Merck KGaA
Darmstadt, Germany

Annual Report 2020

KEY FIGURES 2020

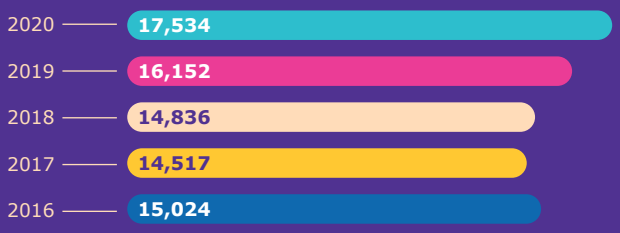
Group

€ million	2020	2019	Change € million	Change %
Net sales	17,534	16,152	1,383	8.6%
Operating result (EBIT)[1]	2,985	2,120	865	40.8%
Margin (% of net sales)[1]	17.0%	13.1%		
EBITDA[1]	4,923	4,066	857	21.1%
Margin (% of net sales)[1]	28.1%	25.2%		
EBITDA pre[1]	5,201	4,385	817	18.6%
Margin (% of net sales)[1]	29.7%	27.1%		
Profit after tax	1,994	1,324	670	50.6%
Earnings per share (in €)	4.57	3.04	1.53	50.3%
Earnings per share pre (€)[1]	6.70	5.56	1.14	20.5%
Business free cash flow[1]	3,765	2,732	1,033	37.8%

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

Group

Net sales
€ million



Group

EBITDA pre[1]
€ million

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

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TO OUR SHAREHOLDERS

Dear shareholders, dear friends,

Without a doubt, 2020 was a very challenging year. The Covid-19 pandemic has upended the world. For us, it has also been extremely demanding – but it has not shaken us. In fact, we have successfully weathered the pandemic so far. That's because the strengths of our business model with three innovation-driven business sectors have become particularly evident during the Covid-19 crisis. Thanks to our clear focus on science and technology, we are very well positioned even during economically challenging times.

From the start, one thing was clear to us: The health and safety of our employees as well as business continuity would have top priority. Consequently, we succeeded in keeping the infection rates at our company low. At the same time, we continued to supply patients, scientists and customers with essential medicines and products and were again able to mark key accomplishments in 2020.

A major milestone in our Healthcare business sector was the full approval of our immuno-oncology therapy Bavencio® by the U.S. Food and Drug Administration (FDA) for the treatment of patients with advanced urothelial cancer. We gained further approvals around the world for Mavenclad®, our oral multiple sclerosis therapy. It is now registered in more than 80 countries globally, including the European Union, the United States, Australia, Canada, and Switzerland. Both products made an increasingly larger contribution to organic sales growth in Healthcare. In addition, our oncology precision medicine Tepmetko® (tepotinib), which was developed in-house, was approved in Japan. It is thus the world's first oral MET inhibitor indicated for the treatment of advanced lung cancer with MET gene alterations to receive regulatory approval. However, this business sector was temporarily strongly impacted by Covid-19, especially the Fertility franchise. Yet in the third quarter, sales of this franchise recovered significantly from the pandemic-related impacts incurred in the first half of the year. Having divested Allergopharma, we are now sharpening our focus within Healthcare on the development of innovative medicines for difficult-to-treat diseases.

We have successfully weathered the pandemic so far. That's because the strengths of our business model with three innovation-driven business sectors have become particularly evident during the Covid-19 crisis. Thanks to our clear focus on science and technology, we are very well positioned even during economically challenging times.

Stefan Oschmann

Our Life Science business sector offers a broad portfolio of products and services for customers around the globe – from academic institutions to biotech and pharmaceutical companies. In terms of sales, this business sector ranks among the top three in the global life science industry. Our full portfolio encompasses more than 300,000 products and solutions, ranging from lab water systems to genome-editing tools, antibodies, cell lines and complete solutions for the manufacture of medicines. And we are investing further in research, development and production worldwide. Last year, we celebrated the topping-out ceremony for our new membrane plant in Darmstadt, Germany. To meet the high demand in the Process Solutions business unit, which offers products and services for the entire pharmaceutical production value chain, we announced plans to expand our U.S. production facilities in Danvers, Massachusetts, and in Jaffrey, New Hampshire. Thanks to strong business growth, we will also be expanding our capacities for antibody-drug conjugate manufacturing at our facility near Madison, Wisconsin, as well as for viral and gene therapy production in Carlsbad, California. These investments are worth millions and will allow us to position ourselves well in highly promising fields.

Our specialty chemicals business is combined in our Performance Materials business sector. Within the framework of our Bright Future transformation program, we developed further into a leading materials-based solutions player in the electronics market in 2020. Thanks not least to the acquisitions of Versum Materials and Intermolecular in 2019, we already hold a strong position in the electronic materials market. Following the successful completion of these acquisitions we rolled out the new, integrated Performance Materials organization last year. A further step in the course of the ongoing transformation is now the renaming of the business sector: Performance Materials will become Electronics. The new name reflects our strategic focus and makes it clear at a glance what the business sector stands for. After all, through our product and service portfolio, we are enabling the technical progress emanating from continuously growing data volumes. This development is being driven by strong growth trends, such as 5G, Big Data, and new applications such as autonomous driving and the Internet of Things.

