Fundamental information about the Group

Company Profile and Structure

We are Merck, a science and technology company dedicated to sparking discovery and elevating humanity. In our three business sectors Life Science, Healthcare and Electronics, we work together to create value on behalf of customers and patients.

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 are committed to working toward a better future and delivering sustainable progress for humankind.

The founding family, now in its 13th generation, is still the majority owner. This is made possible by the structure of our company as a corporation with general partners (Kommanditgesellschaft auf Aktien – KGaA). In a KGaA, the total capital is divided between general partners and limited partners; the general partners are personally liable with their assets, while the limited partners are liable with their contributions. The founding family holds a 70.274% stake in the listed MERCK Kommanditgesellschaft auf Aktien (Merck KGaA), Darmstadt, as a 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 uniformly by the entire management of the company for the Life Science, Healthcare and Electronics business sectors as well as the Group's Enabling 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.

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, and the Middle East and Africa. As of December 31, 2024, we had 62,557 employees[1] worldwide. The figure as of December 31, 2023, was 62,908 employees[1].

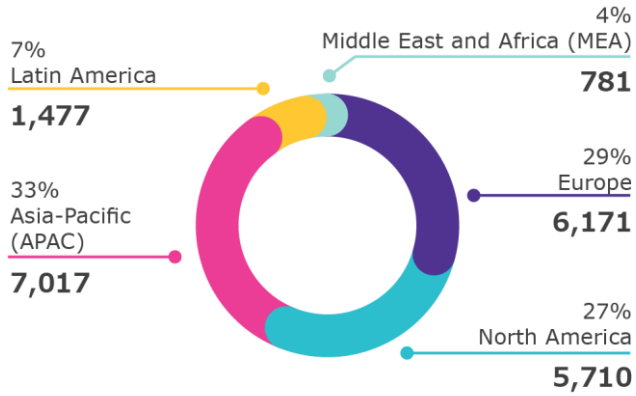
We have summarized further details on our employees and important sustainability topics, as well as the key indicators used to monitor sustainability and the degree to which we have achieved our strategic goals, in the "**(Group-) Sustainability Statement**".

For fiscal 2024, 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.

[1] Merck also employs people at sites of subsidiaries that are not fully consolidated. This number refers to people employed in fully consolidated subsidiaries excluding employees of HUB Organoids Holding B.V., Netherlands, whose acquisition was completed on December 23, 2024.

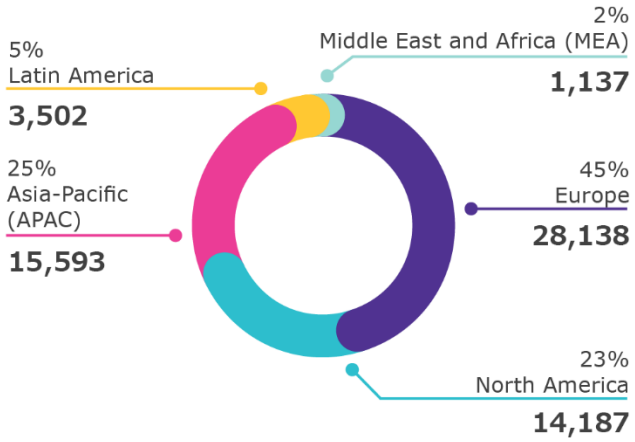
Merck Group

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



Merck Group

Employees by region as of December 31, 2024[1]
Number/in %



[1] Merck also employs people at sites of subsidiaries that are not fully consolidated. These numbers refer to people employed in fully consolidated subsidiaries excluding employees of HUB Organoids Holding B.V., Netherlands, whose acquisition was completed on December 23, 2024.

Life Science

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

Across our Life Science business sector, we collaborate with the global scientific community to deliver innovations. To this end, we offer a broad and deep product portfolio as well as global services as a contract development and manufacturing organization (CDMO), ranging from process development to commercialization. In fiscal 2024, we continued to consistently develop our strategy and strengthened our position as a diversified life science company with our three business units Science & Lab Solutions, Process Solutions and Life Science Services.

The development of preventive and personalized medicine is progressing steadily. It is therefore essential to set standards for robust, scalable and efficient processes for production of novel modalities such as antibody-drug conjugates (ADCs) and those for cell-, gene- and mRNA-based therapies. This progress will support the expansion of novel therapies as well as the treatment of further complex and chronic conditions including cancer, heart disease, diabetes, and muscular dystrophy.

To accomplish this, more than 1,700 scientists in research and development (R&D) within Life Science across twelve global sites focus on strengthening our core portfolio. They have enabled our three business units to launch more than 9,200 products and solutions, including those launched via our “faucet program” for antibodies, reference materials and nanomaterials.

In addition to our diversified portfolio of products and services, we offer a wealth of expertise to our customers around the world: We are constantly seeking opportunities to work together with leading universities around the world to advance research. For example, in May 2024 we signed a non-binding memorandum of understanding with the Korea Advanced Institute of Science and Technology (KAIST) to collaboratively advance the research and development ecosystem in Korea for industrial applications in life science. By partnering with this academic institution, we will provide researchers at KAIST’s labs with products from our chemistry and biology portfolios. A collaboration will also be established for joint R&D projects, focusing on advancing innovation in prioritized research areas.

In fiscal 2024, Life Science generated 42% of Group sales and 39% of EBITDA pre (excluding Corporate and Other). Europe and North America generated 70% of Life Science’s sales in 2024; Asia-Pacific and Latin America accounted for 29% of sales.

Science & Lab Solutions

The Science & Lab Solutions business unit supports customers in the biotech and pharmaceutical industries, public authorities and scientific institutions and other industrial markets. Customers can access a broad portfolio including reagents, consumables, devices, instruments, software, and services for research, production and testing in addition to lab water instruments, microbiology and biomonitoring products, test assays, analytical reagents, and flow cytometry kits and instruments.

In the first half of 2024, we introduced our M-Trace® software and the associated mobile app for microbiological quality control, a comprehensive data tracking solution to digitalize sterility testing. The software helps ensure overall process safety by automatically documenting data for every step of the testing process. This reduces the risk of deviations, false positive results and human error.

In June, we announced a collaboration with the New York City-based Michael J. Fox Foundation, New York, USA, aimed at advancing Parkinson's research to slow the progression of the disease, leveraging our SMCxPRO® immunoassay technology to help detect low levels of a biomarker associated with cell dysfunction in patients. The service is now available to the scientific community, making it possible to track the response of different therapeutic options to disease progression.

In December, we acquired Netherlands-based HUB Organoids Holding B.V., Utrecht, a pioneer in the field of organoids. Organoids are cell culture models that mimic the functions of an organ. They can accelerate drug development, improve the understanding of disease treatments in diverse populations and reduce the industry's dependence on animal testing.

Process Solutions

The Process Solutions business unit supports biotech and pharma customers that focus on developing and manufacturing traditional and novel therapies with its comprehensive portfolio of products and services, including filtration devices, chromatography resins, single-use systems, process chemicals, and excipients for bioprocessing.

In May 2024, we signed a definitive agreement to acquire the life science company Mirus Bio LLC (Mirus Bio) for a purchase price of US$ 617 million. Based in Madison, Wisconsin, USA, Mirus Bio specializes in the development and commercialization of transfection reagents, such as its own TransIT-VirusGEN®. These transfection reagents are used to help introduce genetic material into cells and thus play a key role in the production of viral vectors for cell and gene therapies. The transaction officially closed on July 31, 2024.

In September, we launched the first scalable single-use mixer specifically designed for manufacturing ADCs. ADCs are a rapidly emerging and relatively new class of therapeutic agents that can target and selectively kill tumor cells while protecting healthy ones. The Mobius® ADC Reactor enables biopharmaceutical companies to produce their therapies faster and more safely by offering accelerated turnaround times and fewer cross-contamination risks, all while maintaining high product quality. Additionally, the new reactor's single-use assemblies are manufactured using Ultimus® film technology, making the bags stronger, more durable and more resistant to leaks.

Life Science Services

The Life Science Services business unit manufactures traditional and novel modalities for biotech and pharmaceutical customers, including monoclonal antibodies, high-potency active pharmaceutical ingredients, antibody-drug conjugates, and viral and gene therapy products, as well as mRNA. With our integrated offering of contract development, manufacturing and testing services, we support customers from preclinical phases to commercial production.

In April, we launched a first-of-its-kind, all-in-one, validated genetic stability assay. The Aptegra™ genetic stability platform replaces five different assays and four different technologies with one assay that uses a digital platform with next-generation sequencing technology. This approach reduces testing time by 66% compared with traditional methods. The platform meets all regulatory requirements for genetic stability assurance, including gene copy number assessment.

In October, we opened our new € 290 million biosafety testing facility in Rockville, Maryland, USA. Biosafety testing and analytical development are fundamental components of drug development and commercialization for traditional and novel modalities. The 23,000 square-meter facility houses biosafety testing, analytical development and cell banking manufacturing services. The new site will feature advanced testing capabilities, including a rapid methods package that enables the fast testing of large sample volumes for virus contamination. This package is the first to include the Blazar® CHO Animal Origin Free (AOF) panel, a targeted molecular method for detecting virus families.

