as described in Note (33) "**Provisions for employee benefits**", and other long-term benefits. On the basis of the long-term incentive plan, 57,164 virtual shares, also referred to as Merck Share Units (MSU), were made potentially available in fiscal 2023 (2022: 43,436 MSU).

Payments to former members of the Executive Board and their surviving dependents in accordance with section 314 (1) no. 6 b) HGB were made as pension payments, as profit sharing, under the long-term incentive plan and waiting allowance for a post-contractual non-competition clause. These payments amounted to € 14.4 million in fiscal 2023 (2022: € 21.7 million). Provisions for defined benefit pension commitments carried by E. Merck KG amounted to € 123.8 million as of December 31, 2023 (December 31, 2022: € 123.1 million).

The compensation of the Supervisory Board in accordance with section 314 (1) no. 6 a) HGB and IAS 24.17 was composed as follows:

€ thousand	2023	2022
Fixed portion	808	815
Meeting attendance fees	58	48
Committee membership compensation	95	105
Total compensation granted in the fiscal year	**961**	**968**

As in the previous year, no compensation was paid to former members of the Supervisory Board in fiscal 2023.

As in the previous year, the members of the Executive Board and the Supervisory Board did not receive any advances or loans in fiscal 2023 from companies included in the consolidated financial statements. As in the previous year, no contingent liabilities were entered into for the benefit of these persons in fiscal 2023.

Further individualized information and disclosures, as well as a presentation of the compensation system for the members of the Executive Board and the Supervisory Board, can be found in the compensation report.

(47) Auditor's fees

The auditor of the consolidated financial statements changed to Deloitte GmbH Wirtschaftsprüfungsgesellschaft, Germany, in fiscal 2023. The costs for the auditor of the consolidated financial statements were composed as follows:

	2023	
€ million	**Group**	**thereof: Deloitte GmbH Wirtschafts-prüfungs-gesellschaft, Germany**
Audits of financial statements	10.6	3.9
Other audit-related services	0.4	0.3
Tax consultancy services	–	–
Other services	–	–
Total	**11.0**	**4.2**

The expenses for other audit-related services to Deloitte GmbH Wirtschaftsprüfungsgesellschaft primarily arose for the audit of the non-financial statement and the sustainability report.

Scope of Consolidation

(48) List of shareholdings

The shareholdings of Merck KGaA as of December 31, 2023, are presented below:

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA (%)
I. Fully consolidated companies				
Germany				
Germany	Merck KGaA	Darmstadt	Parent company	
Germany	AmpTec GmbH A)	Hamburg	100.00	
Germany	AZ Electronic Materials GmbH A)	Darmstadt	100.00	
Germany	Biochrom GmbH A)	Berlin	100.00	
Germany	Chemitra GmbH A)	Darmstadt	100.00	100.00
Germany	Emedia Export Company mbH	Gernsheim	100.00	
Germany	Merck 12. Allgemeine Beteiligungs-GmbH A)	Darmstadt	100.00	100.00
Germany	Merck 13. Allgemeine Beteiligungs-GmbH	Darmstadt	100.00	
Germany	Merck 15. Allgemeine Beteiligungs-GmbH	Darmstadt	100.00	
Germany	Merck 16. Allgemeine Beteiligungs-GmbH A)	Darmstadt	100.00	
Germany	Merck 20. Allgemeine Beteiligungs-GmbH A)	Darmstadt	100.00	
Germany	Merck 21. Allgemeine Beteiligungs-GmbH	Darmstadt	100.00	
Germany	Merck 24. Allgemeine Beteiligungs-GmbH A)	Darmstadt	100.00	100.00
Germany	Merck Chemicals GmbH A)	Darmstadt	100.00	
Germany	Merck Consumer Health Holding Germany GmbH	Darmstadt	100.00	100.00
Germany	Merck Display Trading GmbH A)	Darmstadt	100.00	
Germany	Merck Electronics KGaA A)	Darmstadt	100.00	
Germany	Merck Export GmbH A)	Darmstadt	100.00	100.00
Germany	Merck Financial Services GmbH	Darmstadt	100.00	100.00
Germany	Merck Financial Trading GmbH	Gernsheim	100.00	
Germany	Merck Gernsheim Holding GmbH A)	Darmstadt	100.00	
Germany	Merck Healthcare Germany GmbH A)	Weiterstadt	100.00	100.00
Germany	Merck Healthcare Holding GmbH	Darmstadt	100.00	100.00
Germany	Merck Healthcare KGaA A)	Darmstadt	100.00	
Germany	Merck Holding GmbH	Gernsheim	100.00	100.00
Germany	Merck International GmbH	Darmstadt	100.00	100.00
Germany	Merck Internationale Beteiligungen GmbH	Darmstadt	100.00	
Germany	Merck Life Science Holding GmbH	Darmstadt	100.00	100.00
Germany	Merck Life Science KGaA A)	Darmstadt	100.00	
Germany	Merck LS RTU GmbH A)	Darmstadt	100.00	100.00
Germany	Merck Patent GmbH A)	Darmstadt	100.00	
Germany	Merck Performance Materials GmbH	Wiesbaden	100.00	
Germany	Merck Performance Materials Holding GmbH	Darmstadt	100.00	100.00
Germany	Merck Real Estate GmbH A)	Darmstadt	100.00	100.00
Germany	Merck Schuchardt OHG	Hohenbrunn	100.00	
Germany	Merck Site Management GmbH A)	Gernsheim	100.00	100.00
Germany	Merck Surface Solutions GmbH A)	Gernsheim	100.00	
Germany	Merck Vierte Allgemeine Beteiligungsgesellschaft mbH	Gernsheim	100.00	
Germany	Merck Wohnungs- und Grundstücksverwaltungsgesellschaft mbH A)	Darmstadt	100.00	100.00

Footnotes follow at the end of the table.

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA (%)
Germany	Sigma-Aldrich Biochemie GmbH	Steinheim	100.00	
Germany	Sigma-Aldrich Chemie GmbH	Steinheim	100.00	
Germany	Sigma-Aldrich Chemie Holding GmbH	Taufkirchen	100.00	
Germany	Sigma-Aldrich Grundstücks GmbH & Co. KG	Steinheim	100.00	
Germany	Sigma-Aldrich Logistik GmbH	Steinheim	100.00	
Germany	Sigma-Aldrich Verwaltungs GmbH	Steinheim	100.00	100.00
Germany	Versum Materials Germany GmbH	Darmstadt	100.00	
Other European countries				
Austria	Merck Chemicals and Life Science GesmbH	Vienna	100.00	
Austria	Merck Gesellschaft mbH	Vienna	100.00	
Austria	Sigma-Aldrich Handels GmbH	Vienna	100.00	
Belgium	Merck Chemicals NV/SA	Hoeilaart	100.00	
Belgium	Merck Life Science BV	Hoeilaart	100.00	
Belgium	Merck NV/SA	Hoeilaart	100.00	
Bulgaria	Merck Bulgaria EAD	Sofia	100.00	
Croatia	Merck d.o.o.	Zagreb	100.00	
Czech Republic	Merck Life Science spol. s r.o.	Prague	100.00	
Czech Republic	Merck spol. s r.o.	Prague	100.00	
Denmark	Merck A/S	Soborg	100.00	
Denmark	Merck Life Science A/S	Soborg	100.00	
Estonia	Merck Serono OÜ	Tallinn	100.00	
Finland	Merck Life Science OY	Espoo	100.00	
Finland	Merck OY	Espoo	100.00	
France	Gonnon S.A.S.	Lyon	100.00	
France	Merck Biodevelopment S.A.S.	Lyon	100.00	
France	Merck Chimie S.A.S.	Fontenay s/Bois	100.00	
France	Merck Performance Materials S.A.S.	Trosly Breuil	100.00	
France	Merck S.A.	Lyon	99.86	
France	Merck Santé S.A.S.	Lyon	100.00	
France	Merck Serono S.A.S.	Lyon	100.00	
France	Millipore S.A.S.	Molsheim	100.00	
France	Sigma-Aldrich Chimie S.a.r.l.	Saint Quentin Fallavier	100.00	
France	Sigma-Aldrich Chimie SNC	Saint Quentin Fallavier	100.00	
France	Sigma-Aldrich Holding S.a.r.l.	Saint Quentin Fallavier	100.00	
Greece	Merck Commercial Industrial Pharmaceutical Chemical Single Member S.A.	Maroussi	100.00	
Hungary	Merck Kft.	Budapest	100.00	
Hungary	Merck Life Science Kft.	Budapest	100.00	
Ireland	Merck Finance Limited	Carrigtwohill	100.00	
Ireland	Merck Life Science Limited	Arklow	100.00	
Ireland	Merck Millipore Ltd.	Carrigtwohill	100.00	
Ireland	Merck Serono (Ireland) Ltd.	Dublin	100.00	
Ireland	Millipore Cork Unlimited Company	Carrigtwohill	100.00	
Ireland	Sigma-Aldrich Ireland Ltd.	Arklow	100.00	
Ireland	Versum Materials Ireland Limited	Dublin	100.00	
Italy	Istituto di Ricerche Biomediche Antoine Marxer RBM S.p.A.	Colleretto Giacosa	100.00	
Italy	Merck Life Science S.r.l.	Milan	100.00	
Italy	Merck S.r.l.	Milan	100.00	
Italy	Merck Serono S.p.A.	Rome	99.74	
Italy	Versum Materials Italia S.r.l.	Milan	100.00	