At the same time, we have been actively fighting the pandemic on many fronts since the very start. With our products and services we are contributing to the global Covid-19 response in many ways.

- We help scientists to detect and characterize viruses and to develop vaccines and therapies. This also includes our co-work on more than 50 potential or approved Covid-19 vaccines and support in the development of more than 35 Covid-19 testing solutions as well as over 20 therapeutic options. One example is the collaboration with the biotech company Mammoth Biosciences on the development and production of their CRISPR[1]-based Covid-19 diagnostic tests.
- By donating Rebif®, one of our relapsing multiple sclerosis therapies, last year we supported global initiatives to study potential therapies for Covid-19. These include the SOLIDARITY study by the World Health Organization (WHO) as well as a study by the French Institut National de la Santé et de la Recherche Médicale (INSERM).
- Moreover, we are working with the Bill & Melinda Gates Foundation and the European consortium CARE. In both projects, we aim to help accelerate research and development into the coronavirus.
- We initiated a study with our own active ingredient candidate M5049. We are investigating whether M5049 could prevent Covid-19 from inducing a “cytokine storm”, a dangerous and excessive immune response that often leads to death in patients with Covid-19.
- And as countless people around the world work from home and practice social distancing, our high-tech materials are critically important to the electronic equipment and devices that bring people together virtually.

[1] Clustered Regularly Interspaced Short Palindromic Repeats

We are proud to note that in all our businesses and functions, we are helping both directly and indirectly to meet the global challenges posed by Covid-19. Whether through financial contributions or by donating masks and disinfectant, we have been providing support in the regions and cities in which we operate worldwide.

Yet, also in terms of business, we performed very well overall in 2020, despite considerable pandemic-related obstacles in some businesses. Once again, we generated growth. Group sales rose to a total of € 17.5 billion, growing by 8.6% over 2019. And EBITDA pre, the most important financial indicator to steer our operating business, amounted to € 5.2 billion, a year-on-year increase of 18.6%. EBITDA pre was positively impacted by income from the release of a provision of € 365 million for potential damages relating to patent litigation with Biogen Inc. USA (Biogen). Earnings per share pre (EPS pre) increased by 20.5% to € 6.70.

In a year marked by a pandemic, these positive results should not be taken for granted. First and foremost, they are thanks to the engagement, the perseverance and the unabated passion for innovation shared by our global workforce of over 58,000 employees. On behalf of the entire Executive Board, I would like to warmly thank them for their extraordinary commitment last year.

Our positive business performance in 2020 was also reflected in the capital markets. For the first time in German stock market history, we became the company with the highest market capitalization in the chemical and pharmaceutical industries. This is superb recognition of our development and strategic direction. In addition, we also celebrated the 25th anniversary of our listing on the Frankfurt Stock Exchange.

As shareholders, you are also benefiting from this. In 2020, our share price increased by 33%. The dividend reflects this growth as well because, in line with our sustainable dividend policy, we focus primarily on the development of the Group's earnings. Consequently, we will propose to the Annual General Meeting the payment of a dividend of € 1.40 per share for fiscal 2020 – 10 cents more than in the previous year.

We can be very satisfied with how well we made it through the "crisis year 2020". At the same time, we must set our sights on the future. We want to drive our transformation to become the leading science and technology company forward. That is why we have set ourselves clear priorities for 2021.

Being a global supplier of innovative specialty products – that is and remains our strategy in Healthcare. An important priority will be to further drive the profitable growth of our core General Medicine, Endocrinology and Fertility franchises, particularly in China. We will focus also on realizing the commercial potential of Mavenclad®, Bavencio® and Tepmetko®. We want to further unlock the possibilities of our pharmaceutical pipeline – while at the same time operating efficiently in order to meet our ambition for the future. At the beginning of 2021, we welcomed Peter Guenter as a new member of the Executive Board with responsibility for the Healthcare business sector. He has many years of experience and superb knowledge of the international pharmaceutical sector.

In Life Science, we are aiming to further expand our strong positions in Process Solutions and e-commerce. To achieve this, we must resolutely realize new growth opportunities, for instance in genome editing and novel modalities, end-to-end bioprocessing and connected laboratories. At the same time, we are doing everything possible to meet the increased demand for our life science products in these unprecedented times. Together with the global Life Science team, Matthias Heinzel will be building on our previous successes. He will become a member of the Executive Board of our company on April 1, 2021, assuming responsibility for the Life Science business sector.

In Electronics, formerly Performance Materials, we remain committed to further expanding our leading position as an innovation partner. We are the company behind the companies, advancing digital living. To this end, we aim to grow while securing stable margins, especially in businesses with materials and solutions for the semiconductor industry as well as with organic light-emitting diodes (OLED). We are therefore pushing forward with the execution of the five-year Bright Future transformation program.

We want to continue to grow profitably in 2021. As in the past, we will be guided by a high degree of cost discipline and the optimum design of our operating business models.