Investments to expand capabilities and production

- In February, we opened a new € 20 million, 10,000-square-meter distribution center in Cajamar, São Paulo, Brazil, to better serve our customers in the region and meet the country's growing demand for life science products.
- In March, we announced the expansion of our M Lab™ Collaboration Center in Shanghai, China, which brought together with several laboratories of the BioReliance® Biologics Testing Center under the new name Shanghai Technical Application and Testing Center. Shanghai M Lab™ is one of nine customer cooperation centers in our network.
- Also in March, we announced an investment of more than € 300 million in a new Bioprocessing Production Center in Daejeon, Korea. The new site is the largest investment in Asia-Pacific in the Life Science business sector to date and demonstrates our commitment to expanding our capacities in the fast-growing region. The production facility will manufacture essential products for biotechnology such as dry powder cell culture media, process liquids and sterile sampling systems, as well as offering small-scale pre-GMP production. By the end of 2028, the center is also expected to have a distribution center and an automated warehouse.
- In April, we announced the investment of more than € 300 million in a new research center in Darmstadt, Germany, named the Advanced Research Center. Starting in 2027, the building will be home to more than 500 employees focusing on researching solutions for manufacturing antibodies, mRNA applications and additional products required for biotechnological production.
- In June, we announced an investment of € 68 million in a new quality control building at our global headquarters in Darmstadt. The facility will bring together approximately 135 employees from across several departments in a single state-of-the-art collaborative space.
- Also in June, we also opened our newly expanded distribution center in Schnelldorf, Germany. With an investment of more than € 180 million, we have almost doubled our space. Alongside a new manual down-filling facility, the site now provides more space for distributing a wide range of products to laboratories and research facilities worldwide. The Schnelldorf site employs more than 400 engineers and experts in manufacturing and distribution.
- In late October, we announced the € 70 million expansion of our ADC manufacturing capabilities at our Bioconjugation Center of Excellence facility in St. Louis, Missouri, USA. This investment will significantly expand existing capacity and enhance our offering as a CDMO, reinforcing our commitment to partner with new and existing customers in the pharmaceutical industry as they advance their drug development pipelines. With the added capacity and upgraded process and analytical development labs, we will provide support for early-stage and commercial bioconjugates.

Healthcare

Our Healthcare business sector helps to create, improve, and prolong lives across the therapeutic areas of oncology, neurology & immunology and fertility as well as cardiovascular, metabolic and endocrinological disorders. As a global specialty innovator, with a strong established business, we deliver a diversified portfolio of therapies to millions of patients around the world, every day.

Throughout the reporting year 2024, we ensured the supply of our medicines beyond the demand anticipated at the start of the year despite ongoing geopolitical crises. Even as some of our competitors experienced shortages, we provided support and worked diligently to ensure, whenever possible, that patients could access an alternative therapeutic option.

In 2024, Healthcare generated 40% of Group sales and 46% of EBITDA pre (excluding Corporate and Other). Europe and North America generated 53% of Healthcare's net sales in the reporting year. Asia-Pacific and Latin America accounted for 40% of sales in 2024.

Oncology

Erbitux® (cetuximab) remains our best-selling healthcare product with € 1,162 million in sales in 2024. Erbitux® 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 approximately 200 active clinical trials involving Erbitux®, including more than 30 Phase III trials, we are committed to continuously advancing our robust lifecycle management strategy.

We have continued to make progress in transforming the global standard of care for patients with locally advanced or metastatic urothelial carcinoma (UC) as we continue to obtain additional regulatory and reimbursement approvals for Bavencio® (avelumab), our anti-PD-L1 antibody. Currently approved as a first-line maintenance treatment for advanced UC in over 70 countries, Bavencio® has become a standard of care in the treatment of this disease based on the results of the pivotal JAVELIN Bladder 100 trial, the only Phase III trial of an immunotherapy to demonstrate a significant overall survival benefit in the first-line maintenance setting.

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

We are also continuing to expand the availability of Tepmetko® (tepotinib), our oral MET inhibitor designed to inhibit the oncogenic MET receptor signaling caused by MET (gene) alterations. In February, the U.S. Food and Drug Administration (FDA) granted full approval to Tepmetko®, which had previously been available in the United States under accelerated approval. Tepmetko® is now available in approximately 40 markets globally, with regulatory submissions under review in additional markets.

In June 2024, we announced the discontinuation of the randomized Phase III TrilynX trial evaluating xevinapant plus chemoradiotherapy in patients with unresected locally advanced squamous cell carcinoma of the head and neck (LA SCCHN). The Phase III clinical trial XRay Vision evaluating xevinapant plus radiotherapy in patients with resected LA SCCHN was also discontinued (see "**Research and Development**" for further details).

We continued to advance our pipeline of novel oncology medicines in 2024. We presented first-in-human data for the first antibody-drug conjugate (ADC) developed in our labs, M9140, an ADC targeting carcinoembryonic antigen-related cell adhesion molecule 5 (CEACAM5), and advanced a second ADC, targeting GD2 (disialoganglioside expressed on tumors) into a Phase I clinical trial (see "**Research and Development**" for further details).

We also initiated new clinical studies for our portfolio of small-molecule DNA damage response (DDR) inhibitors. With our potent and selective inhibitor of ataxia telangiectasia and Rad3-related (ATR) tuvusertib (M1774) and

the selective PARP1 (poly ADP-ribose polymerase 1) inhibitor M9466 (also known as HRS-1167), licensed from Jiangsu Hengrui Pharmaceuticals Co. Ltd., we are exploring the potential of these investigational compounds in various tumors. This includes a Phase II trial opened in 2024 to evaluate the potential of two combinations with tuvusertib to overcome resistance to PARP inhibition in ovarian cancer (see "**Research and Development**" for further details).

Neurology & Immunology

We develop therapies for people living with neurological and immune-mediated conditions and aim to help significantly improve quality of life for them and their caregivers. Our portfolio is the result of over two decades of experience in MS research and currently includes two approved products for the treatment of relapsing MS (RMS): Rebif® (interferon beta-1a) and Mavenclad® (cladribine tablets).

Mavenclad®, the only short-course, oral disease-modifying therapy for the treatment of adults with various forms of highly active relapsing MS, achieved blockbuster status in 2024 for the second consecutive year, with total net sales of more than US$ 1 billion (€ 1,062 million). More than 100,000 patients have now benefited from Mavenclad® across more than 90 countries, including those of the European Union, Switzerland, Australia, Canada, and the United States. Rebif®, a disease-modifying drug, has been a standard treatment in RMS for over 20 years with almost 2 million patient-years of therapy since approval.

Beyond MS, we are continuing to expand the disease focus of our Neurology & Immunology therapeutic area by developing potential first-in-class treatments for conditions with high unmet medical needs. In June 2023, the FDA granted orphan drug designation for cladribine capsules for the treatment of generalized myasthenia gravis (gMG), and we initiated a global Phase III clinical trial program in June 2024.

In immunology, we have a Phase II clinical trial program of the investigational oral therapy enpatoran in cutaneous lupus erythematosus (CLE) and systemic lupus erythematosus (SLE). In October 2024, we shared an analysis from the CLE cohort of the study, which showed that enpatoran met its primary endpoint with an acceptable safety profile in CLE patients. The results from the SLE cohort of the study are anticipated in early 2025.

Fertility

We are a global market leader in fertility drugs and treatments. Infertility is an increasing challenge globally due to demographic change and lifestyle adjustments. Based on the latest data from WHO, one in six people worldwide is affected by infertility.

With our broad portfolio of treatment options, devices, and advanced fertility technologies, we aim to contribute to improved treatment outcomes that help couples fulfill the dream of parenthood.

According to the latest data, more than six 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. A recent real-world study from France showed improved live birth outcomes with Gonal-f® compared with other commonly used gonadotropins. Real-world evidence complements randomized clinical trials by providing additional insights into long-term treatment effects in large, heterogeneous patient populations.

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

Cardiovascular, Metabolism & Endocrinology

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

Glucophage®, containing the active ingredient metformin, is a drug for the first-line treatment of type 2 diabetes and is available in more than 100 countries. In recent years, Glucophage® has been approved by additional health authorities for use in prediabetes in cases where pronounced lifestyle changes failed to produce the desired outcome.

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.

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).

Saizen®, which contains the active ingredient somatropin, is our primary endocrinology product and is indicated for the treatment of various growth hormone disorders in both children and adults. Saizen® can be administered using the Easypod® auto-injector, the only growth hormone injection device capable of remotely transferring data such as injection times, dates, and doses to the web-based software system Growzen® Connect, which can be accessed by healthcare professionals, patients and caregivers. Alternatively, Saizen® can be delivered using Aluetta, a simple pen injection device.

Electronics

We are an integral part of the semiconductor ecosystem. With our materials, the related delivery equipment and tools for metrology and inspection, we are a significant part of the value chain for semiconductor processing. Our broad and innovative product portfolio helps solve key industry challenges. In doing so, we place a special focus on high-performance chips needed for applications including artificial intelligence (AI). We provide our materials, systems and services to all major industry players. To this end, we work closely with our customers in the key regions of North America, Europe and Asia Pacific and are a reliable and stable partner with our global network of R&D, production and distribution sites.

After a cyclical downturn, the semiconductor market began to recover during the course of the reporting year 2024, driven mainly by the positive market development for semiconductor materials for AI chips and advanced nodes. Global semiconductor industry sales are expected to grow between 9% and 12% year-on-year up to 2027. To meet the expected growth in demand in the next few years, major semiconductor manufacturers are investing in ramping up their production capacities. Accordingly, we are continuously expanding capacities at our sites all over the world in lockstep with our customers' plans.

We serve manufacturers of logic, memory and analog microchips. The evolution of AI and the unabated growth of data volumes in our digital world are setting ever tougher computing requirements for microchips. They need to be able to process (logic chips) and retrieve (memory chips) more data faster. The electronics industry is working on ever higher-performing devices with microchips that are smaller, faster and more efficient. Accordingly, advanced nodes are required with a higher transistor and memory cell density and more complex architectures (e.g. 3D stacking). Moreover, the most advanced packaging technologies, such as heterogeneous integration, are playing a significant role in further boosting system performance in semiconductors. Heterogeneous integration requires precise measurements of interconnects and components, leading to growing demand for innovative metrology and inspection tools alongside materials for front-end manufacturing (see the section on the **acquisition of Unity-SC**). Miniaturization, vertical stacking as well as heterogeneous integration require more and new process steps and, consequently, new material solutions for further densification.