Footnotes follow at the end of the table.

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA (%)
Latvia	Merck Serono SIA	Riga	100.00	
Lithuania	Merck Serono, UAB	Vilnius	100.00	
Luxembourg	Merck Chemicals Holding S.à r.l.	Luxembourg	100.00	
Luxembourg	Merck Finance S.à r.l.	Luxembourg	100.00	
Luxembourg	Merck Finanz S.à.r.l.	Luxembourg	100.00	
Luxembourg	Merck Holding S.à r.l.	Luxembourg	100.00	
Luxembourg	Merck Invest SCS	Luxembourg	100.00	
Luxembourg	Merck Re S.A.	Luxembourg	100.00	100.00
Luxembourg	Millipore International Holdings S.à r.l.	Luxembourg	100.00	
Luxembourg	Sigma-Aldrich Global S.a.r.l.	Luxembourg	100.00	
Luxembourg	Sigma-Aldrich S.a.r.l.	Luxembourg	100.00	
Malta	Merck Capital Holding Limited	Pietà	100.00	50.29
Malta	Merck Capital Limited	Pietà	100.00	
Netherlands	eyrise B.V.	Veldhoven	100.00	100.00
Netherlands	Merck B.V.	Schiphol-Rijk	100.00	
Netherlands	Merck Chemicals B.V.	Amsterdam	100.00	
Netherlands	Merck Europe B.V.	Amsterdam	100.00	
Netherlands	Merck Holding Netherlands B.V.	Schiphol-Rijk	100.00	
Netherlands	Merck Life Science N.V.	Amsterdam	100.00	
Netherlands	Merck Ventures B.V.	Amsterdam	100.00	
Netherlands	Serono Tri Holdings B.V.	Schiphol-Rijk	100.00	
Netherlands	Sigma-Aldrich B.V.	Amsterdam	100.00	
Netherlands	Versum Materials Asia B.V.	Amsterdam	100.00	
Netherlands	Versum Materials Holdings Nederland B.V.	Amsterdam	100.00	
Netherlands	Versum Materials International B.V.	Amsterdam	100.00	
Netherlands	Versum Materials Netherlands B.V.	Amsterdam	100.00	
Netherlands	Versum Materials Netherlands International B.V.	Amsterdam	100.00	
Netherlands	Versum Materials Pacific B.V.	Amsterdam	100.00	
Norway	Merck Life Science AS	Oslo	100.00	
Poland	Merck Business Solutions Europe Sp. z o.o.	Wroclaw	100.00	
Poland	Merck Life Science Sp. z o.o.	Poznan	100.00	
Poland	Merck Sp. z o.o.	Warsaw	100.00	
Portugal	Merck, S.A.	Algés	100.00	
Romania	Merck Romania S.R.L.	Bucharest	100.00	
Russia	Merck Life Science LLC	Moscow	100.00	
Russia	Merck LLC	Moscow	100.00	
Serbia	Merck d.o.o. Beograd	Belgrade	100.00	
Slovakia	Merck Life Science spol. s r.o.	Bratislava	100.00	
Slovakia	Merck spol. s r.o.	Bratislava	100.00	
Slovenia	Merck d.o.o.	Ljubljana	100.00	
Spain	Merck Chemicals and Life Science S.A.U.	Madrid	100.00	
Spain	Merck Life Science S.L.U.	Madrid	100.00	
Spain	Merck, S.L.U.	Madrid	100.00	
Sweden	Merck AB	Solna	100.00	
Sweden	Merck Life Science AB	Solna	100.00	
Switzerland	Ares Trading SA	Aubonne	100.00	
Switzerland	Chord Therapeutics SA	Eysins	100.00	
Switzerland	Merck & Cie KmG	Altdorf	51.63	51.63
Switzerland	Merck (Schweiz) AG	Zug	100.00	
Switzerland	Merck Performance Materials (Suisse) SA	Eysins	100.00	
Switzerland	Merck Serono SA	Aubonne	100.00	
Switzerland	SeroMer Holding SA	Eysins	100.00	
Switzerland	Sigma-Aldrich (Switzerland) Holding AG	Buchs	100.00	
Switzerland	Sigma-Aldrich Chemie GmbH	Buchs	100.00	

Footnotes follow at the end of the table.

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA (%)
Switzerland	Sigma-Aldrich International GmbH	Buchs	100.00	
Switzerland	Sigma-Aldrich Production GmbH	Buchs	100.00	
Türkiye	Merck Ilac, Ecza Ve Kimya Ticaret Anonim Sirketi	Istanbul	100.00	
United Kingdom	BioReliance Limited	Aberdeen	100.00	
United Kingdom	Epichem Group Limited	Gillingham	100.00	
United Kingdom	Merck Holding Ltd.	Feltham	100.00	
United Kingdom	Merck Investments Ltd.	Feltham	100.00	
United Kingdom	Merck Life Science UK Limited	Gillingham	100.00	
United Kingdom	Merck Performance Materials Limited	Feltham	100.00	
United Kingdom	Merck Serono Europe Limited	Feltham	100.00	
United Kingdom	Merck Serono Ltd.	Feltham	100.00	
United Kingdom	Millipore (U.K.) Limited	Feltham	100.00	
United Kingdom	SAFC Biosciences Limited	Gillingham	100.00	
United Kingdom	SAFC Hitech Limited	Gillingham	100.00	
United Kingdom	Sigma-Aldrich Company Limited	Gillingham	100.00	
United Kingdom	Versum Materials UK Limited	Feltham	100.00	
North America				
Canada	EMD Crop BioScience Canada Inc.	Toronto	100.00	
Canada	EMD Inc.	Mississauga	100.00	
Canada	MilliporeSigma Canada Ltd.	Oakville	100.00	
United States	Aldrich Chemical Co. LLC	Milwaukee	100.00	
United States	Aldrich Chemical Foreign Holding LLC	St. Louis	100.00	
United States	Aldrich-APL, LLC	Urbana	100.00	
United States	BioControl Systems, Inc.	Wilmington	100.00	
United States	BioReliance Corporation	Rockville	100.00	
United States	Cell Marque Corporation	Rocklin	100.00	
United States	Cerilliant Corporation	Round Rock	100.00	
United States	Electron Transfer Technologies, Inc.	West Trenton	100.00	
United States	EMD Accounting Solutions & Services America, Inc.	Rockland	100.00	
United States	EMD Digital Inc.	Burlington	100.00	
United States	EMD Finance LLC	Wilmington	100.00	
United States	EMD Group Holding, Inc.	Wilmington	100.00	
United States	EMD Holding Corp.	Rockland	100.00	
United States	EMD Invest LLC	Wilmington	100.00	
United States	EMD Millipore Corporation	Burlington	100.00	
United States	EMD Performance Materials Corp.	Wilmington	100.00	
United States	EMD Serono Holding, Inc.	Rockland	100.00	
United States	EMD Serono Research & Development Institute, Inc.	Billerica	100.00	
United States	EMD Serono, Inc.	Rockland	100.00	
United States	Exelead Inc.	Wilmington	100.00	
United States	FloDesign Sonics, Inc.	Wilmington	100.00	
United States	Intermolecular, Inc.	Wilmington	100.00	
United States	J.C. Schumacher Company	Glendale	100.00	
United States	Millipore Asia Ltd.	Wilmington	100.00	
United States	MilliporeSigma Distribution LLC	Wilmington	100.00	
United States	Ormet Circuits, Inc.	San Diego	100.00	
United States	Research Organics, LLC	Cleveland	100.00	
United States	SAFC Biosciences, Inc.	Lenexa	100.00	
United States	SAFC Carlsbad, Inc.	Carlsbad	100.00	
United States	SAFC, Inc.	Madison	100.00	
United States	Serono Laboratories, Inc.	Rockland	100.00	
United States	Sigma Chemical Foreign Holding LLC	St. Louis	100.00	
United States	Sigma Redevelopment Corporation	St. Louis	100.00	
United States	Sigma-Aldrich Co. LLC	St. Louis	100.00	