In all these efforts, we will run our business as a good corporate citizen. For us, scientific progress and responsibility go hand in hand. Responsible and sustainable conduct with respect to employees, products, the environment, and society is a fundamental prerequisite for our business success. That is why we specified the following goals in our sustainability strategy: In 2030, we will achieve human progress for more than one billion people through sustainable science and technology. By 2030, we will integrate sustainability into all our value chains. And by 2040, we will achieve climate neutrality and reduce our resource consumption. These are ambitious goals. However, we are convinced that we can reach them and contribute in this way to the achievement of the UN Sustainable Development Goals.

Climate impact mitigation, resource scarcity and a pandemic are major societal challenges that can be solved only through broad-based collaboration. In particular, the search for a Covid-19 vaccine has made clear how important it is for research, business and decision-makers from the political sphere to pull in the same direction. International cooperation is the order of the day; multilateralism is the answer to economic standstill. Simultaneously, the crisis is acting as a catalyst for new-found trust in science. Widespread skepticism is giving way to greater openness and mutual respect. As a science and technology company, we can and must seize these opportunities to enable social progress.

We are a company with a passion for research and discovery. Our actions are shaping human progress: We are developing innovative therapies, working on the biotechnology of tomorrow and enabling the digital revolution. This is something I have experienced every day for the past ten years. My time at our company will be over at the end of April 2021. On May 1, Belén Garijo will succeed me. We have worked together successfully for the last ten years. The company is in very good hands with her. It was a special honor for me to lead this unique company. And I firmly believe that our company is excellently-positioned for sustainable and profitable growth – and will also remain committed to progress in the future.

Sincerely,

Dr. Stefan Oschmann
Chairman of the Executive Board and CEO

EXECUTIVE BOARD

Stefan Oschmann
Chairman of the Executive Board
and CEO

Belén Garijo
Vice Chair of the Executive Board
and Deputy CEO

Kai Beckmann
Member of the Executive Board
CEO Performance Materials

Peter Guenter
Member of the Executive Board
CEO Healthcare

Marcus Kuhnert
Member of the Executive Board
Chief Financial Officer

Short biographies

More information can be found on our website:
www.emdgroup.com -> Company -> Who We Are -> Management

Our Shares

At a glance

On the whole, the performance of our shares in 2020 was characterized by a strong increase in value of 33%. The shares started the year trending upward before entering a rapid downward movement from February 21 as a result of the Covid-19 pandemic, which also affected the relevant indices. The shares bottomed out on March 18. While the pharmaceutical industry index performed slightly better during this period (-16% as of March 18), our shares (-23% as of March 18) developed better than the relevant reference index for the chemical industry (-28% as of March 18) and considerably better than the DAX® (-36% as of March 18).

With the subsequent turnaround in the second, third and fourth quarters, our shares enjoyed resilient development despite the global uncertainty in the context of the Covid-19 pandemic. In particular, the share price was boosted by positive development in the Life Science sector, the rapid recovery of the Healthcare sector and the sustained strong performance of the semiconductor business in the Performance Materials sector.

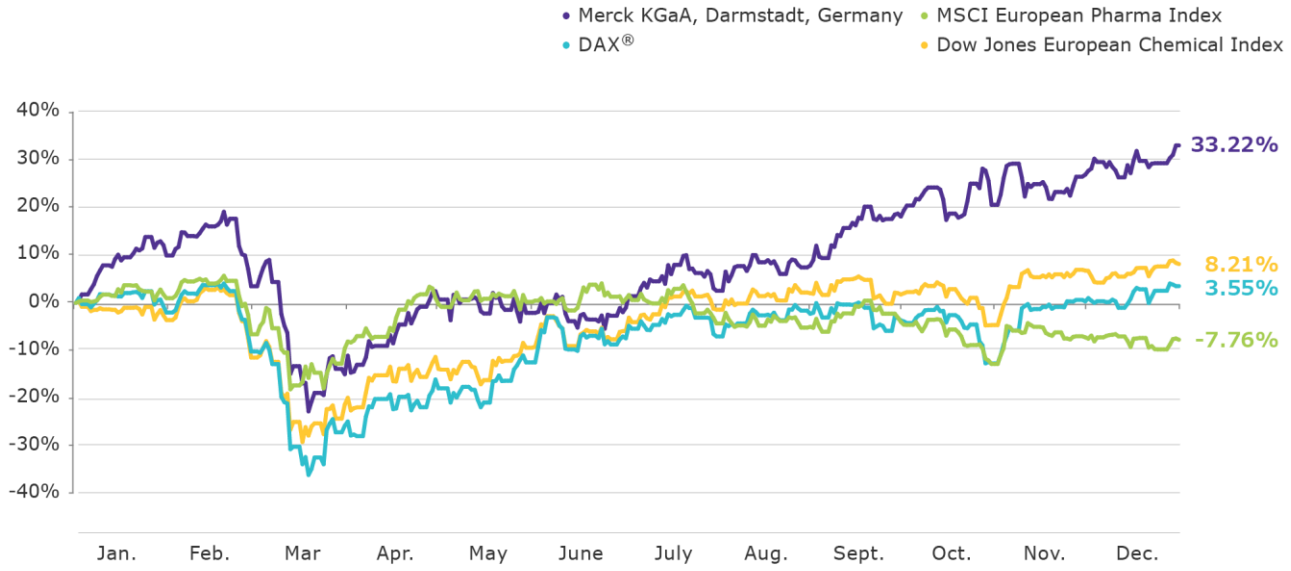
The shares closed 2020 up on the relevant reference indices, which saw differing development over the course of the year. With its share price rising by 33.2%, we narrowly outperformed the S&P 500 Life Sciences Tools & Services Index, which saw growth of 32.8% in the same period. Our shares clearly outperformed the DAX® reference index, which rose by 4% over the period as a whole, as well as the relevant reference index of the chemical industry, which saw full-year growth of around 8%. By contrast, the pharmaceutical industry index fell by around 8% in 2020, meaning it was outperformed by our shares by 40 percentage points in the same period.