We continuously strengthen our comprehensive portfolio in order to play a role in developing ever more sophisticated technologies, in doing so catering to the growing demand for cutting-edge microchips required in AI and high-performance computing. Due to this growing complexity, we need a broad portfolio and in-depth expertise to identify solutions that increasingly consist of innovations that build upon one another in a cumulative fashion. To this end, we rely on our Materials Intelligence™ – combining materials science and AI in an interdisciplinary and targeted way, with the objective of working with our customers to make this innovation process more efficient and reducing complexity effectively. As such, we are among the trailblazers when it comes to the next generation of logic and memory chips.

The Electronics business sector consists of the Semiconductor Solutions, Display Solutions (named Optronics since January 1, 2025) and Surface Solutions business units. Three cross-functional boards support the business units: the Technology Leadership Board, the Supply Chain Leadership Board and the Commercial Leadership Board. They define cross-sector standards, drive forward exchange on best practices, promote transparency, and therefore play a key role in our matrix organization.

In July 2024, we signed an agreement to divest the Surface Solutions business to Global New Material International Holdings Ltd. (GNMI) for an agreed purchase price of € 665 million (see **Surface Solutions** section).

Electronics accounted for 18% of Group sales in 2024, and its share of EBITDA pre (excluding Corporate and Other) was 15%. The majority of semiconductors and displays are manufactured in Asia. In 2024, Asia-Pacific generated 68% of Electronics' net sales, with Europe and North America accounting for 29% of sales. Semiconductor Solutions accounted for 69% of our Electronics sales in 2024, while Display Solutions contributed 20% and Surface Solutions 11%.

Acquisition of Unity-SC, SAS

As the industry moves towards more complex and integrated systems, metrology and inspection tools are becoming increasingly important to enable precise semiconductor manufacturing, as they help reduce production costs and optimize yields. To enhance our capabilities in this area, we have acquired Unity-SC, SAS (Unity-SC), a provider of 3D optical metrology and inspection instrumentation for the semiconductor industry based in Montbonnot-Saint-Martin near Grenoble, France. The acquisition was completed on October 31, 2024 for a purchase price amounting to € 144 million within the meaning of IFRS 3 (International Financial Reporting Standards), plus additional payments linked to the achievement of milestones. This transaction expands our expertise and our portfolio. Moreover, it enables us to deliver process control solutions in advanced packaging and heterogeneous integration for microchips and their internal connecting structures, which are essential for manufacturing advanced semiconductors, especially for AI chips. Unity-SC metrology and inspection tools measure key parameters during wafer processing and packaging steps. By adding these metrology and inspection tools for manufacturing to our portfolio, we are gaining a key technology and can obtain further insights into how our materials can increase added value for our customers.

Semiconductor Solutions

As the largest business unit in terms of sales within our Electronics business sector, Semiconductor Solutions offers products and services for the semiconductor industry. We are developing materials and solutions for the next generation of semiconductor components – helping to make microchips smaller, faster, more powerful, and more sustainable.

A microchip undergoes a large number of process steps during fabrication, and each of these steps is enabled by specialized materials that are subject to tough requirements. We supply a strong portfolio of materials for every key process step, focusing in particular on wafer processing. Our expertise not only covers the materials themselves, but also how they are integrated during fabrication to make the final components.

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

- The Thin Films business field supplies solutions and products for our customers in the fields of dielectrics (organosilanes and spin-on dielectrics) and metallic materials. Thin film technology allows materials to be deposited and removed on an atomic level, enabling more layers, higher complexity and new architectures – all essential factors for AI applications.
- The portfolio of the Formulations business field is divided into the areas of Patterning and Planarization. It includes lithography products such as photoresists, anti-reflective coatings and materials for directed self-assembly (DSA). Additionally, we offer a range of cleans and selective etch chemistries that help improve the patterning process. The Planarization business encompasses materials for chemical-mechanical planarization (CMP), which are essential for achieving the desired surface flatness and precision in semiconductor manufacturing.
- 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 processing. 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 of the industry's sites, production facilities and delivery systems are operated and maintained by our MEGASYS® Total Gas and Chemical Services employees.

Display Solutions

Our Display Solutions business unit (named Optronics since January 1, 2025) controls light for imaging, processing, measurements, and inspection. We materialize light through display materials, optical technologies, and metrology. These include the businesses with liquid crystals (LC), display patterning materials (photoresists), materials for organic light-emitting diodes (OLED), and reactive mesogens. We support our customers in developing novel technologies beyond TV monitors for IT, mobile devices, the automotive industry, gaming, and other applications. Together with our customers, we are working in the field of AR/VR to expand the range of application scenarios to include optoelectronic technologies. Furthermore, we collaborate very closely with leading panel makers to develop next-generation products with LCD (liquid crystal display) technology for the electronics market.

Thanks to the acquisition of Unity-SC, the business unit now also offers optical metrology equipment (see the section on **Unity-SC**), making full use of its optical capabilities. Optical components are becoming increasingly important when it comes to meeting requirements for more computing power, higher bandwidth and faster data transmission. At Electronics, we develop optical technologies with the goal of enhancing the performance of electronic devices.

Surface Solutions

In our Surface Solutions business unit, we provide our customers with solutions that help them 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, protective or 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.

Given our strategic focus on the electronics market and the advancement of future technologies, the Surface Solutions business is no longer at the core of what we do in Electronics. On July 25, 2024, we signed an agreement to divest the Surface Solutions business unit to GNMI, also known under the Chesir brand name. The company is one of the largest manufacturers of pearlescent pigments with sites in China and Korea. The agreement comprises the majority of the global production, sales and development activities of our Surface Solutions business unit. Its presence in Europe and North America would complement that of GNMI, which is represented in Asia. The transaction is expected to close in the second half of 2025 and is subject to regulatory approvals and the satisfaction of certain other customary closing conditions.

Strategy*

Vision and strategy fundamentals

In an ever more complex world increasingly characterized by macroeconomic and geopolitical tensions, we once again demonstrated our impressive resilience and returned to growth in fiscal 2024. Driven by factors such as an aging population, new technologies and climate change, we believe that the demand for scientific breakthroughs has never been greater.

We embrace change as a catalyst for innovation and growth. United behind our vision of "Sparking Discovery, Elevating Humanity", we are committed to creating a brighter, healthier and more sustainable world by empowering science to achieve breakthroughs. Our history spanning more than 356 years, coupled with our diversified business model, puts us in an excellent position to continue to tap into attractive global markets with long-term growth potential.

By implementing our innovation-centric strategy, we will continue to strengthen our position as a leading science and technology company. Our Life Science business sector targets the expanding market for complex molecules and novel modalities, for example. In Healthcare we focus on specialty pharmaceuticals in Oncology and Neurology & Immunology, with established products such as Erbitux® and Bavencio® for cancer and Mavenclad® for multiple sclerosis. In Electronics, we benefit from the increasing demand for semiconductors, which is driven by aspects including data growth, artificial intelligence (AI) and the Internet of Things (IoT).

The ongoing development and integration of digital and data-based technologies will considerably increase our value creation and our capacity for innovation in all three business sectors. Our data and digital strategy is anchored in a clearly defined roadmap designed to continuously enhance our digital infrastructure and elevate our digital differentiation from competitors across our businesses. A recent example of this is our strategic partnership with Siemens, for which we signed a memorandum of understanding in fiscal 2024. Together, we have set the goal of driving digital transformation across our business sectors through strategic projects in the field of smart manufacturing (Smartfacturing).

At the same time, we are committed to maintaining our positive impact on society and the planet by incorporating environmental, social and corporate governance considerations into our growth ambitions. By 2030, we intend to achieve progress for more than one billion people through sustainable science and technology. Moreover, we will fully integrate sustainability into our value chains by the same year. In addition, we will achieve climate neutrality and reduce our consumption of resources by 2040.

Our strategic investments are intended to further expand our positions in high-growth areas, enabling strong long-term profitable growth and attractive cash generation. In this context, active management of our business portfolio will remain a crucial element. Recent examples include the acquisition of Mirus Bio LLC, United States, a leader in transfection reagents for cell and gene therapies, and Unity-SC, France, a provider of metrology and inspection instrumentation for the semiconductor industry. In addition, we signed an agreement to divest our Surface Solutions business unit to sharpen our focus on high-tech applications in Electronics.
Merger and acquisition (M&A) measures will continue to play an essential role in optimizing our positioning for decades to come.

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

Business strategies

Life Science

Our Life Science business sector continues to be a global leader in the approximately € 220 billion life science market. As the impact of pandemic-associated supply disruptions and recent capital constraints diminishes, we are poised for growth. We anticipate a medium- to long-term annual market growth rate of 5% to 7%, which presents numerous opportunities for our Life Science business to deliver value to customers in rapidly evolving segments. Our updated strategic plan will concentrate on increasing sales and EBITDA pre by strengthening our focus on academic, biotech and pharma customers and establishing portfolio leadership. At the same time, we intend to improve our customer experience and drive operational excellence. Over the medium to long term, we will continually advance along three themes.

First, we are recognized for offering products, services and solutions that perfectly meet our customers' scientific and technical needs thanks to our diverse portfolio. To build on this, we are strengthening a unified sector-wide portfolio strategy that aligns our offerings with the emerging needs of our target customers. Second, we will advance our new product development by increasing our research and development (R&D) allocation, pursuing bigger and bolder innovation projects and driving more collaborations. This will invigorate our portfolio with new technology anchors and bring about a step change in the value of our R&D portfolio and returns with new products. Third, we will pursue complementary inorganic paths through targeted collaborations and M&A measures to expand our offerings in attractive segments.