Footnotes follow at the end of the table.

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA (%)
United States	Sigma-Aldrich Corporation	St. Louis	100.00	
United States	Sigma-Aldrich Manufacturing LLC	St. Louis	100.00	
United States	Sigma-Aldrich Missouri Insurance Company	St. Louis	100.00	
United States	Sigma-Aldrich Research Biochemicals, Inc.	Wilmington	100.00	
United States	Sigma-Aldrich RTC, Inc.	Laramie	100.00	
United States	Sigma-Aldrich, Inc.	Madison	100.00	
United States	Sigma-Genosys of Texas LLC	The Woodlands	100.00	
United States	Supelco, Inc.	Bellefonte	100.00	
United States	Versum Materials Manufacturing Company, LLC	Wilmington	100.00	
United States	Versum Materials Technology LLC	Wilmington	100.00	
United States	Versum Materials US International, Inc.	Wilmington	100.00	
United States	Versum Materials US, LLC	Wilmington	100.00	
United States	Versum Materials, Inc.	Wilmington	100.00	
Asia-Pacific (APAC)				
Australia	Merck Healthcare Pty. Ltd.	Macquarie Park	100.00	
Australia	Merck Pty. Ltd.	Bayswater	100.00	
Australia	Sigma-Aldrich Oceania Pty. Ltd.	Macquarie Park	100.00	
Australia	Sigma-Aldrich Pty. Ltd.	Macquarie Park	100.00	
China	Merck Chemicals (Shanghai) Co., Ltd.	Shanghai	100.00	
China	Merck Display Materials (Shanghai) Co., Ltd.	Shanghai	100.00	
China	Merck Electronic Materials (Suzhou) Ltd.	Suzhou	100.00	
China	Merck Electronics (Zhangjiagang) Co., Ltd.	Suzhou	100.00	
China	Merck Holding (China) Co., Ltd.	Shanghai	100.00	
China	Merck Innovation Hub (Guangdong) Co., Ltd.	Guangzhou	100.00	
China	Merck Life Science Ltd.	Hong Kong	100.00	
China	Merck Life Science Technologies (Nantong) Co., Ltd.	Nantong	100.00	
China	Merck Ltd.	Hong Kong	100.00	
China	Merck Performance Materials Hong Kong Ltd.	Hong Kong	100.00	
China	Merck Pharmaceutical (HK) Ltd.	Hong Kong	100.00	
China	Merck Pharmaceutical Distribution (Jiangsu) Co., Ltd.	Nantong	100.00	
China	Merck Pharmaceutical Manufacturing (Jiangsu) Co., Ltd.	Nantong	100.00	
China	Merck Serono (Beijing) Pharmaceutical Distribution Co., Ltd.	Beijing	100.00	
China	Merck Serono (Beijing) Pharmaceutical R&D Co., Ltd.	Beijing	100.00	
China	Merck Serono Co., Ltd.	Beijing	100.00	
China	Merck Testing and Certification (Shanghai) Co., Ltd.	Shanghai	100.00	
China	SAFC Hitech (Shanghai) Co., Ltd.	Shanghai	100.00	
China	Sigma-Aldrich (Shanghai) Trading Co., Ltd.	Shanghai	100.00	
China	Sigma-Aldrich (Wuxi) Life Science & Technology Co., Ltd.	Wuxi	100.00	
China	Versum Materials (Dalian) Co., Ltd.	Dalian	100.00	
China	Versum Materials (Shanghai) Co., Ltd.	Shanghai	100.00	
India	Merck Life Science Pvt. Ltd.	Mumbai	100.00	
India	Merck Performance Materials Pvt. Ltd.	Mumbai	100.00	
India	Merck Specialities Pvt. Ltd.	Mumbai	100.00	
India	Sigma-Aldrich Chemicals Private Limited	Bangalore	100.00	
Indonesia	P.T. Merck Chemicals and Life Sciences	Jakarta	100.00	
Indonesia	P.T. Merck Tbk.	Jakarta	86.65	
Japan	Merck Biopharma Co., Ltd.	Tokyo	100.00	
Japan	Merck Electronics Ltd.	Tokyo	100.00	
Japan	Merck Holdings G.K.	Tokyo	100.00	
Japan	Merck Ltd.	Tokyo	100.00	
Japan	Merck Performance Materials G.K.	Tokyo	100.00	
Japan	Sigma-Aldrich Japan G.K.	Tokyo	100.00	

Footnotes follow at the end of the table.