Despite the restrictions that were in place in 2020, the Executive Board and the Investor Relations team gave in-depth briefings in largely virtual form to more than 750 investors at investor conferences, as well as during roadshows and conference calls.

The average daily trading volume of our shares rose by around 13% year-on-year, from approximately 505,000 to just over 569,000 in 2020. Europe accounted for the largest proportion of the free float in 2020, with its share increasing by 5 percentage points to 46%. By investor type, growth investors and value investors dominated, as in the previous year. In 2020, the proportion of growth investors at Merck KGaA, Darmstadt, Germany, remained broadly unchanged year-on-year at 33%. As in 2019, the top five investors at the end of 2020 cumulatively held around 24% of the free float.

Our shares

Share price development from January 1, 2020, to December 31, 2020, in %



Our shares

Key share price data[1]

		2020	2019
Dividend[2]	€	1.40	1.30
Share price high	€	140.35	109.75
Share price low	€	81.26	86.46
Year-end share price	€	140.35	105.35
Daily average number of shares traded[3]	Number	566,911	504,934
Market capitalization[4] (at year-end)	€ million	61,021	45,804
Market value of authorized shares[5] (at year-end)	€ million	18,139	13,616

[1] Share price-relevant figures relate to the closing price in Xetra® trading on the Frankfurt Stock Exchange.

[2] 2020 dividend subject to approval by the Annual General Meeting.

[3] Based on the floor trading systems of all German exchanges and the regulated market on Xetra®.

[4] Based on the theoretical number of shares (434.8 million).

[5] Based on the number of shares in free float (129.2 million). Source: Bloomberg, Thomson Reuters.

Identified investors by region as of November 2020

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

Identified investors by type as of November 2020

Source: Nasdaq Shareholder Identification

COMBINED MANAGEMENT REPORT*

* The management report of Merck KGaA, Darmstadt, Germany, has been combined with the Group management report and published in the 2020 Annual Report as well as in the annual financial statements of Merck KGaA, Darmstadt, Germany. The 2020 Annual Report is an additional, non-official publication, which does comply with the requirements of the European Single Electronic Format (ESEF). The official annual financial report for fiscal 2020, prepared in accordance with the ESEF format, has been filed with the electronic German Federal Gazette (elektronischer Bundesanzeiger) and is available on the website of the German company register.

This combined management report contains certain financial indicators such as operating result (EBIT), EBITDA, EBITDA pre, business free cash flow (BFCF), free cash flow, net financial debt and earnings per share pre, which are not defined by International Financial Reporting Standards (IFRS). These financial indicators should not be taken into account in order to assess the performance of Merck KGaA, Darmstadt, Germany, in isolation or used as an alternative to the financial indicators presented in the consolidated financial statements and determined in accordance with IFRSs.

The figures presented in this combined management report have been rounded. This may lead to individual values not adding up to the totals presented.

The Statement of Corporate Governance according to section 15d HGB in conjunction with section 289f (1) sentence 2 HGB is available at https://www.emdgroup.com/en/investors/corporate-governance/reports.

The separate, combined non-financial (Group) report of Merck KGaA, Darmstadt, Germany, which we issue pursuant to sections 289b–289e and 315b–315c HGB, is available as an online version on our website as of April 13, 2021 at http://www.emdgroup.com/en/sustainability-report/2020/. It is integrated into the 2020 Sustainability Report. We have compiled an overview of the information contained in the combined non-financial (Group) declaration at https://www.emdgroup.com/nfr20.

For reasons of better readability, we do not use gender-specific formulations in this annual report. The chosen male form represents all genders.

Fundamental Information about the Group

The Group

We are a vibrant science and technology company. Science is at the heart of everything we do. It drives the discoveries we make and the technologies we create. We make a positive difference in the lives of millions of people every day.

In the Healthcare business sector, we accompany people in every phase of their life and help them to shape, improve, and prolong it. We enable personalized treatments for serious illnesses and help many couples to realize their wish to have children. The digital platform and the products and services in our Life Science business sector make precision research simpler and help to speed up scientific breakthroughs. They enable quicker access to healthcare and ensure that analyses are accurate and medications are trustworthy. The developments we make in our Performance Materials business sector sit inside the technologies that are changing the way we use information and shaping our future. They make mobility safer, houses and devices more intelligent, and technologies more sustainable.