By 2030, we aim to have evolved our portfolio to address the needs of academic, biotech and pharmaceutical customers even more effectively along the molecule and modality journey from concept to commercialization, including discovery research, process development, manufacturing, and testing.

The pursuit of differentiation through portfolio leadership guides our business ambitions.

In Science & Lab Solutions, we aim to accelerate innovation for scientific labs and manufacturers to advance health and contribute to a sustainable future. In Process Solutions, our ambition is to anticipate and shape the future of biomanufacturing together with our customers. We will achieve this through a uniquely differentiated offering, amplified by our commercial execution. And in Life Science Services, our objective is to become an acknowledged, trusted and innovative service provider for the biotech and pharma industry, aiming for an excellent position in our targeted modalities, especially antibody-drug conjugates, viral vectors and mRNAs.

Our commitment to science and technology aligns with our customers' needs for innovative solutions that facilitate new discoveries and manufacturing efficiencies.

While we aim to secure a lasting role as a scientific and technical leader, we must also evolve our customer experience and drive operational excellence to meet changing customer expectations and continue to grow profitably. On the theme of customer experience, we aim to provide seamless interactions along the customer journey.

We will advance our multichannel sales approach, e-commerce platform and sustainability and improve our service levels. Through operational excellence initiatives, our business processes and integrated supply chain organization will become more agile, resilient and customer-centric.

A sharper focus on the needs of academic, biotech and pharmaceutical customers will unite our teams globally around our declared purpose to impact life and health with science.

Healthcare

The global pharmaceutical industry continues to deliver robust growth at attractive margins. Although the macroeconomic and geopolitical environment has displayed increasing volatility for a number of years, the impact of cyclical and/or crisis-related market fluctuations on the industry's underlying growth drivers – i.e. demographic shifts, increasing access to medicines and the emergence of innovative new therapeutic approaches – remains comparatively modest, resulting in relatively constant demand for pharmaceutical products. Our diversified portfolio and our geographical footprint have proven resilient and represent a solid foundation for the future success of our Healthcare business.

In developed and, increasingly, in emerging markets, the majority of pharmaceutical market growth and long-term profitability stems from innovation. Similarly, the growth of our Healthcare business is primarily driven by launches of innovative products, while our mature portfolio provides us with a strong foundation to continue our investment in innovation. Given these dynamics, we remain steadfast in our ambition to continue to grow as a global specialty innovator. Innovative launches in Oncology and Neurology & Immunology put us at the leading edge of change and fuel the growth of our business. Our ambition builds on a solid foundation, and we continue to grow our established franchises, Cardiovascular, Metabolism & Endocrinology and Fertility, both sustainably and profitably. Complementing our portfolio with external innovations further boosts our growth outlook and ensures long-term sustainability. In our decision-making, we focus on areas in which we have the best chance of success thanks to our scale and the diligent trade-off of clinical versus commercial risks in our pipeline.

Despite recent setbacks in late trial phases of our pipeline, we remain committed to innovation. We continue to drive pipeline projects with the aim of bringing innovative medicines to patients, maximizing our existing portfolio and continuing our expansion in growth markets.

To maximize the results of our R&D investments and ensure their long-term sustainability, we continuously progress our R&D model to expand our innovation capabilities. Furthermore, we aim to increase our intake of external innovation in line with industry practice in order to bolster our pipeline with more attractive business opportunities.

We continue to focus on specialty medicine franchises. Within each specialty franchise, our approach is to develop deep internal expertise and insights, from internal research to commercialization, augmented by recruiting external talent and strategic collaborations. 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.

We aim to reinforce and expand our global presence, bringing the innovation of our pipeline to patients and growing our business in all major markets. With innovation being the key growth driver and the majority of absolute pharmaceutical market growth stemming from developed markets, we aim to strengthen our position in these markets through our innovative portfolio. At the same time, rapidly evolving healthcare infrastructure in 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 while leveraging our strengths in further markets and ensuring the profitable growth of the existing business will be a strategic imperative.

Electronics

Our ambition is to be a leading partner in materials and material-related equipment as well as services for the electronics industry by maximizing added value for our customers with our Materials Intelligence™. We have successfully taken up a leading role in the semiconductor ecosystem and already serve the world's most important industry players with one of the broadest portfolios. The semiconductor ecosystem is one of the most innovative, fast-paced and scientifically advanced industries. Our portfolio and innovation mindset are ideally suited to helping the industry overcome technological challenges. Our increasingly data-driven solutions are designed to address all areas of 3D densification, including miniaturization, performance optimization, vertical stacking, and heterogeneous integration.

We are investing in innovations and sustainable alternatives to help the industry overcome its sustainability challenges. Recognizing the increased demand for sustainable solutions, we see an opportunity to offer products that are unique in the market and lead the industry toward more resource-efficient production of end products.

The medium- and long-term growth prospects of the industry remain very attractive. The increasing importance of AI and the unabated growth of data volumes in our digital world are setting ever-tougher computing requirements for microchips, which need to be able to process more data faster (logic chips) and enable faster data access (memory chips). Semiconductors will thus continue to be indispensable in numerous industries. The most important end market growth drivers are the next generation of chips enabled by advanced nodes – especially for AI – and the end device replacement cycle accelerated by this, accompanied by an increasing semiconductor content per device. Both growth drivers will have a positive impact on Electronics' business in wafer processing and microchip packaging. AI in particular is and will remain the driving force behind business development.

These factors are expected to act as a catalyst for growth and market development over the next decade. To produce ever more powerful and energy-efficient microchips, innovation in novel materials will be even more essential. This leads to further miniaturization and ever more complex architectures in semiconductors. We drive customer intimacy by embedding innovations and solutions from our brand portfolio in the technology roadmaps of our customers. At the same time, we are continuously broadening the scope of our offering beyond our current focus on the wafer processing chain and are investing to support the realization of new architectures through heterogeneous integration in chip manufacturing.

Additionally, we expect that expertise in optronics will become even more important. Optical technologies are gaining in importance in the semiconductor industry. Market forecasts take the same view and predict that semiconductor and optical technologies will increasingly converge. To address this growing field of convergence, we will use our Materials Intelligence™, leveraging our deep technological expertise in optics and chemistry throughout critical production processes in the electronics industry. Our strengths – ranging from organic synthesis to our expertise in manufacturing semiconductor components – are essential to utilizing new business opportunities in the field of optoelectronic technologies, such as in augmented reality, virtual reality and mixed reality, as well as the newly acquired metrology and instrumentation business of Unity-SC. Furthermore, the pace of innovation in AI chips requires heterogeneous integration with optical interconnects in order to manage efficiency and high-bandwidth data transfer as well as overcome the transmission limitation of traditional electrical wiring. Additionally, the further development of our display businesses with liquid crystals and materials for organic light-emitting diodes remains an important part of our optronics portfolio and will open up new opportunities.

In our view, we are also well prepared for very long-term trends in the industry. One example is the fusion of semiconductor technology and biotechnology, which is already emerging in neuromorphic chips and biosensors. We believe that a 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.

With the divestment of Surface Solutions, we are sharpening our focus on the electronics industry in order to play an even more important role within the semiconductor ecosystem.

Data & digital strategy

We accelerate innovation as a long-term growth driver by leveraging collaboration through data and digital technologies among other things. Our mission is to harness the transformative power of data and digital innovations in everything we do to spark discovery and elevate humanity. By embedding our vision into our Data & Digital strategy, we strive to provide best-in-class solutions for our three business sectors and deliver value to the industries they serve.

We are expanding our innovation efforts into new technologies, markets and digital business models with a strategic focus on enhancing existing assets and capabilities. The newly established Data, Digital & IT Executive Council under the joint leadership of the Group Chief Science & Technology Officer and the Group Chief Information Officer leads this effort, integrating transformative technology trends to foster innovation across our business sectors.

Our approach is exemplified by joint initiatives, such as UPTIMIZE, our data and AI ecosystem, and the Smartfacturing program, which enhance operational excellence and streamline processes across sectors. UPTIMIZE provides a harmonized data and AI operating model, enabling us to derive actionable insights and scale the company’s machine learning and AI capabilities.

The Smartfacturing program is building a robust infrastructure for scalable AI capabilities by using real-time data from IoT sensors, connected equipment and operational systems. This drives operational efficiency, product quality and an adaptive supply chain, enabling us to effectively meet evolving market demands and regulatory requirements.

Data culture is foundational to our digital transformation. Through data upskilling initiatives and generative AI literacy programs, including our own myGPT Suite, we empower our workforce to use data effectively and securely, ensuring a collaborative approach to innovation and value creation.

Sustainability strategy

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 and integrate circular economy aspects. 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 crucial to us. By supplying products that meet extensive sustainability criteria, we also help other companies to achieve their sustainability goals.

Sustainability is a key element of our corporate strategy. We pursue three strategic sustainability goals: By 2030, we intend to achieve progress for more than one billion people through sustainable science and technology. Moreover, we will fully integrate sustainability into our value chains by the same year. In addition, we will achieve climate neutrality and reduce our resource consumption by 2040. With these goals, we are helping to achieve the UN Sustainable Development Goals. 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.

We use 16 key indicators to record and assess our progress towards achieving our sustainability goals. Our annual Long-Term Incentive Plan 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 the reporting year, the company tied 15% of variable employee compensation to sustainability parameters.

As such, we are in the process of transforming our company with the aim of balancing environmental, social and governance aspects – for us as a company, for our stakeholders and for society at large. We are integrating sustainability into the innovation process and all parts of the value chain, in doing so positioning ourselves as a responsible company, and expect a lasting competitive advantage. It is our aim to decouple the growth of our businesses from negative environmental impacts.

More information about sustainability topics, as well as the key indicators used to monitor sustainability and the degree to which we have achieved our strategic goals, can be found in the "**(Group-) Sustainability Statement**".