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA (%)
Japan	Versum Materials Japan Inc.	Tokyo	100.00	
Malaysia	Merck Sdn Bhd	Petaling Jaya	100.00	
Malaysia	Sigma-Aldrich (M) Sdn Bhd	Petaling Jaya	100.00	
Malaysia	Versum Materials Malaysia Sdn Bhd	Kuala Lumpur	100.00	
New Zealand	Merck Ltd.	Auckland	100.00	
New Zealand	Sigma-Aldrich New Zealand Co.	Auckland	100.00	
Philippines	Merck Business Solutions Asia Inc.	Taguig	99.99	
Philippines	Merck Inc.	Taguig	100.00	
Republic of Korea	M Chemicals Inc.	Eumseong	100.00	
Republic of Korea	Merck Electronic Materials Ltd.	Seoul	100.00	
Republic of Korea	Merck Ltd.	Seoul	99.99	
Republic of Korea	Merck Performance Materials Ltd.	Pyeongtaek-shi	100.00	
Republic of Korea	Sigma-Aldrich Korea Ltd.	Seoul	100.00	
Republic of Korea	Versum Materials ADM Korea Inc.	Ansan-si	100.00	
Republic of Korea	Versum Materials HYT Inc.	Ansan-si	100.00	
Republic of Korea	Versum Materials Korea Inc.	Siheung-si	100.00	
Republic of Korea	Versum Materials PM Korea Inc.	Siheung-Si	100.00	
Republic of Korea	Versum Materials SPC Korea Ltd.	Pyeongtaek-shi	100.00	
Singapore	Merck Performance Materials Pte. Ltd.	Singapore	100.00	
Singapore	Merck Pte. Ltd.	Singapore	100.00	
Singapore	Sigma-Aldrich Pte. Ltd.	Singapore	100.00	
Singapore	Versum Materials Singapore International Pte. Ltd.	Singapore	100.00	
Singapore	Versum Materials Singapore Pte. Ltd.	Singapore	100.00	
Taiwan	Merck Ltd.	Taipei	100.00	
Taiwan	Merck Performance Materials Ltd.	Taipei	100.00	
Taiwan	SAFC Hitech Taiwan Co., Ltd.	Kaohsiung	100.00	
Taiwan	Versum Materials Taiwan Co., Ltd.	Taipei	74.00	
Thailand	Merck Ltd. B)	Bangkok	45.11	
Vietnam	Merck Healthcare Vietnam Limited	Ho Chi Minh City	100.00	
Vietnam	Merck Vietnam Company Limited	Ho Chi Minh City	100.00	
Latin America				
Argentina	Merck S.A.	Buenos Aires	100.00	
Argentina	Sigma-Aldrich de Argentina S.R.L.	Buenos Aires	100.00	
Brazil	Merck S.A.	Rio de Janeiro	100.00	
Brazil	Sigma-Aldrich Brasil Ltda.	Barueri	100.00	
Chile	Merck S.A.	Santiago de Chile	100.00	
Chile	Sigma-Aldrich Quimica Ltda.	Santiago de Chile	100.00	
Colombia	Merck S.A.	Bogota	100.00	
Ecuador	Merck C.A.	Quito	100.00	
Guatemala	Merck, S.A.	Guatemala City	100.00	
Mexico	Merck Biopharma Distribution S.A. de C.V.	Mexico City	100.00	
Mexico	Merck, S.A. de C.V.	Mexico City	100.00	
Mexico	Sigma-Aldrich Quimica, S. de R.L. de C.V.	Toluca	100.00	
Panama	Merck, S.A.	Panama City	100.00	
Panama	Mesofarma Corporation	Panama City	100.00	
Peru	Merck Peruana S.A.	Lima	100.00	
Uruguay	Ares Trading Uruguay S.A.	Montevideo	100.00	

Footnotes follow at the end of the table.

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA (%)
Middle East and Africa (MEA)				
Egypt	Merck Ltd.	Cairo	100.00	
Israel	Inter-Lab Ltd.	Yavne	100.00	
Israel	InterPharm Laboratories Ltd.	Yavne	100.00	
Israel	Merck Serono Ltd.	Herzliya Pituach	100.00	
Israel	PMatX Ltd.	Yavne	90.91	
Israel	QLight Nanotech Ltd.	Jerusalem	100.00	
Israel	Sigma-Aldrich Israel Ltd.	Rehovot	100.00	
Israel	Versum Materials Israel Ltd.	Tel Aviv	100.00	
Kenya	Merck Healthcare and Life Science Limited	Nairobi	100.00	
Saudi Arabia	MERCK Limited	Riyadh	100.00	
South Africa	Merck (Pty) Ltd.	Modderfontein	100.00	
South Africa	Merck Life Science (Pty) Ltd.	Modderfontein	100.00	
Tunisia	Merck Promotion SARL	Tunis	100.00	
Tunisia	Merck SARL	Tunis	100.00	
United Arab Emirates	Merck Serono Middle East FZ-Ltd.	Dubai	100.00	
II. Companies accounted for using the equity method				
Other European countries				
United Kingdom	MM Domain Holdco Limited	London	50.00	50.00
North America				
United States	Syntropy Technologies LLC	Wilmington	50.00	

Footnotes follow at the end of the table.

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA (%)
III. Companies measured at fair value through other comprehensive income in accordance with IFRS 9 due to immateriality and other equity investments				
Germany				
Germany	BEEoled GmbH	Dresden	21.76	
Germany	GreenTech Accelerator Gernsheim GmbH	Gernsheim	20.00	20.00
Germany	Merck 25. Allgemeine Beteiligungs-GmbH	Darmstadt	100.00	100.00
Germany	Merck 26. Allgemeine Beteiligungs-GmbH	Darmstadt	100.00	100.00
Germany	Merck 27. Allgemeine Beteiligungs-GmbH	Darmstadt	100.00	100.00
Germany	Merck 28. Allgemeine Beteiligungs-GmbH	Darmstadt	100.00	100.00
Germany	Merck 29. Allgemeine Beteiligungs-GmbH	Darmstadt	100.00	100.00
Germany	Merck 37. Allgemeine Beteiligungs-GmbH	Darmstadt	100.00	
Germany	Merck 38. Allgemeine Beteiligungs-GmbH	Darmstadt	100.00	
Germany	Merck 39. Allgemeine Beteiligungs-GmbH	Darmstadt	100.00	100.00
Germany	Merck 40. Allgemeine Beteiligungs-GmbH	Darmstadt	100.00	100.00
Germany	Merck 41. Allgemeine Beteiligungs-GmbH	Darmstadt	100.00	100.00
Germany	Merck 42. Allgemeine Beteiligungs-GmbH	Darmstadt	100.00	100.00
Germany	Merck 43. Allgemeine Beteiligungs-GmbH	Darmstadt	100.00	100.00
Germany	Merck 44. Allgemeine Beteiligungs-GmbH	Darmstadt	100.00	100.00
Germany	Merck 45. Allgemeine Beteiligungs-GmbH	Darmstadt	100.00	100.00
Germany	Merck 46. Allgemeine Beteiligungs-GmbH	Darmstadt	100.00	100.00
Germany	Merck 47. Allgemeine Beteiligungs-GmbH	Darmstadt	100.00	100.00
Germany	Merck 48. Allgemeine Beteiligungs-GmbH	Darmstadt	100.00	100.00
Germany	Merck 49. Allgemeine Beteiligungs-GmbH	Darmstadt	100.00	100.00
Other European countries				
Belgium	ReWind Therapeutics NV	Leuven-Heverlee	25.72	
France	MERCK 8ème S.A.S.	Lyon	100.00	
France	MERCK Holding S.A.S.	Lyon	100.00	
France	Scipio Bioscience S.A.S.	Montrouge	21.69	
Netherlands	Calypso Biotech B.V.	Amsterdam	27.49	
Netherlands	iOnctura B.V.	Amsterdam	32.41	
Netherlands	Kivu BioScience B.V.	Naarden	21.66	
Russia	Chemical Trade Limited LLC	Moscow	100.00	
Switzerland	Asceneuron SA	Lausanne	21.54	
Switzerland	CAM AG Chemie-Erzeugnisse und Adsorptionstechnik AG	Muttenz	39.11	
United Kingdom	Macrophage Pharma Limited	London	22.21	
United Kingdom	Merck Cross Border Trustees Ltd.	Feltham	100.00	
United Kingdom	Merck Ltd.	Feltham	100.00	
United Kingdom	Merck Pension Trustees Ltd.	Feltham	100.00	
United Kingdom	Outrun Therapeutics Limited	Dundee	35.40	
United Kingdom	Sigma Chemical Co. Ltd.	Gillingham	100.00	
United Kingdom	Theolytics Ltd.	Oxford	23.80	
North America				
Canada	Future Fertility Inc.	Toronto	21.65	
United States	Actithera Inc.	Dover	50.00	
United States	EMD Biotech LLC	Wilmington	100.00	
United States	ImmuneBridge Inc.	Wilmington	25.43	
United States	Indi Molecular, Inc.	Wilmington	32.16	
United States	MemryX Inc.	Ann Arbor	20.67	
United States	Pictor Labs, Inc.	Los Angeles	23.55	
United States	Polaris Electro-Optics, Inc	Wilmington	24.99	

Footnotes follow at the end of the table.