Everything we do is fueled by a belief in science and technology as a force for good – a belief that has driven our work since 1668, and will continue to inspire us to find more joyful and sustainable ways to live. We are curious minds dedicated to human progress.

Merck KGaA, Darmstadt, Germany, holds the rights to the name and the trademark "MERCK" internationally except for the United States and Canada, In these countries, we operate as EMD Serono in the biopharmaceutical business, as MilliporeSigma in the life science business, and as EMD Performance Materials in the high-tech materials business.

Apart from our three business sectors, our financial reporting presents five regions: Europe, North America, Asia-Pacific, Latin America, and the Middle East & Africa. As of December 31, 2020, we had 58,127 employees worldwide[1]. This compares with 57,071 employees as of December 31, 2019.

Our contributions to combating Covid-19*

As a science and technology company, we are convinced that we can help to combat the global challenges resulting from Covid-19. Our top priority is ensuring the health and safety of our employees and their families and continuing our business activities for the benefit of the many patients, scientists, and customers who depend on us. In specific terms, our commitment takes various forms:

- We are collaborating with other healthcare and life sciences companies as well as the Bill & Melinda Gates Foundation to accelerate the development, manufacture, and delivery of vaccines, diagnostics, and treatments for Covid-19 and to enhance access for everyone around the world.
- We are part of the European CARE (Corona Accelerated R&D in Europe) consortium, which aims to accelerate the discovery and development of urgently needed medicines to treat SARS-CoV2, the virus that causes Covid-19.

[1] The Group also has employees at sites that are not fully consolidated subsidiaries. These figures refer to all people directly employed by the Group and therefore may deviate from figures in the financial section of this report.

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

- Our Life Science products and services are supporting pharma and biotech companies in the development of Covid-19 vaccines and treatments, including more than 50 potential Covid-19 vaccines, more than 35 solutions for testing, and more than 20 monoclonal antibodies, plasma products, and antiviral drugs.
- We donated units of our drug Rebif® to the World Health Organization (WHO), the French Institute for Health and Medical Research (INSERM) and the U.S. National Institute of Allergy and Infectious Diseases (NIAID) for investigation in Covid-19 clinical trials.[2]
- We are conducting a Phase II study to evaluate the safety and efficacy of M5049 in patients with Covid-19 pneumonia. The aim of the study is to investigate if M5049 may prevent or ameliorate the hyper-inflammatory response in these patients and prevent progression to 'cytokine storm'.
- We are producing electronic materials that allow the global scientific community to interact intensively and share the results of their important work, among other things.
- We are particularly proud of the exceptional performance of our employees during these pandemic times. Thanks to their contribution, we succeeded in staying on course and achieving good results in 2020. To honor this contribution, around 46,000 employees worldwide received a one-time bonus payment.
- Above and beyond this, we are supporting many who are doing great things in the fight against the pandemic with donations in-kind and financial donations. To that end, we approved more than € 8 million in Covid-19-related donations in 2020, including two million FFP2 respiratory masks and more than 240,000 liters of disinfectant, among other things.

You can find more information on our contribution to combating the global challenges resulting from Covid-19 in the following sections on the business sectors and on our website: **https://www.emdgroup.com/en/company/press/press-kits/corona-pandemic.html**.

Healthcare

Healthcare discovers, develops, manufactures, and markets innovative pharmaceutical and biological prescription drugs to treat cancer, multiple sclerosis (MS), infertility, growth disorders, and certain cardiovascular and metabolic diseases. Healthcare operates in four franchises: Neurology and Immunology, Oncology, Fertility, and General Medicine & Endocrinology. Our R&D pipeline positions us with a clear focus on becoming a global specialty innovator in oncology, immuno-oncology, neurology, and immunology.

In 2020, Healthcare generated 38% of Group sales and 40% of EBITDA pre (excluding Corporate and Other). Europe and North America generated 55% of Healthcare's net sales in 2020. In recent years, we have steadily expanded our presence in growth markets. In 2020, Asia-Pacific and Latin America accounted for 38% of sales.

Neurology & Immunology*

Mavenclad® (cladribine tablets) is now approved in more than 80 countries worldwide, including those of the European Union, United States, Australia, Canada, and Switzerland. We view Mavenclad® as a complementary oral treatment option in our MS product portfolio. Rebif® (interferon beta-1a), a disease-modifying drug used to treat relapsing forms of MS (RMS), is and remains a well-established therapy. Rebif® has been a standard treatment in RMS for more than 20 years, and has more than 1.6 million patient-years of therapy since approval. Following the European Union approval of the Rebif® label update last year, making it a treatment option for RMS that may be continued into pregnancy if clinically needed and while breastfeeding, the U.S. Food and Drug Administration (FDA) followed in May of this year by approving the inclusion of new safety data on pregnancy and breastfeeding in the prescribing information for Rebif® in the United States.

[2] To date, Rebif® is not approved by any regulatory authority for the treatment of Covid-19 or for use as an antiviral agent.