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 2029 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 August 2024 (€ 0.8 billion hybrid bond issue). The use of various instruments provides a broad financing basis and addresses different investor groups.

Maintaining reliable and long-term 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 financial institutions with strong capabilities and expertise in various products and geographical regions. We regard these banks as strategic partners and therefore involve them in important financing transactions.

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 a cornerstone of our financial policy as it safeguards access to attractive financial conditions on the capital markets.

In November 2024, our rating was confirmed by Moody’s (A3, stable outlook); Standard & Poor’s confirmed our rating (A, stable outlook) in December 2024.

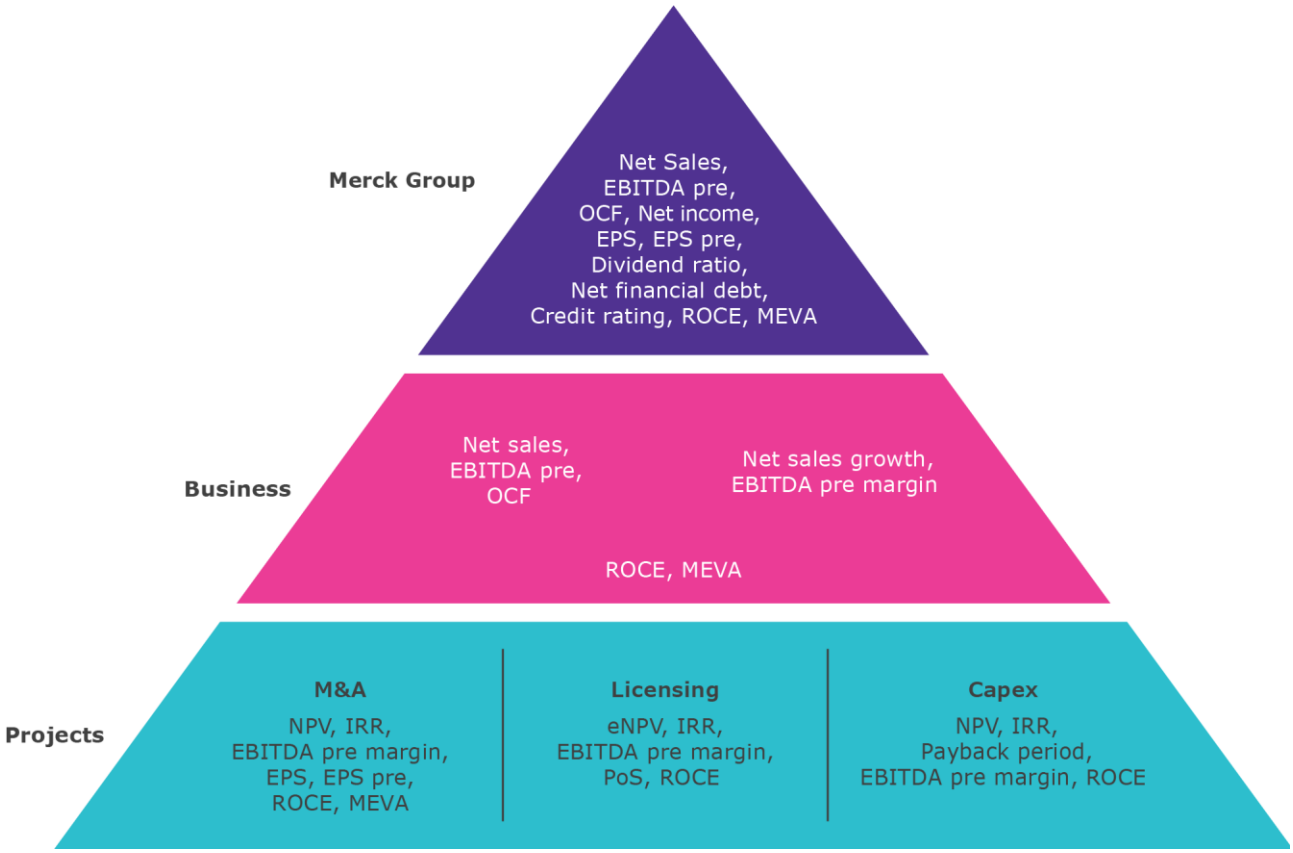
Sustainable dividend policy

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 as a percentage of net sales.
EPS = Earnings per share.
EPS pre[1] = Earnings per share pre (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 indicators for assessing our 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 are therefore an important parameter of external as well as internal performance measurement. In addition, organic sales growth compared with the annual 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 fluctuations 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	**2024**	2023	€ million	%
Net sales	**21,156**	**20,993**	**163**	**0.8%**

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 allows for efficiency improvements to be implemented in processes without the performance of the operating business being affected by exceptional items or restructuring expenses. The following table shows the composition of EBITDA pre in fiscal 2024 compared with the previous year. The International Financial Reporting Standards (IFRS) figures have been modified to reflect the elimination of adjustments included in the respective functional costs.

Merck Group

Reconciliation EBITDA pre[1]

	2024			2023			Change
€ million	IFRS	Elimination of adjustments	pre[1]	IFRS	Elimination of adjustments	pre[1]	pre[1]
Net sales	**21,156**	**–**	**21,156**	**20,993**	**–**	**20,993**	**0.8%**
Cost of sales	-8,671	41	-8,630	-8,600	43	-8,558	0.8%
Gross profit	**12,485**	**41**	**12,526**	**12,392**	**43**	**12,435**	**0.7%**
Marketing and selling expenses	-4,536	30	-4,506	-4,510	44	-4,466	0.9%
Administration expenses	-1,370	154	-1,216	-1,392	246	-1,146	6.1%
Research and development costs	-2,279	11	-2,269	-2,445	7	-2,438	-7.0%
Impairment losses and reversal of impairment losses on financial assets (net)	-8	2	-7	-51	–	-51	-87.1%
Other operating income and expenses	-646	333	-313	-385	138	-247	26.8%
Operating result (EBIT)[1]	**3,645**			**3,609**			
Depreciation/amortization/impairment losses/reversals of impairment losses	2,134	-277	1,856	1,880	-87	1,792	3.6%
EBITDA[2]	**5,779**			**5,489**			
Restructuring expenses	144	-144	–	249	-249	–	
Integration expenses/IT expenses	103	-103	–	118	-118	–	
Gains (-)/losses (+) on the divestment of businesses	-46	46	–	-51	51	–	
Acquisition-related adjustments	26	-26	–	18	-18	–	
Other adjustments	68	-68	–	56	-56	–	
EBITDA pre[1]	**6,072**	**–**	**6,072**	**5,879**	**–**	**5,879**	**3.3%**
thereof: organic growth[1]							6.9%
thereof: exchange rate effects							-3.6%
thereof: acquisitions/divestments							-0.1%

[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	**2024**	2023	€ million	%
EBITDA pre[1]	**6,072**	**5,879**	**193**	**3.3%**
Adjustments[1]	-293	-390	97	-24.9%
Finance result[2]	-108	-125	17	-13.4%
Income tax[2]	-751	-650	-101	15.5%
Changes in working capital[1]	-63	-141	78	-55.4%
thereof: Changes in inventories[3]	36	-89	124	>100.0%
thereof: Changes in trade accounts receivable[3]	79	-8	88	>100.0%
thereof: Changes in trade accounts payable/refund liabilities[3]	-178	-43	-134	>100.0%
Changes in provisions[3]	62	188	-126	-67.0%
Changes in other assets and liabilities[3]	-309	-755	446	-59.1%
Neutralization of gains/losses on disposal of fixed assets and other disposals[3]	-2	-150	148	-98.6%
Other non-cash income and expenses[3]	-22	-72	50	-69.6%
Operating cash flow	**4,586**	**3,784**	**802**	**21.2%**

[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.

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 to prioritize investments in property, plant and 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 in a period. 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 account of the fact that the general partner's capital is not represented by shares. To provide an alternative view, we also report earnings per share pre, in which the effects of integration expenses, IT expenses for selected projects, restructuring expenses, gains/losses on the divestment of businesses, acquisition expenses, and other adjustments are eliminated. Furthermore, amortization of acquired intangible assets is adjusted. 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	**2024**	2023	€ million	in %
Net income	**2,777**	**2,824**	**-47**	**-1.7%**
Non-controlling interest	9	10	-1	-9.0%
Income tax	751	650	101	15.5%
Amortization of acquired intangible assets	714	783	-69	-8.8%
Adjustments[1]	570	477	93	19.5%
Income tax on the basis of the underlying tax rate[1]	-1,061	-1,044	-17	1.6%
Non-controlling interests to be adjusted	-9	-10	1	-9.0%
Net income pre[1]	**3,751**	**3,691**	**61**	**1.6%**
Earnings per share pre[1] in €	**8.63**	**8.49**	**0.14**	**1.6%**

[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 key indicators for the credit rating are EBITDA, cash flow, and net/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 Merck forward. In making our high-impact culture a lived reality, we measure our ability to attract, develop, and retain the right people.

Sustainability

With our sustainability strategy, we aim to achieve human progress through sustainable innovations and technologies, to comprehensively integrate sustainability within our value chains, and to reduce our resource consumption. We pursue these goals across seven focus areas in which we realize numerous initiatives and projects and measure 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 diversity among our leaders in order to create an inclusive culture that reflects our values and enables every employee to fulfill their potential.

Research and Development

We are a diversified science and technology company with a leading position in the life science, healthcare and electronics industries. In line with our new vision of "Sparking Discovery. Elevating Humanity", we are striving for innovation in all three business sectors in order to make our growth plans a reality. We conduct research and development (R&D) worldwide to develop new products, services and solutions 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 as early as the product development stage (see "**(Group-) Sustainability Statement**").