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA (%)
United States	Prolog Healthy Living Fund II, L.P. C)	St. Louis	44.50	
United States	Prolog Healthy Living Fund, L.P. C)	St. Louis	35.61	
United States	Surface Solutions, LLC	Wilmington	100.00	
Asia-Pacific (APAC)				
China	Merck Testing (Shanghai) Co., Ltd.	Shanghai	100.00	
Japan	Resonac Versum Materials Co. LTD D)	Kawasaki	35.00	
Singapore	Merck Life Science Testing Services Pte. Ltd.	Singapore	100.00	
Latin America				
Dominican Republic	Merck Dominicana, S.R.L.	Santo Domingo	100.00	
Middle East and Africa (MEA)				
Algeria	Novapharm Production SARL	Wilaya de Tipiza	20.00	
Israel	PxE Computational Imaging Ltd.	Lachish Darom	26.92	
Israel	Sentaur Bio Ltd.	Yavne	98.37	
Nigeria	Merck Pharmaceutical and Life Sciences Ltd.	Lagos	100.00	
IV. Majority interest in non-controlled companies				
Germany				
Germany	Merck Foundation gGmbH	Darmstadt	100.00	100.00
Latin America				
Venezuela	Merck S.A.	Caracas	100.00	
Venezuela	Representaciones MEPRO S.A.	Caracas	100.00	

A) Companies opting for exemption as provided for by section 264 (3) and section 264b of the German Commercial Code.

B) Fully-consolidated due to majority of voting rights.

C) Closed-end funds classified as debt instruments in accordance with IFRS 9.

D) This is an affiliate within the meaning of IFRS 11 (joint activity).

Darmstadt, February 14, 2024

Belén Garijo

Kai Beckmann

Peter Guenter

Matthias Heinzel

Helene von Roeder

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Responsibility statement

To the best of our knowledge, and in accordance with the applicable reporting principles, the consolidated financial statements of the Merck Group give a true and fair view of the assets, liabilities, financial position, and profit or loss of the Group. The combined management report includes a fair review of the development and performance of the business and the position of the Group, together with a description of the material opportunities and risks associated with the expected development of the Group.

Darmstadt, February 14, 2024

Belén Garijo

Kai Beckmann

Peter Guenter

Matthias Heinzel

Helene von Roeder

Reproduction of the Independent Auditor's Report

To Merck Kommanditgesellschaft auf Aktien, Darmstadt, Germany

Report on the Audit of the Consolidated Financial Statements and of the Combined Management Report

Audit Opinions

We have audited the consolidated financial statements of Merck Kommanditgesellschaft auf Aktien, Darmstadt, Germany, and its subsidiaries (the Group) which comprise the consolidated balance sheet as at December 31, 2023, the consolidated income statement, the consolidated statement of comprehensive income, the consolidated statement of changes in net equity and the consolidated cash flow statement for the financial year from January 1 to December 31, 2023, and the notes to the consolidated financial statements, including a summary of significant accounting policies. In addition, we have audited the combined management report for the parent and the Group of Merck Kommanditgesellschaft auf Aktien, Darmstadt, Germany, for the financial year from January 1 to December 31, 2023. In accordance with the German legal requirements, we have not audited the content of the combined non-financial statement pursuant to sections 289b and 315b German Commercial Code (HGB) included in the section "**Non-financial statement**" of the combined management report, nor the corporate governance statement pursuant to sections 289f and 315d HGB referred to in the combined management report. Moreover, we have not audited the content of the disclosures described as extraneous to the combined management report.

In our opinion, on the basis of the knowledge obtained in the audit,

- the accompanying consolidated financial statements comply, in all material respects, with the IFRS as adopted by the EU and the additional requirements of German commercial law pursuant to section 315e (1) HGB and, in compliance with these requirements, give a true and fair view of the assets, liabilities and financial position of the Group as at December 31, 2023, and of its financial performance for the financial year from January 1 to December 31, 2023, and

- the accompanying combined management report as a whole provides an appropriate view of the Group's position. In all material respects, this combined management report is consistent with the consolidated financial statements, complies with German legal requirements and appropriately presents the opportunities and risks of future development. Our audit opinion on the combined management report does not cover the content of the above-mentioned statements and disclosures extraneous to the combined management report.

Pursuant to section 322 (3) sentence 1 HGB, we declare that our audit has not led to any reservations relating to the legal compliance of the consolidated financial statements and of the combined management report.

Basis for the Audit Opinions

We conducted our audit of the consolidated financial statements and of the combined management report in accordance with section 317 HGB and the EU Audit Regulation (No. 537/2014; referred to subsequently as "EU Audit Regulation") and in compliance with German Generally Accepted Standards for Financial Statement Audits promulgated by the Institut der Wirtschaftsprüfer (IDW). Our responsibilities under those requirements and principles are further described in the "**Auditor's Responsibilities for the Audit of the Consolidated Financial Statements and of the Combined Management Report**" section of our auditor's report. We are independent of the group entities in accordance with the requirements of European law and German commercial and professional law, and we have fulfilled our other German professional responsibilities in accordance with these requirements. In addition, in accordance with Article 10 (2) point (f) of the EU Audit Regulation, we declare that we have not provided non-audit services prohibited under Article 5 (1) of the EU Audit Regulation. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinions on the consolidated financial statements and on the combined management report.

Key Audit Matters in the Audit of the Consolidated Financial Statements

Key audit matters are those matters that, in our professional judgment, were of most significance in our audit of the consolidated financial statements for the financial year from January 1 to December 31, 2023. These matters were addressed in the context of our audit of the consolidated financial statements as a whole and in forming our audit opinion thereon; we do not provide a separate audit opinion on these matters.

In the following we present the key audit matters we have determined in the course of our audit:

1. Recoverability of goodwill in the Electronics business sector

2. Completeness and measurement of income tax liabilities

Our presentation of these key audit matters has been structured as follows:

a) description (including reference to corresponding information in the consolidated financial statements)

b) auditor's response

1. Recoverability of goodwill in the Electronics business sector

a) In the consolidated financial statements as of December 31, 2023, of Merck Kommanditgesellschaft auf Aktien, Darmstadt, Germany, the amount stated under the balance sheet item "Goodwill" is mEUR 17,845 (36.8% of the Group's total assets), with mEUR 4,532 attributable to the Electronics business sector. The Electronics business sector represents a cash-generating unit.

Recoverability of goodwill of the cash-generating unit Electronics was a key matter in our audit because we identified an increased impairment risk for this business sector as part of our risk assessment. The impairment test for the preparation of the consolidated financial statements is based on a valuation of the Electronics business sector that involves discounting the planned future cash flows for this business sector at weighted average cost of capital using a discounted cash flow model. The planned cash flows are derived from the medium-term planning for the business sector approved by the executive directors, which is extrapolated based on assumed long-term growth rates.

The result of this valuation highly depends on the executive directors' judgmental determination of future cash flows and the discount rate for the business sector and is therefore subject to considerable uncertainties. Therefore, and as a result of our risk assessment, this matter was of particular significance in our audit.

The disclosures of the executive directors on goodwill can be found in note 18 in the notes to the consolidated financial statements.

b) Among others, in our audit we obtained an understanding of the accounting-relevant controls included in the process and reproduced the methodological approach to performing the impairment tests. Where identified controls were relevant for our audit, we had their design and implementation tested. Where estimates were made by the executive directors, we assessed whether the methods applied, assumptions made and data used were acceptable. Regarding the projection of future cash flows, we firstly evaluated the planning reliability by reviewing the past adherence to planning, walked through the underlying planning process and conducted a critical assessment. Subsequently, we evaluated the appropriateness of the future cash flows used in the valuation, especially by comparing these figures with the medium-term planning approved by the executive directors and by reconciling selected planning assumptions with general, company and industry-specific market expectations. We obtained a deep understanding of the parameters applied in determining the discount rate used, evaluated the completeness and accuracy of the calculation scheme and had them compared with general and industry-specific market expectations. Furthermore, due to the material significance of goodwill, we performed an additional own sensitivity analysis for the cash-generating unit (comparison of carrying amount with recoverable amount). As part of our audit, we were supported by internal valuation experts. Using their help, we reproduced the methodological approach to impairment testing, the arithmetical correctness of the valuation model as well as the determination of the used discount rate.