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This is an important update for women living with MS who wish to start or expand their family, not having to choose between treating their disease or becoming pregnant.

Rebif® has also played an important role in our company support to fight the Covid-19 pandemic, which includes in-kind contributions, product donations, resources, and expertise in consortia and partnerships aimed at fighting the pandemic. As part of the global effort to investigate potential Covid-19 therapeutics and our support of independent research, we worked with the World Health Organization (WHO) and INSERM (the French National Institute of Health) on a donation of up to 300,000 units Rebif® (interferon beta-1a) for their important global Covid-19 clinical trials known as SOLIDARITY and DISCOVERY, respectively. This donation was followed by a collaboration with the US National Institute of Allergy and Infectious Diseases (NIAID), part of the U.S. National Institutes of Health (NIH) with a contribution of 3,000 units of Rebif® for the Adaptive Covid-19 Treatment Trial 3 (ACTT 3), which is currently enrolling hospitalized adults with Covid-19 in the United States and in other countries. The NIAID-led study is evaluating treatment with Rebif® in combination with remdesivir, compared with remdesivir alone, in over 1,000 hospitalized adults diagnosed with Covid-19 and will evaluate time to recovery in the combination therapy group relative to the remdesivir-only group.

Generating data around our MS treatments and the risk of respiratory viral infections has been important to help support clinicians as they make treatment decisions for their patients living with MS. At MSVirtual2020: 8th Joint ACTRIMS-ECTRIMS Meeting, which took place virtually from September 11-13, we presented a total of 54 abstracts across our MS portfolio, including data providing insights on how Mavenclad® and Rebif® do not affect the risk of respiratory viral infections and Covid-19 outcomes in MS patients. We also presented data demonstrating investigational treatment evobrutinib is the first and only Bruton's tyrosine kinase inhibitor (BTKi) to demonstrate high and sustained efficacy through 108 weeks in clinical studies (for further details see "Research & Development").

Oncology & Immuno-Oncology*

Erbitux® (cetuximab) is the third best-selling drug in terms of revenue in the portfolio of our Biopharma business and is our flagship product in oncology. Treating more than 1 million patients since authorization, the product is a standard of care for patients with epidermal growth factor receptor (EGFR)-expressing, RAS wildtype metastatic colorectal cancer (mCRC), as well as both recurrent and/or metastatic and locally advanced squamous cell carcinoma of the head and neck (SCCHN). During the last year, encorafenib in combination with cetuximab has received regulatory approval in several markets worldwide for mCRC BRAF mutant patients. In December, Erbitux® was once again officially included in the China National Drug Reimbursement List (NDRL) for the treatment of RAS wild-type mCRC. This achievement will enable more patients with mCRC in need of innovative targeted therapies to benefit from the use of Erbitux®.

Together with Pfizer Inc., we have made progress in sharing new data, securing additional regulatory approvals and reimbursement decisions with our anti-PD-L1 antibody Bavencio® (avelumab) (for further details see "Research & Development").

On June 30, the FDA approved Bavencio® for the maintenance treatment of patients with locally advanced or metastatic urothelial carcinoma (UC) that has not progressed with first-line platinum-containing chemotherapy, based on the results of JAVELIN Bladder 100. On December 11, 2020, the Committee for Medicinal Products for Human Use (CHMP) of the European Medicines Agency (EMA) adopted a positive opinion recommending approval of Bavencio® as monotherapy for the first-line maintenance treatment of adult patients with locally advanced or metastatic UC who are progression-free following platinum-based chemotherapy. The CHMP's positive opinion will now be reviewed by the European Commission (EC), with a decision expected in early 2021.

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

Other highlights from our development pipeline included the advancement of several potential first-in-class/best-in-class compounds. The development program for tepotinib, our oral MET inhibitor designed to inhibit the oncogenic MET receptor signaling caused by MET (gene) alterations, has continued to see pivotal clinical, regulatory, and commercial milestones in 2020. Discovered in-house, tepotinib underscores our strategic focus on delivering innovative precision medicines to patients with cancer.

On March 25, tepotinib was approved in Japan for the treatment of patients with unresectable, advanced or recurrent non-small cell lung cancer (NSCLC) with METex14 skipping alterations. The treatment, known as Tepmetko® in Japan, was the first oral MET inhibitor to have received a regulatory approval for NSCLC with MET gene alterations.

On August 25, 2020, the U.S. FDA accepted and granted Priority Review to our New Drug Application for once-daily, orally dosed tepotinib for the treatment of patients with metastatic NSCLC whose tumors have a mutation that leads to mesenchymal-epithelial transition exon 14 (METex14) skipping. Tepotinib was granted Breakthrough Therapy Designation by the FDA in September 2019. On November 26, 2020, the EMA validated our tepotinib application for the treatment of advanced NSCLC with METex14 skipping alterations. On February 3, 2021, we announced that the FDA has approved Tepmetko® (tepotinib) following Priority Review for the treatment of adult patients with metastatic NSCLC harboring mesenchymal-epithelial transition (*MET*) exon 14 skipping alterations.