Around 6,400 employees (2023: approximately 6,500) worked in R&D and related support functions in 2024. They dealt with innovations to address long-term health and technology trends in both established and growth markets.

Expenditure for R&D amounted to € 2.3 billion in 2024 (2023: € 2.4 billion).

The organizational setup of our R&D activities reflects our structure. In the Life Science business sector, we drive scientific breakthroughs with innovative technologies for applications in natural sciences and pharmaceutical research that enable life-saving novel therapies and treatments for diseases such as cancer and diabetes. In the Healthcare business sector, we develop innovative therapies, leveraging internal discoveries and external partnerships. In the Electronics business sector, we are accelerating the development of the next generation of microchips to enable innovations in the semiconductor and display industry that are needed for AI applications and the digital world of the future.

At Group level, we want to create synergies both within and between our business sectors and continuously develop new areas of innovation. One of our key objectives is to continue expanding the scope of our innovation by looking into new technologies, markets and digital business models as well as by leveraging existing assets and capabilities and combining them with data and digital technologies. Our efforts in this area include Syntropy® and Athinia®, which are partnerships with Palantir. Both platforms enable secure AI data flows and data sharing ecosystems that can help increase efficiencies while ensuring that stakeholders maintain control of their intellectual property.

We opened the Merck Digital Hub in Singapore in January 2024. Supported by the Singapore Economic Development Board, the Digital Hub aims to drive progress within the healthcare and semiconductor industries. The Merck Digital Hub is also where the expertise of Syntropy® and Athinia® will converge to help data owners integrate and curate their data across organizations.

In addition, we are continuing to develop opportunities at the intersection of our business sectors and converging technologies to develop solutions that enable our three business sectors to bring value to the industries they serve:

- We are continuing to build our automated design-make-test-analyze platform powered by lab automation and AIDDISON™, our generative AI-powered active ingredient discovery platform. Following its launch by Life Science in 2023, we updated AIDDISON™ in 2024 to meet the needs of our customers even more effectively. In addition to external commercialization, we also use it internally in our Healthcare business sector in early stages of drug discovery. Our AI in Drug Discovery program will accelerate the discovery of new and better drug candidates, making new therapies available to patients faster.
- We are using our capabilities across our sectors in messenger ribonucleic acid (mRNA) synthesis, lipid nanoparticle (LNP) synthesis and formulation, targeted delivery, and AI to enable the development of "smart" LNPs that can more effectively target different tissue types including hard-to-reach biological targets to treat various diseases.

- We contribute to our Healthcare pipeline through a new type of antibody-targeted drug modality capable of selectively delivering PROTACs (PROteolysis TArgeting Chimeras) to tumor cells. The newly developed technology, which is patent pending, has the potential to release two active ingredients in a targeted manner that enable tissue- and target-selective degradation. This “plug-and-play” technology can be applied to multiple therapeutic targets across different therapeutic areas, potentially revolutionizing the fields of both antibody-drug conjugates (ADCs) and PROTACs.

In 2024, we also successfully completed several pilot projects of our “Smartfacturing” program, i.e. highly adaptable, modular smart factories, including the development and implementation of a new automation technology for GMP (good manufacturing practice) production that enables equipment connectivity. This technology uses special software components called module type packages to interlink different production devices and systems based on a common standard. This project was supported with funding from the German Federal Ministry for Economic Affairs and Climate Action.

We are currently utilizing the new automation technology to produce both pharmaceuticals and chemicals, but it can also be applied to various production processes and manufacturing industries. To further advance our initiatives in this area, we have formed a strategic partnership with Siemens, aimed at fostering transformative projects across our three business sectors. By integrating Merck’s expertise in Life Science, Healthcare and Electronics with Siemens’ leadership in advanced hardware and software development, this partnership will facilitate the design of faster, more cost-effective and more sustainable manufacturing processes.

The following table depicts research and development costs of the business units in fiscal 2023 and 2024:

			Change	
€ million	**2024**	2023	€ million	%
Life Science	388	396	-9	-2.2%
Healthcare	1,503	1,657	-154	-9.3%
Electronics	297	297	–	-0.2%
Corporate and Other	92	94	-3	-2.7%
Total	**2,279**	**2,445**	**-166**	**-6.8%**

The ratio of research expenditure to Group sales was 10.8% (2023: 11.6%). It has declined due to positive sales development and the discontinuation of clinical studies in Healthcare.

Life Science

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

The development of preventive and personalized medicine is progressing steadily. It is therefore essential to set standards with robust, scalable and efficient processes for viral vector production, next-generation sequencing, i.e. improved technologies for DNA 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.

Together, we are having a decisive impact on these scientific developments. To this end, more than 1,700 engineers, chemists and biologists across our twelve global hubs continue to focus on six strategic innovation vectors: building our core portfolio, labs and factories of the future, novel modalities, next-generation biology, Artificial Intelligence (AI) and digital, and sustainability. In 2024, we launched more than 9,200 products and solutions, including those under our “faucet program” for antibodies, reference materials, chemicals, and nanomaterials.

Science & Lab Solutions

In 2024, we launched our M-Trace® software and the associated mobile app for microbiological quality control, a comprehensive data tracking solution to digitalize sterility testing. The software helps ensure overall process safety by automatically documenting data for every step of the testing process. This reduces the risk of deviations, false positive results, and human error.

For more than 50 years, our lab water systems have been an integral part of academic laboratories. In 2024, we continued to evolve our Milli-Q® lab water systems with the launch of Milli-Q® SQ 2Series systems. Installation of these compact systems into laboratory setups can be self-managed by customers and take 30 minutes. It is also what we call a “Greener Alternative Product”, reducing water usage by up to 60% and minimizing power consumption compared with our previous series, thus providing a greener solution for ultrapure water. We also launched enhanced Milli-Q® water purification cartridges with sustainability in mind. For instance, the carbon emissions of these can now be reduced by up to 18% over the water purification system’s lifetime.

Process Solutions

In September, we launched the first scalable single-use mixer specifically designed for manufacturing antibody-drug conjugates (ADCs). ADCs are a rapidly emerging class of therapeutic agents that can target and selectively kill tumor cells while protecting healthy ones. The Mobius® ADC Reactor enables biopharmaceutical companies to produce crucial therapies faster and more safely by offering accelerated turnaround times and fewer cross-contamination risks, all while maintaining high product quality. The new ADC bioreactor is a collaboration between the Process Solutions and Life Science Services business units.

In addition, Process Solutions launched several other products to support the needs of our customers, including: GMP-grade Benzonase® salt tolerant endonuclease, which enables the incorporation of high salt concentrations during the midstream step in bioprocessing; mPredict™ Co-Crystal Prediction Service, a new AI-based tool designed to accelerate drug formulation that achieves results three times faster than random digital screening; RevIT GMP AAV Enhancer, which can be paired with any transfection reagent and delivers higher titers for recombinant adeno-associated virus production; and Cellvento® ModiFeed Gal+, Gal-, and Sial+ COMP feeds, three new chemically defined feeds, enabling customers to easily fine-tune galactosylation or sialylation (crucial product quality attributes) of mAbs, biosimilars or other therapeutic proteins.

Life Science Services

In April, Life Science Services launched a first-of-its-kind, all-in-one, validated genetic stability assay. The Aptegra™ genetic stability platform replaces five different assays and four different technologies with one assay that uses a digital platform with next-generation sequencing technology. This approach reduces testing time by 66% compared with traditional methods. The platform meets all regulatory requirements for genetic stability assurance, including copy number assessment.

Healthcare

Patients are at the center of all our research and development efforts. We are committed to innovation in science to bring more medicines to more patients, faster. We will continue our internal discovery engine, while more than 50% of future launches are expected to result from external co-development partnerships and strategic in-licensing of assets. In 2024, our Healthcare business devoted roughly 17.8% of total sales to R&D activities aimed at discovering and developing new therapies.

Oncology

In Oncology, our scientific curiosity and dedication to patients are at the heart of our efforts to improve the lives of people living with cancer. As a key focus area within our R&D portfolio, we are dedicated to delivering transformative treatments. Translational research is integrated throughout the entire R&D process, with several projects addressing unmet needs in difficult-to-treat cancers through innovative treatment approaches and novel combinations.

Marketed therapies

We are committed to setting new standards of care for multiple tumor types and making the corresponding therapies accessible to as many patients as possible globally. Therefore, in 2024, we continued to explore the impact of our marketed therapies by continuously analyzing data from our pivotal studies and generating real-world evidence. Additionally, we are evaluating these treatments in new clinical settings to allow more cancer patients to partake in their potential benefits.

To date, Bavencio® (avelumab), an anti-PD-L1 antibody, has been approved in over 70 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. New analyses presented at congresses throughout 2024 continued to strengthen the robust evidence supporting its use in this setting. This includes data from the pivotal Phase III JAVELIN Bladder 100 study shared at the 2024 American Society of Clinical Oncology (ASCO®) Annual Meeting, confirming the benefit of Bavencio® in key subgroups of patients with advanced urothelial carcinoma that has not progressed on platinum-based chemotherapy, including those who have low tumor burden and those with mixed histologic subtypes.

In addition, findings from long-term responders in JAVELIN Bladder 100 treated with Bavencio® plus best supportive care for ≥1 year and ≥2 years were presented at the European Society for Medical Oncology (ESMO) Congress. Further analyses from Japan and France presented at the ESMO Congress added to the extensive real-world evidence of Bavencio® as a maintenance treatment, demonstrating that the clinical trial outcomes can be translated into real-world practice across a range of settings and geographies.

In the Phase II JAVELIN Bladder Medley study, we are continuing to evaluate whether optimizing first-line maintenance treatment by combining a novel therapy with avelumab could further improve outcomes for patients with advanced UC whose disease did not progress following first-line platinum-based chemotherapy. Initiated in 2022, this randomized umbrella study assesses avelumab monotherapy versus avelumab in combination 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®.