2. Completeness and measurement of income tax liabilities

a) As at December 31, 2023, the amount recognized for income tax liabilities including liabilities for uncertain tax obligations is mEUR 1,473.

The Group operates in different jurisdictions with different legal systems. The application of local tax regulations and tax incentives as well as transfer pricing rules is complex. The recognition and measurement of income tax liabilities require the executive directors to exercise judgment in assessing tax matters and to make estimates regarding uncertain tax positions. In order to reinforce and validate their own risk assessment, the executive directors engaged external experts as deemed necessary. There is a risk for the consolidated financial statements that income tax liabilities are not fully recognized or not appropriately measured. For these reasons, this matter was of particular significance in our audit.

The disclosures of the executive directors on recognition and measurement of income tax liabilities can be found in note 15 in the notes to the consolidated financial statements.

b) Among other things, as part of our audit we obtained an understanding of the process and of the accounting-relevant controls included in the process and involved our own tax experts in respect of national and international tax law into the audit team in order to evaluate the executive directors' judgments and estimates as well as the assessment of the engaged external experts, if any. Where identified controls were relevant for our audit, we had their design and implementation tested.

We obtained an understanding of existing tax risks through inquiry of employees in the tax department. We assessed the competence, capabilities and objectivity of the external experts and evaluated their expert opinions.

Furthermore, we analyzed correspondence with the competent tax authorities and assessed the assumptions underlying the determination of income tax liabilities based on our knowledge and experience of how the relevant legal requirements are currently applied by the tax authorities and courts. We used a risk-based audit approach to audit the accuracy of the calculation of the income tax liabilities.

Other Information

The executive directors and/or the supervisory board are responsible for the other information. The other information comprises:

- the report of the supervisory board,
- the remuneration report pursuant to section 162 German Stock Corporation Act (AktG),
- the combined consolidated non-financial statement pursuant to sections 289b and 315b HGB included in the section "**Non-financial statement**" of the combined management report,
- the corporate governance statement pursuant to sections 289f and 315d HGB referred to in the combined management report,
- the other content of the combined management report described as extraneous to the combined management report,
- the executive directors' confirmation regarding the consolidated financial statements and the combined management report pursuant to section 297 (2) sentence 4 and section 315 (1) sentence 5 HGB, and
- all other parts of the annual report,
- but not the consolidated financial statements, not the audited content of the combined management report and not our auditor's report thereon.

The supervisory board is responsible for the report of the supervisory board. The executive directors and the supervisory board are responsible for the statement according to section 161 AktG concerning the German Corporate Governance Code, which is part of the corporate governance statement, and for the remuneration report pursuant to section 162 AktG. Otherwise, the executive directors are responsible for the other information.

Our audit opinions on the consolidated financial statements and on the combined management report do not cover the other information, and consequently we do not express an audit opinion or any other form of assurance conclusion thereon.

In connection with our audit, our responsibility is to read the other information identified above and, in doing so, to consider whether the other information:

- is materially inconsistent with the consolidated financial statements, with the audited content of the group management report or our knowledge obtained in the audit, or
- otherwise appears to be materially misstated.

Responsibilities of the Executive Directors and the Supervisory Board for the Consolidated Financial Statements and the Combined Management Report

The executive directors are responsible for the preparation of the consolidated financial statements that comply, in all material respects, with IFRS as adopted by the EU and the additional requirements of German commercial law pursuant to section 315e (1) HGB, and that the consolidated financial statements, in compliance with these requirements, give a true and fair view of the assets, liabilities, financial position and financial performance of the Group. In addition, the executive directors are responsible for such internal control as they have determined necessary to enable the preparation of consolidated financial statements that are free from material misstatement, whether due to fraud (i.e. fraudulent financial reporting and misappropriation of assets) or error.

In preparing the consolidated financial statements, the executive directors are responsible for assessing the Group's ability to continue as a going concern. They also have the responsibility for disclosing, as applicable, matters related to going concern. In addition, they are responsible for financial reporting based on the going concern basis of accounting unless there is an intention to liquidate the Group or to cease operations, or there is no realistic alternative but to do so.

Furthermore, the executive directors are responsible for the preparation of the combined management report that as a whole provides an appropriate view of the Group's position and is, in all material respects, consistent with the consolidated financial statements, complies with German legal requirements, and appropriately presents the opportunities and risks of future development. In addition, the executive directors are responsible for such arrangements and measures (systems) as they have considered necessary to enable the preparation of a combined management report that is in accordance with the applicable German legal requirements, and to be able to provide sufficient appropriate evidence for the assertions in the combined management report.

The supervisory board is responsible for overseeing the Group's financial reporting process for the preparation of the consolidated financial statements and of the combined management report.

Auditor's Responsibilities for the Audit of the Consolidated Financial Statements and of the Combined Management Report

Our objectives are to obtain reasonable assurance about whether the consolidated financial statements as a whole are free from material misstatement, whether due to fraud or error, and whether the combined management report as a whole provides an appropriate view of the Group's position and, in all material respects, is consistent with the consolidated financial statements and the knowledge obtained in the audit, complies with the German legal requirements and appropriately presents the opportunities and risks of future development, as well as to issue an auditor's report that includes our audit opinions on the consolidated financial statements and on the combined management report.

Reasonable assurance is a high level of assurance but is not a guarantee that an audit conducted in accordance with section 317 HGB and the EU Audit Regulation and in compliance with German Generally Accepted Standards for Financial Statement Audits promulgated by the Institut der Wirtschaftsprüfer (IDW) will always detect a material misstatement. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these consolidated financial statements and this group management report.

We exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- identify and assess the risks of material misstatement of the consolidated financial statements and of the combined management report, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our audit opinions. The risk of not detecting a material misstatement resulting from fraud is higher than the risk of not detecting a material misstatement resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal controls.
- obtain an understanding of internal control relevant to the audit of the consolidated financial statements and of arrangements and measures relevant to the audit of the combined management report in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an audit opinion on the effectiveness of these systems.
- evaluate the appropriateness of accounting policies used by the executive directors and the reasonableness of estimates made by the executive directors and related disclosures.
- conclude on the appropriateness of the executive directors' use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Group's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in the auditor's report to the related disclosures in the consolidated financial statements and in the combined management report or, if such disclosures are inadequate, to modify our respective audit opinions. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Group to cease to be able to continue as a going concern.
- evaluate the overall presentation, structure and content of the consolidated financial statements, including the disclosures, and whether the consolidated financial statements present the underlying transactions and events in a manner that the consolidated financial statements give a true and fair view of the assets, liabilities, financial position and financial performance of the Group in compliance with IFRS as adopted by the EU and with the additional requirements of German commercial law pursuant to section 315e (1) HGB.
- obtain sufficient appropriate audit evidence regarding the financial information of the entities or business activities within the Group to express audit opinions on the consolidated financial statements and on the combined management report. We are responsible for the direction, supervision and performance of the group audit. We remain solely responsible for our audit opinions.
- evaluate the consistency of the combined management report with the consolidated financial statements, its conformity with German law, and the view of the Group's position it provides.
- perform audit procedures on the prospective information presented by the executive directors in the combined management report. On the basis of sufficient appropriate audit evidence we evaluate, in particular, the significant assumptions used by the executive directors as a basis for the prospective information, and evaluate the proper derivation of the prospective information from these assumptions. We do not express a separate audit opinion on the prospective information and on the assumptions used as a basis. There is a substantial unavoidable risk that future events will differ materially from the prospective information.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

We provide those charged with governance with a statement that we have complied with the relevant independence requirements, and communicate with them all relationships and other matters that may reasonably be thought to bear on our independence, and where applicable, the actions taken or safeguards applied to eliminate independence threats.

From the matters communicated with those charged with governance, we determine those matters that were of most significance in the audit of the consolidated financial statements for the current period and are therefore the key audit matters. We describe these matters in the auditor's report unless law or regulation precludes public disclosure about the matter.