In February 2019, we entered a global strategic alliance with GlaxoSmithKline (GSK) to jointly develop and commercialize the investigational bifunctional fusion protein, bintrafusp alfa (M7824), discovered as a result of our own research. Bintrafusp alfa is a potential first-in-class investigational bifunctional fusion protein designed to simultaneously block two immunosuppressive pathways, TGF-β and PD-L1, within the tumor micro-environment. This bifunctional approach is thought to control tumor growth by potentially restoring and enhancing anti-tumor responses. In preclinical studies, bintrafusp alfa has demonstrated antitumor activity both as monotherapy and in combination with chemotherapy. Based on its mechanism of action, bintrafusp alfa offers a potential targeted approach to addressing the underlying pathophysiology of difficult-to-treat cancers (for further details see “Research & Development”).

In June 2020, the Japanese Ministry of Health, Labour and Welfare (MHLW) granted SAKIGAKE ‘fast-track’ designation for the investigational bifunctional fusion protein bintrafusp alfa, as a potential treatment for patients with BTC. Bintrafusp alfa was previously granted orphan drug designation by both the FDA as well as the EMA in BTC in December 2018. Bintrafusp alfa is being studied in more than 15 different cancers and 11 alliance-led clinical studies, each exploring distinct mechanistic hypotheses related to the action of TGF-β in supporting cancer growth. To date, more than 1,300 patients have been dosed globally in the bintrafusp alfa INTR@PID clinical development program.

Our broad portfolio of small-molecule DNA Damage Response (DDR) inhibitors represents multiple development paths as monotherapies or in combination with immunotherapy, chemotherapy, or radiotherapy (for further details see “Research & Development”).

Fertility*

To date, an estimated 4 million babies have been born with the help of our fertility portfolio. Being the global market leader in fertility drugs and treatments, with a unique and broad portfolio from therapeutics to lab technologies, our Fertility franchise is an important growth driver for our Biopharma business. Infertility represents an increasing challenge globally due to demographic changes and growing lifestyle adjustments like delayed childbearing. In this highly specialized market, we enable treatment individualization including digital health solutions and technologies in assisted reproductive technologies (ART) for patient convenience. With our current portfolio, we are well equipped to be the Fertility partner of choice for our customers and to further improve ART through innovative solutions across therapeutics, lab technologies, services, and digital health solutions.

The Pergoveris® Pen is the first product with a combination of recombinant follicle-stimulating hormone (FSH) and recombinant luteinizing hormone (LH) in a ready-to-use liquid version, eliminating the need for mixing. It thus provides an improved and convenient treatment option for women with severe deficiency of both FSH and LH. Launches around the globe will continue in order to provide patients with access to this therapeutic.

On the occasion of the annual meeting of the European Society of Human Reproduction and Embryology (ESHRE), we launched the Digital Congress Center (DCC). Our DCC provides opportunities to leverage the interaction in a digital way and to reach the customers, especially during pandemic times. Our DCC allows digital means for collaboration, bringing together internal and external expertise.

General Medicine & Endocrinology*

Every day, more than 80 million patients around the world use our trusted general medicine and endocrinology (GM&E) medications. Concor®, Euthyrox®, Glucophage®, and Saizen® are highly valued brands and market leaders in many key markets worldwide. As a result, GM&E is the largest business franchise of the Healthcare business sector in terms of sales, with strong growth in all major therapeutic areas of focus, contributing significantly to the overall profitability of Healthcare and our company. Although no longer patent-protected, the brand equity of our products, built up over decades, makes them cornerstones for the treatment of chronic cardiovascular, metabolic, and endocrine diseases.

Concor®/Concor Cor®, containing bisoprolol, is the leading beta-blocker worldwide in volume shares for treating hypertension and cardiovascular diseases such as coronary heart diseases and chronic heart failure. In addition to the plain preparations, the Concor® family offers fixed-dose combinations such as Concor Plus®/Lodoz® (bisoprolol with hydrochlorothiazide) and Concor AM® (bisoprolol with amlodipine). Euthyrox®, with the active ingredient levothyroxine, is the worldwide market leader with a market share of 39% in volume for the treatment of hypothyroidism, a disease with high prevalence but still low diagnosis rates in most emerging markets. Glucophage®, containing the active ingredient metformin, is the drug of choice for first-line treatment of type 2 diabetes. During 2020, multiple health authorities worldwide continued to approve Glucophage® in prediabetes when intensive lifestyle changes have failed. This indication for Glucophage® is now registered in 64 countries. Overall, considering the high prevalence of prediabetes and diabetes, we continue seeing great potential for Glucophage®.

We help to raise awareness and education in the areas we operate in, such as thyroid diseases and diabetes. This is well demonstrated by our active role in International Thyroid Awareness Week and our partnership with the International Diabetes Federation (IDF), which serves as a basis for implementation of education and communication activities that emphasize the importance of type 2 diabetes prevention.

Saizen®, with its active ingredient somatropin, is our main endocrinology product and is indicated for the treatment of growth hormone deficiency in children and adults. Saizen® can be delivered with the Easypod® electromechanical injection device, the only growth hormone injection device able to wirelessly transfer data

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such as injection times, dates, and doses to the web-based software system Easypod® Connect, making it easier for healthcare practitioners and patients to manage adherence and reach their treatment goals. Since 2019, Aluetta® (the new Saizen® pen) has been rolled out to select markets with the objective of expanding the reach of Saizen®, offering additional options for healthcare practitioners and patients and expanding our devices portfolio.