Bavencio® is also approved as a monotherapy for the treatment of metastatic Merkel cell carcinoma (MCC) in 63 countries. Additionally, Bavencio® is approved for the treatment of advanced renal cell carcinoma (RCC) in combination with axitinib in 60 countries.

Tepmetko®

In February 2024, the U.S. Food and Drug Administration (FDA) granted full approval to the oral MET inhibitor Tepmetko® (tepotinib) for adult patients with metastatic METex14-skipping non-small-cell lung cancer (NSCLC). The conversion from accelerated to full approval was based on the VISION study, which encompassed 161 further patients and was presented at the 2024 ASCO® Annual Meeting as well as a follow-up spanning an additional 28 months to assess duration of response.

In 2024, we presented further data on health-related quality of life (HRQoL) in patients treated with Tepmetko®. Data from the Phase II VISION study showed that patients with METex14-skipping NSCLC with brain, liver, adrenal, or bone metastases maintained stable HRQoL during treatment with Tepmetko® with improvements in symptoms, such as coughing, that were consistent with results for the overall population.

In August 2024, the Phase II INSIGHT 2 primary analysis manuscript was published in The Lancet Oncology, showing that tepotinib combined with osimertinib offered promising clinical benefit with a manageable safety profile in patients with EGFR-mutated NSCLC whose disease had progressed on first-line osimertinib and had experienced MET amplification.

Novel medicines

In 2024 we made significant progress in advancing our novel medicines, including our antibody-drug conjugates (ADC) discovered in-house and assets from our portfolio of DNA damage response (DDR) inhibitors.

At the 2024 ASCO® Annual Meeting, we presented first-in-human data for M9140, an investigational ADC targeting carcinoembryonic antigen-related cell adhesion molecule 5 (CEACAM5) that features a novel exatecan payload. This is the first ADC developed in our labs to enter clinical development. Data from 40 patients treated across seven dose levels in Part 1A of the study demonstrated encouraging clinical activity with a manageable and predictable safety profile in this population. Updated results, including biomarker analyses, were presented at the ESMO Congress 2024. M9140 entered the randomized dose optimization part of the study for metastatic colorectal cancer in 2024, with further explorative analyses in patients with CEACAM5-expressing tumors including gastric, pancreatic and NSCLC to start in 2025.

We also advanced M3554, our GD2 (disialoganglioside expressed on tumors)-targeted ADC from our platform, into clinical development, with the first-in-human study beginning in November 2024.

Within our DDR portfolio, we are continuing to advance the development of tuvusertib (M1774), our potent and selective inhibitor of ataxia telangiectasia and Rad3-related (ATR), and M9466, the selective PARP1 (poly ADP-ribose polymerase 1) inhibitor licensed from Jiangsu Hengrui Pharmaceuticals Co. Ltd in 2023, opening new studies in 2024 to explore the potential of these medicines in different tumors. The Phase II DDRiver EOC 302 study evaluates tuvusertib in combination with our ataxia telangiectasia-mutated (ATM) inhibitor, lartesertib, or with niraparib, a PARP inhibitor, in PARP-resistant ovarian cancer. For M9466, we opened the Phase I DDRiver 501 study, exploring M9466 in combination with tuvusertib in solid tumors with relevant mutations and/or prior PARP inhibitor exposure, with a focus on castration-resistant prostate and ovarian cancers. Additionally, the DDRiver 511 study was initiated, combining M9466 with FOLFIRI chemotherapy.

Throughout the year, we have presented several abstracts at congresses that form the foundation of Phase II combination studies of tuvusertib. These included data from the Phase Ib DDRiver Solid Tumors 320 study evaluating tuvusertib in combination with lartesertib or our immune checkpoint inhibitor Bavencio®, which were first presented at the ASCO® Annual Meeting 2024. The findings confirm that both DDRi assets are well positioned for the development of combinations in therapeutic areas in which we have experience. At the 2024 ASCO® Annual Meeting, we shared findings from Part B1 of the Phase I DDRiver Solid Tumors 301 study, which demonstrated a manageable safety profile and preliminary efficacy for different dosing regimens of tuvusertib in combination with niraparib, a PARP inhibitor, in patients with advanced solid tumors. We shared additional data from this study with translational, pharmacokinetic, pharmacodynamic, and immunophenotyping analyses at ESMO 2024.

In June, we announced the discontinuation of the randomized Phase III TrilynX® study evaluating xevinapant plus chemoradiotherapy (CRT) in patients with unresected locally advanced squamous cell carcinoma of the head and neck (LA SCCHN). The decision followed a pre-planned interim analysis performed by the study's Independent Data Monitoring Committee, which found that the trial would be unlikely to meet its primary objective of prolonging event-free survival. The company also discontinued the Phase III XRay Vision® study of xevinapant versus placebo in combination with adjuvant, post-operative radiotherapy in patients with resected LA SCCHN.

In November, our partners at Abbisko Therapeutics Co. Ltd., Shanghai, China, announced that Abbisko's investigational treatment for tenosynovial giant cell tumor (TGCT), pimicotinib, significantly improved objective response rate (ORR) compared to placebo in the Abbisko-led pivotal Phase III MANEUVER study, meeting its primary endpoint. We entered into a licensing agreement with Abbisko in December 2023, granting us an exclusive license to commercialize products comprising or containing pimicotinib for all indications in mainland China, Hong Kong, Macau, and Taiwan, as well as an exclusive option for global commercial rights of pimicotinib.

Building on our expertise in the treatment of colorectal cancer (CRC), in January we announced a licensing agreement with Inspirna, Inc. for the development and commercialization of ompenaclid, a potentially first-in-class oral inhibitor of the creatine transport channel SLC6A8 and SLC6A8-targeting follow-on compounds outside of the United States. Ompenaclid is currently being evaluated by Inspirna in a Phase II study for the second-line treatment of RAS-mutated (RASmut) advanced or metastatic CRC.

Neurology & Immunology

We have been committed to people living with multiple sclerosis (MS) for more than 25 years. Our ongoing dedication to science drives us to continue to push the boundaries of knowledge through our research in neurological and immune-mediated disease areas.

Beyond MS, we are continuing to expand the therapeutic focus areas of our Neurology & Immunology franchise by developing potential first-in-class treatments for conditions with high unmet medical needs. 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, is being developed as a new investigational oral therapy for SLE and CLE in a Phase II study. It aims to overcome limitations of currently available lupus therapies by providing selective inhibition of Toll-like-receptors (TLR) 7 and 8, that are known as key lupus-relevant disease drivers, which may increase efficacy while preserving immunity against infections. Analysis from the CLE cohort of a Phase II study indicates that enpatoran met the primary endpoint with a good safety profile. We anticipate Phase II results for enpatoran in systemic lupus in early 2025, which would then complete the data.

We are also exploring the potential of cladribine capsules for the treatment of gMG, which affects an estimated 700,000 people worldwide and where a high unmet need remains, particularly with regard to oral treatment options. Cladribine is expected to selectively target B and T lymphocytes, which are thought to be the root cause of gMG. In June 2023, the FDA granted orphan drug designation for cladribine capsules for the treatment of gMG. We began a global Phase III clinical trial program in June 2024.

In 2024, we also presented new data from our portfolio in MS at numerous scientific meetings, including the Americas Committee for Treatment and Research in Multiple Sclerosis (ACTRIMS) Forum in February, the Consortium of Multiple Sclerosis Centers (CMSC) Annual Meeting in May and the European Committee for Treatment and Research in Multiple Sclerosis (ECTRIMS) Congress in September.

At ACTRIMS, we presented two new post-hoc analyses from the M AGNIFY-MS clinical program. The first presentation suggested the potential of Mavenclad® to maintain or improve cognitive function in patients with highly active relapsing multiple sclerosis (RMS). Additionally, the second presentation with interim findings from year three of the M AGNIFY-MS extension trial underscored the continued efficacy and safety profile of Mavenclad® following the completion of the two-year treatment course.

At ECTRIMS, we showcased data on the long-term safety profile, sustained efficacy, and durable effect of Mavenclad® in RMS with 40 abstracts and two oral presentations. Mavenclad® data from several M AGNIFY-MS sub-studies demonstrate the benefits of early treatment and the drug's sustained efficacy across multiple measures of disease activity, such as its impact on both peripheral and central inflammation, on promoting immune cell reconstitution effects and on disability progression, including freedom from progression independent of relapse activity for most patients.

Building on data presented at the 2024 CMSC Annual Meeting, which showed that Mavenclad® can reduce or eliminate oligoclonal bands in the cerebrospinal fluid, additional data presented at ECTRIMS suggested that immune reconstitution following treatment with Mavenclad® may shift the immune system to a less pathogenic state.

Fertility

As a global market leader in fertility drugs and treatments, our Fertility franchise plays a crucial role in our Healthcare business. Infertility is a growing challenge globally due to demographic change and lifestyle adjustments such as delayed childbearing.

According to the latest data, more than six 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

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

The new formulation of Euthyrox® (levothyroxine) for the treatment of hypothyroidism obtained further regulatory approvals in 2024 and is available in more than 90 countries where this incremental innovation is registered. With its characteristics of delivering precise, fine-tuned, and stable natural thyroid hormone thyroxine doses due to the tightened specification, Euthyrox® may help optimize disease management.

Glucophage®, containing the active ingredient metformin, is the most widely prescribed non-insulin diabetes treatment worldwide for first-line treatment of type 2 diabetes. We are continuing to deploy our strategy on the early stages of the diabetes continuum, taking advantage of the fact that Glucophage® is now approved in more than 80 countries.