Other Legal and Regulatory Requirements

Report on the Audit of the Electronic Reproductions of the Consolidated Financial Statements and of the Combined Management report Prepared for Publication Pursuant to section 317 (3a) HGB

Audit Opinion

We have performed an audit in accordance with section 317 (3a) HGB to obtain reasonable assurance whether the electronic reproductions of the consolidated financial statements and of the combined management report (hereinafter referred to as "ESEF documents") prepared for publication, contained in the file, which has the SHA 256 value c114c083dc2ea03436431c301daa4137a7a71bd1b9fb0c7c074e316f288ebc8f, meet, in all material respects, the requirements for the electronic reporting format pursuant to section 328 (1) HGB ("ESEF format"). In accordance with the German legal requirements, this audit only covers the conversion of the information contained in the consolidated financial statements and the combined management report into the ESEF format, and therefore covers neither the information contained in these electronic reproductions, nor any other information contained in the file identified above.

In our opinion, the electronic reproductions of the consolidated financial statements and of the combined management report prepared for publication contained in the file identified above meet, in all material respects, the requirements for the electronic reporting format pursuant to section 328 (1) HGB. Beyond this audit opinion and our audit opinions on the accompanying consolidated financial statements and on the accompanying combined management report for the financial year from January 1 to December 31, 2023 contained in the "Report on the Audit of the Consolidated Financial Statements and of the Combined Management Report" above, we do not express any assurance opinion on the information contained within these electronic reproductions or on any other information contained in the file identified above.

Basis for the Audit Opinion

We conducted our audit of the electronic reproductions of the consolidated financial statements and of the combined management report contained in the file identified above in accordance with section 317 (3a) HGB and on the basis of the IDW Auditing Standard: Audit of the Electronic Reproductions of Financial Statements and Management Reports Prepared for Publication Purposes Pursuant to section 317 (3a) HGB (IDW AuS 410 (06.2022)). Our responsibilities in this context are further described in the "**Group Auditor's Responsibilities for the Audit of the ESEF Documents**" section. Our audit firm has applied the requirements set forth in the IDW Quality Management Standards.

Responsibilities of the Executive Directors and the Supervisory Board for the ESEF Documents

The executive directors of the parent are responsible for the preparation of the ESEF documents based on the electronic files of the consolidated financial statements and of the group management report according to section 328 (1) sentence 4 no. 1 HGB and for the tagging of the consolidated financial statements according to section 328 (1) sentence 4 no. 2 HGB.

In addition, the executive directors of the parent are responsible for such internal controls that they have considered necessary to enable the preparation of ESEF documents that are free from material intentional or unintentional non-compliance with the requirements for the electronic reporting format pursuant to section 328 (1) HGB.

The supervisory board is responsible for overseeing the process for preparing the ESEF documents as part of the financial reporting process.

Group Auditor’s Responsibilities for the Audit of the ESEF Documents

Our objective is to obtain reasonable assurance about whether the ESEF documents are free from material intentional or unintentional non-compliance with the requirements of section 328 (1) HGB. We exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- identify and assess the risks of material intentional or unintentional non-compliance with the requirements of section 328 (1) HGB, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our audit opinion.
- obtain an understanding of internal control relevant to the audit on the ESEF documents in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an assurance opinion on the effectiveness of these controls.
- evaluate the technical validity of the ESEF documents, i.e. whether the file containing the ESEF documents meets the requirements of the Delegated Regulation (EU) 2019/815, in the version in force at the balance sheet date, on the technical specification for this electronic file.
- evaluate whether the ESEF documents enable a XHTML reproduction with content equivalent to the audited consolidated financial statements and to the audited combined management report.
- evaluate whether the tagging of the ESEF documents with Inline XBRL technology (iXBRL) in accordance with the requirements of Articles 4 and 6 of the Delegated Regulation (EU) 2019/815, in the version in force at the balance sheet date, enables an appropriate and complete machine-readable XBRL copy of the XHTML reproduction.

Further Information pursuant to Article 10 of the EU Audit Regulation

We were elected as Group auditor by the general meeting on April 22, 2022. We were engaged by the supervisory board on April 28, 2023. We have been the auditor of Merck Kommanditgesellschaft auf Aktien, Darmstadt/Germany, since the financial year 2023.

We declare that the audit opinions expressed in this auditor’s report are consistent with the additional report to the audit committee pursuant to Article 11 of the EU Audit Regulation (long-form audit report).

Other Matter – Use of the Auditor’s Report

Our auditor’s report must always be read together with the audited consolidated financial statements and the audited combined management report as well as with the audited ESEF documents. The consolidated financial statements and the combined management report converted into the ESEF format – including the versions to be submitted for inclusion in the Company Register – are merely electronic reproductions of the audited consolidated financial statements and the audited combined management report and do not take their place. In particular, the ESEF report and our audit opinion contained therein are to be used solely together with the audited ESEF documents made available in electronic form.

German Public Auditor Responsible for the Engagement

The German Public Auditor responsible for the engagement is Daniel Weise.

Frankfurt am Main, Germany, February 16, 2024

Deloitte GmbH
Wirtschaftsprüfungsgesellschaft

Signed:	Signed:
Christoph Schenk	Daniel Weise
Wirtschaftsprüfer	Wirtschaftsprüfer
(German Public Auditor)	(German Public Auditor)

Limited assurance report of the independent practitioner regarding the non-financial statement

To Merck Kommanditgesellschaft auf Aktien, Darmstadt/Germany

Our Engagement

We have performed a limited assurance engagement on the consolidated non-financial statement of Merck Kommanditgesellschaft auf Aktien, Darmstadt/Germany, ("the Company"), which was combined with the non-financial statement of the Company, for the financial year from January 1 to December 31, 2023 ("non-financial reporting") included in the combined management report on the Company and the Group.

Our assurance engagement did not cover the remuneration report and sustainability report, which are referred to in the non-financial reporting, nor any references to external sources of documentation and websites contained in the non-financial reporting, including the contents of such sources of documentation and websites. Moreover, our assurance engagement did not consider any disclosures relating to prior periods.

Responsibility of the Executive Directors

The executive directors of the Company are responsible for the preparation of the non-financial reporting in accordance with section 289c to section 289e German Commercial Code (HGB), section 315c in conjunction with section 289c to section 289e HGB and Article 8 of Regulation (EU) 2020/852 of the Parliament and the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088 ("EU Taxonomy Regulation") and the delegated acts adopted thereunder, as well as for making their own interpretation of the wording and terms contained in the EU Taxonomy Regulation and the delegated acts adopted thereunder, as set out in the section "**Reporting in accordance with the EU Taxonomy Regulation**" of the non-financial reporting.

This responsibility includes the selection and application of appropriate non-financial reporting methods and making assumptions and estimates about individual non-financial information of the Group that are reasonable in the circumstances. Furthermore, the executive directors are responsible for such internal control as the executive directors consider necessary to enable the preparation of a non-financial reporting that is free from material misstatement, whether due to fraud (i.e. fraudulent non-financial reporting) or error.

The EU Taxonomy Regulation and the delegated acts adopted thereunder contain wording and terms that are still subject to considerable interpretation uncertainties and for which clarifications have not yet been published in every case. Therefore, the executive directors have disclosed their interpretation of the EU Taxonomy Regulation and the delegated acts adopted thereunder in the section "**Reporting in accordance with the EU Taxonomy Regulation**" of the non-financial reporting. They are responsible for the defensibility of this interpretation. Due to the immanent risk that indeterminate legal terms may be interpreted differently, the legal conformity of the interpretation is subject to uncertainties.

The preciseness and completeness of the environmental data in the non-financial reporting is subject to inherent restrictions resulting from the manner in which the data was collected and calculated as well as from assumptions made.

Independence and Quality Assurance of the Audit Firm

We have complied with the German professional requirements on independence as well as other professional conduct requirements.

Our audit firm applies the national legal requirements and professional pronouncements – in particular the Professional Charter for German Public Auditors and German Sworn Auditors (BS WP/vBP) and the quality management standards issued by the Institute of Public Auditors in Germany (IDW) – and accordingly maintains a comprehensive quality management system that includes documented policies and procedures with regard to compliance with professional ethical requirements, professional standards as well as relevant statutory and other legal requirements.

Responsibility of the Independent Practitioner

Our responsibility is to express a conclusion with limited assurance on the non-financial reporting based on our assurance engagement.

We conducted our 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" issued by the IAASB. This standard requires that we plan and perform the assurance engagement to obtain limited assurance about whether any matters have come to our attention that cause us to believe that the Company's non-financial reporting – with the exception of the referenced remuneration report and sustainability report and of references to external sources of documentation and websites including their contents as well as of disclosures relating to prior periods – is not prepared, in all material respects, in accordance with section 289c to section 289e HGB, section 315c in conjunction with section 289c to section 289e HGB and the EU Taxonomy Regulation and the delegated acts adopted thereunder as well as the interpretation by the executive directors disclosed in the section "**Reporting in accordance with the EU Taxonomy Regulation**" of the non-financial reporting.

The procedures performed in a limited assurance engagement are less in extent than for a reasonable assurance engagement; consequently, the level of assurance obtained in a limited assurance engagement is substantially lower than the assurance that would have been obtained had a reasonable assurance engagement been performed. The choice of assurance work is subject to the practitioner's professional judgment.

Within the scope of our assurance engagement, which we performed in the months from October 2023 to February 2024, we have, among other things, performed the following assurance procedures and other activities:

- Gaining an understanding of the structure of the Group's sustainability organization and stakeholder engagement,
- Inquiries of the executive directors and relevant employees involved in the preparation of the non-financial reporting about the preparation process, about the internal control related to this process and about disclosures in the non-financial reporting,
- Identification of likely risks of material misstatement in the non-financial reporting,
- Analytical procedures on selected information in the non-financial reporting,
- Reconciliation of selected disclosures with the corresponding data in the consolidated financial statements and the annual financial statements and combined management report,
- Evaluation of the presentation of the non-financial reporting, and
- Evaluation of the process to identify taxonomy-eligible and taxonomy-aligned economic activities and the corresponding disclosures in the non-financial reporting.

In determining the information in accordance with Article 8 of the EU Taxonomy Regulation, the executive directors are required to interpret indeterminate legal terms. Due to the immanent risk that indeterminate legal terms may be interpreted differently, the legal conformity of their interpretation and, accordingly, our assurance engagement thereon are subject to uncertainties.

Practitioner's Conclusion

Based on the assurance procedures performed and the evidence obtained, nothing has come to our attention that causes us to believe that the combined non-financial statement of the Company for the financial year from January 1, 2023 to December 31, 2023 is not prepared, in all material respects, in accordance with section 289c to section 289e HGB, section 315c in conjunction with section 289c to section 289e HGB and the EU Taxonomy Regulation and the delegated acts adopted thereunder as well as the interpretation by the executive directors as disclosed in the section "**Reporting in accordance with the EU Taxonomy Regulation**" of the combined non-financial statement.

Our assurance engagement did not cover any external sources of documentation, expert opinions or references to external websites listed in the combined non-financial statement.

Restriction of Use

We issue this report as stipulated in the engagement letter agreed with the Company (including the "General Engagement Terms for Wirtschaftsprüfer and Wirtschaftsprüfungsgesellschaften (German Public Auditors and Public Audit Firms)" as of January 1, 2017, promulgated by the Institut der Wirtschaftsprüfer (IDW)). We draw attention to the fact that the assurance engagement was conducted for the Company's purposes and that the report is intended solely to inform the Company about the result of the assurance engagement. Consequently, it may not be suitable for any other purpose than the aforementioned. Accordingly, the report is not intended to be used by third parties for making (financial) decisions based on it.

Our responsibility is to the Company alone. We do not accept any responsibility to third parties. Our conclusion is not modified in this respect.

Frankfurt am Main, Germany, February 16, 2024

Deloitte GmbH
Wirtschaftsprüfungsgesellschaft

Signed:	Signed:
Daniel Oehlmann	Jan Joos
Wirtschaftsprüfer	Wirtschaftsprüfer
(German Public Auditor)	(German Public Auditor)

Business Development 2019 – 2023

This overview may include historically adjusted values in order to ensure comparability with the reporting period.

€ million	2019	2020	2021	2022	2023	Change in %
Results of operations						
Net sales	16,152	17,534	19,687	22,232	20,993	-5.6%
Operating result (EBIT)[1]	2,120	2,985	4,179	4,474	3,609	-19.3%
Margin (% of net sales)[1]	13.1%	17.0%	21.2%	20.1%	17.2%	
EBITDA[2]	4,066	4,923	5,946	6,504	5,489	-15.6%
Margin (% of net sales)[1]	25.2%	28.1%	30.2%	29.3%	26.1%	
Adjustments[1]	318	279	157	345	390	13.1%
EBITDA pre[1]	4,385	5,201	6,103	6,849	5,879	-14.2%
Margin (% of net sales)[1]	27.1%	29.7%	31.0%	30.8%	28.0%	
Profit before income tax	1,735	2,630	3,924	4,287	3,484	-18.7%
Profit after tax	1,324	1,994	3,065	3,339	2,834	-15.1%
Earnings per share (in €)	3.04	4.57	7.03	7.65	6.49	-15.2%
Assets and liabilities						
Total assets	43,808	41,796	45,362	48,535	48,495	-0.1%
Non-current assets	34,805	32,516	34,380	36,334	36,102	-0.6%
thereof:						
Goodwill	17,114	15,959	17,004	18,389	17,845	-3.0%
Other intangible assets	9,221	7,653	7,612	7,335	6,551	-10.7%
Property, plant, and equipment	6,192	6,421	7,217	8,204	9,056	10.4%
Current assets	9,003	9,280	10,982	12,201	12,393	1.6%
thereof:						
Inventories	3,342	3,294	3,900	4,632	4,637	0.1%
Trade receivables and other current receivables	3,488	3,221	3,646	4,114	4,004	-2.7%
Cash and cash equivalents	781	1,355	1,899	1,854	1,982	6.9%
Equity	17,914	17,017	21,416	26,005	26,754	2.9%
Financial liabilities	13,194	12,142	10,801	10,428	9,941	-4.7%
Non-current	8,644	9,785	8,270	9,200	9,239	0.4%
Current	4,550	2,357	2,531	1,228	702	-42.9%
Liquidity						
Payments for investments in intangible assets[3]	208	150	355	275	216	-21.5%
Payments for investments in property, plant, and equipment[3]	813	1,413	1,066	1,531	1,807	18.0%
Operating cash flow[3]	2,856	3,477	4,616	4,259	3,784	-11.2%
Net financial debt[1]	12,363	10,758	8,753	8,328	7,500	-9.9%
Other key data						
Equity ratio (in %)[1]	40.9%	40.7%	47.2%	53.6%	55.2%	
Research and development costs	2,268	2,288	2,426	2,521	2,445	-3.0%
Dividend per share (in €)	1.30	1.40	1.85	2.20	2.20[4]	0.0%
Employees (number as of December 31)	57,036	58,096	60,334	64,232	62,908	-2.1%

[1] Not defined by International Financial Reporting Standards (IFRS).

[2] Not defined by International Financial Reporting Standards (IFRS); EBITDA corresponds to operating result (EBIT) adjusted by depreciation, amortization, impairment losses, and reversals of impairment losses.

[3] According to the consolidated cash flow statement.

[4] Proposal on the appropriation of profits for 2023.

financial calendar

March
7
2024
Annual Press Conference

April
26
2024
Annual General Meeting

May
15
2024
Quarterly Statement Q1

August
1
2024
Half-yearly
Financial Report

November
14
2024
Quarterly Statement Q3

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