Our pipeline

As of December 31, 2024

Therapeutic area / Compound	Indication	Status
Neurology & Immunology		
Cladribine capsules (Immune reconstitution[1])	Generalized myasthenia gravis	Phase III
Enpatoran (TLR7/8 antagonist)	Systemic lupus erythematosus[2]	Phase II
Enpatoran (TLR7/8 antagonist)	Cutaneous lupus erythematosus[2]	Phase II
Enpatoran (TLR7/8 antagonist)	Idiopathic inflammatory myopathies (DM and PM)[3]	Phase II
M5542 (CTLA4Ig/anti-OX40L fusion protein)	T cell-mediated autoimmune diseases[4]	Phase I
Oncology		
Pimicotinib (CSF-1R inhibitor)[5]	Tenosynovial giant cell tumor (TGCT)[6]	Phase III
Avelumab (anti-PD-L1 mAb) + Sacituzumab Govitecan/NKTR-255/M6223 (anti-TIGIT mAb)	Locally advanced or metastatic urothelial carcinoma	Phase II
Ompenaclid (SLC6A8 inhibitor)[7]	RAS-mutated advanced or metastatic colorectal cancer	Phase II
Tuvusertib (ATR inhibitor) + lartesertib (ATM inhibitor) or niraparib	Epithelial ovarian cancer[8]	Phase II
Precemtabart tocentecan (M9140, anti-CEACAM5 Antibody drug conjugate)	Colorectal cancer	Phase Ib
M9466 (selective PARP1 inhibitor)[9] + tuvusertib	Solid tumors[10]	Phase Ib
M9466 (selective PARP1 inhibitor) + Topoisomerase 1 inhibitor-based regimens	Colorectal cancer	Phase Ib
M3554 (anti-GD2 Antibody drug conjugate)	Solid tumors[11]	Phase I
Global Health		
Cabamiquine (PeEF2 inhibitor)[12]	Malaria	Phase II

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] Putative mechanism

[2] Clinical trial passed futility analysis.

[3] Dermatomyositis and Polymyositis

[4] Study in healthy volunteers

[5] We entered into a licensing agreement with Abbisko Therapeutics Co. Ltd, Shanghai, China, granting us an exclusive license to commercialize pimicotinib (ABSK021) in mainland China, Hong Kong, Macau, and Taiwan as well as an exclusive option for global commercial rights of pimicotinib.

[6] Study met the primary endpoint, open-label part ongoing.

[7] We entered into a licensing agreement with Inspirna, Inc., New York, NY, United States, for ompenaclid (RGX-202), which grants an exclusive license to ompenaclid outside of the United States and an option to co-develop and co-promote ompenaclid in the US.

[8] Includes studies (phase I/II) in collaboration with/ sponsored by external partners, e.g. US National Cancer Institute (NCI)

[9] We entered a collaboration with Jiangsu Hengrui Pharmaceuticals Co. Ltd., Lianyungang, Jiangsu, China, including an exclusive license worldwide (ex-China) to develop, manufacture and commercialize M9466/HRS-1167.

[10] As a single agent and in combination with tuvusertib (ATRi); study includes patients with castration-resistant prostate cancer (CRPC) and epithelial ovarian cancer (EOC)

[11] Patients with soft tissue sarcoma (STS) and glioblastoma

[12] In combination with pyronaridine in two studies, either in participants with acute uncomplicated malaria, or as chemoprevention in participants with asymptomatic malaria infection.

ATR: Ataxia telangiectasia and Rad3-related
CEACAM5: Carcinoembryonic antigen-related cell adhesion molecule 5
CSF-1R: Colony stimulating factor 1 receptor
CTLA-4: Cytotoxic T-lymphocyte associated protein 4
EOC: Epithelial ovarian cancer
GD2: Disialoganglioside expressed on tumors
mAb: Monoclonal antibody
OX40L: Ligand for OX40 receptor
PARP1: poly (ADP-ribose) polymerase 1
Phase I: Dose finding
Phase Ib: Dose escalation/expansion and signal seeking
PD-L1: Programmed cell death ligand 1
PeEF2: Plasmodium eukaryotic elongation factor 2
SLC6A8: Creatine transport channel coded by SLC6A8 gene
TIGIT: T cell immunoreceptor with Ig and ITIM domains
TLR7/8: Toll-like receptors 7 and 8

Electronics

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) identifies trends and vets technologies that are beyond the time horizon or scope of our business units. As a dedicated technology organization, the CTO manages research partnerships, shapes our technology roadmaps and manages our long-term R&D portfolio. Our Technology Leadership Board reviews and optimizes our technology investment across the business sector.

We are focusing our R&D capabilities on next-generation semiconductor and optical materials to further strengthen our position as one of the leading suppliers to the electronics industry. Our R&D aims to find solutions for the needs that drive our industry: to create smaller, more powerful and more efficient chips and reduce the impact on the environment. Consequently, sustainability and the use of AI and machine learning are both key focus areas of our R&D.

Sustainable technologies and materials

Sustainability is a key innovation area for us. Our sustainability approach is based on three core pillars that drive our activities: collaboration, innovation and operation.

Collaboration

In the interconnected electronics supply chain, collaboration is crucial for developing and scaling sustainable solutions. Joint action benefits the entire value chain, enabling participants to achieve defined sustainability objectives together. One notable example of collaboration is the academic research program we initiated with Intel in Europe in 2023. This three-year initiative comprises six projects with currently eleven universities and institutes across six countries. It aims to develop sustainable semiconductor manufacturing solutions through AI and machine learning, focusing on new materials, efficient processes and waste reduction.

Innovation

Our R&D efforts push the boundaries of innovation to create a safer, smarter and more connected world while protecting the environment. One example of our commitment is the development of materials that do not use PFAS (per- and polyfluoroalkyl substances). They are intended to replace PFAS surfactants in photoresists, solvent-based antireflective coatings and rinse solutions. We already offer alternative products for some applications.

Operation

We recognize that real change begins with us, starting from our own production processes. We are committed to reducing our environmental footprint to meet our sustainability goals. Our efforts to reduce emissions of NF_3 (nitrogen trifluoride) and N_2O (nitrous oxide) from our own processes are one such example of our ambition in this area.

R&D activities in the business units

Semiconductor Solutions

Our R&D team works to ensure that we can supply the materials needed for every key step in wafer processing. To this end, we collaborate with original equipment manufacturers and device makers to shape the future of digital living, providing material solutions for advanced microchips with complex architectures, improved performance, enhanced thermal control, and greater energy efficiency.

The main R&D programs for our Semiconductor Solutions business units include the following:

Thin Films

In Thin Films, we are continuously expanding our product portfolio for both memory and logic chip customers, placing a key focus on unlocking new R&D opportunities as we move to smaller node sizes, including gate-all-around transistor architecture and advanced packaging. We are actively tackling the challenges associated with these innovative technologies. In our view, technologies that enable lower power consumption and higher performance are essential in the rapidly evolving AI landscape.

We are committed to enhancing our offerings by developing cutting-edge material solutions, including molybdenum, ruthenium and cobalt precursors for selective metallization, highly conformal silicon-containing films on complex 3D structures with precise thickness control and enhanced performance, gap filling materials with low dielectric constants, metal oxide precursors, spin-on dielectric films, and more.

Formulations (Patterning and Planarization)

In Patterning, we are continuing to develop non-PFAS materials and have moved closer toward finalizing our new non-PFAS i-Line (365 nm) and KrF (248 nm) photoresists, which we are sampling with customers. Additionally, we are driving innovation in next-generation EUV photoresists.

Our long-term focus on directed self-assembly (DSA) is ongoing, leading to investments in new facilities in Darmstadt to prepare for high-volume manufacturing. The industry’s response to DSA has been encouraging, as this technology helps reduce random defects and lowers expenses for manufacturers.

In Planarization, some of our back-end-of-line products are now in the advanced stages of qualification for use in heterogeneous integration, thus paving the way for further AI-driven chip developments. We gained the first customer for our tungsten slurries in 2023, which is driving forward the use of our products in memory applications.

Specialty Gases

With one of the broadest specialty gases portfolios in the market, covering etching, cleaning, deposition, and dopant gases, we always have sustainability in focus and aim to develop material solutions to achieve both performance and emissions targets.

We are continuing our efforts to develop new, more climate-conscious low-emission etching and cleaning gases, including new low-GWP (global warming potential) materials, and expand the range of applications for which we are developing these sustainable solutions.

Display Solutions

Display Solutions (since January 1, 2025, Optronics) supports customers in developing advanced display technologies for various applications, including TV-, IT- and mobile devices, automotive displays, and gaming. In collaboration with partners, we are advancing augmented reality (AR) and virtual reality (VR), expanding the application of display materials and enhancing user experiences for future immersive devices.

We maintain partnerships with leading panel manufacturers to develop next-generation display products and technologies, focusing on innovative barrier materials that offer superior flexibility, higher reliability and extended lifespans for flexible OLED devices. Our OLED and photoresist materials are integral components in numerous free-form displays, aiding customers in creating sustainable OLED structures for emerging IT applications.

Alongside our focus on new technologies, we are working on advancing LCD technology through collaborations with industry-leading panel makers. Additionally, we are developing both liquid crystal-on-silicon and OLED-on-silicon solutions for AR/VR displays and advancing materials for waveguides and gratings – essential components in new augmented reality devices.

The acquisition of Unity-SC enables us to develop cutting-edge metrology devices for heterogenous integration and high-bandwidth memory, as well as for advanced packaging in microchips.

Surface Solutions

In July 2024, we signed an agreement to divest the Surface Solutions business unit to Global New Material International Holdings Ltd. (GNMI), a leading pigment producer in China. R&D will continue within Surface Solutions until the sale is closed, after which the business unit will be transferred to GNMI.

In 2024, Surface Solutions continued to meet specific customer requirements by developing new formulations that, combined with existing products, provide customized solutions across various industries.