In endocrinology, we differentiate ourselves from competitors through leadership in the e-health space, both by building evidence and by leveraging the meaningful use of technology to provide breakthrough solutions for patient engagement, partnership with healthcare practitioners and better payer value proposition.

Further contributions against Covid-19 *

Right from the start of the Covid-19 pandemic and all throughout 2020, we have been continuously making every effort to proactively handle the situation and minimize the impact of the pandemic on the supply of our medicines locally and globally through three main levers: the thorough implementation of our business continuity plans across our network, the active management of our stocks, and the assessment of alternative transportation routes to reach our customers and patients. As we continue to navigate the Covid-19 pandemic, we are thinking about the most vulnerable people with chronic diseases such as diabetes and cardiovascular diseases. Through our collaboration with the nonprofit organization Direct Relief, we provided over 8.3 million tablets of Glucophage® (metformin) and Glucovance® (glibenclamide/metformin), 5.5 million tablets of Concor® (bisoprolol) and Concor Plus® (bisoprolol/hydrochlorothiazide), and over 2.7 million tablets to people affected by poverty or emergency situations. Direct Relief has estimated that our donation has helped more than 32,000 patients in crisis areas.

Divestment of the allergy business Allergopharma*

On February 19, 2020, we signed an agreement to sell its allergy business Allergopharma to Dermapharm Beteiligungs GmbH, Grünwald, Germany. The transaction was completed effective March 31, 2020, following regulatory approval and satisfaction of other customary closing conditions. Only the transfer of the business in China, which is to be considered immaterial, was completed on August 31, 2020. Allergopharma is a leading provider of specific immunotherapies for type 1 allergies. In addition to the Allergopharma business in Europe and Asia with its broad portfolio of therapeutic and diagnostic products, the transaction includes the production site in Reinbek near Hamburg. An existing adrenaline autoinjector development project for the treatment of anaphylactic reactions was not part of the transaction and remained with our company.

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Life Science

Our purpose is to solve the toughest challenges in the life science industry in collaboration with the global scientific community. With our Research Solutions, Process Solutions, and Applied Solutions business units, we are a leading worldwide supplier of tools, high-grade chemicals, and equipment for academic labs, biotech, and biopharmaceutical manufacturers, as well as the industrial sector. Research Solutions provides our academic customers with the chemicals and biological tools needed to make scientific discovery easier and faster. Process Solutions provides drug manufacturers with process development expertise and technologies, such as continuous bioprocessing. Applied Solutions offers analytical workflows and both lab connectivity and digitization solutions to empower the labs of the future.

Our strategy includes strengthening our core business by expanding our leading positions and capabilities as well as establishing new pillars of growth in scientific areas including gene editing, cell and gene therapies, contract development and manufacturing services, and digitization. The Life Science business sector is a top-three player by revenue in the global life science market, with leading positions across many of our portfolios. Our complete portfolio comprises more than 300,000 products, ranging from lab water systems to genome-editing tools, antibodies, and cell lines, as well as end-to-end bioprocessing systems to support the manufacturing needs of both emerging biotech and large pharma companies. We have and will continue to play a critical role in aiding the ongoing response to the Covid-19 pandemic, supporting our customers working on combatting the novel virus through our products, services, and expertise.

In 2020, the Life Science business sector generated 43% of Group sales as well as 42% of EBITDA pre (excluding Corporate and Other).

Our Response to Covid-19*

The Life Science business sector is responding to the Covid-19 pandemic with products and solutions that empower scientists to detect and characterize viruses and to develop vaccines and therapies. We support more than 35 testing solutions, 50 vaccines, and 20 therapeutic Covid-19 programs for our customers across the globe. Our e-commerce platform, **www.sigmaaldrich.com**, continues to grow and connect customers globally with the products needed to advance their research, development, and production efforts, and our newly consolidated offering of relevant Covid-19 products, services, and necessary raw materials allows scientists and researchers to detect and characterize viruses and to develop vaccines and therapies.

In addition, we are tapping into our existing collaborations to support projects that target Covid-19 vaccine and therapy development. As part of our collaborations with Oxford University in the United Kingdom and Baylor College of Medicine in Houston, Texas, USA, we supported the process development, manufacturing, and scale up of their respective Covid-19 vaccines candidates. In May, we began a new collaboration with the Massachusetts Institute of Technology's (MIT) Center for Collective Intelligence and Community Biotechnology Initiative focused on driving innovative pandemic response efforts, which included the release of a new report detailing potential paths to solutions to combat Covid-19 and future pandemics. Additionally, in October, we announced our collaboration with Mammoth Biosciences Inc., of South San Francisco, California, USA, for the development, scale-up, and commercial production of their CRISPR-based SARS-CoV-2 diagnostic test.

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Promoting scientific engagement and STEM disciplines remains a passion of our business sector. In the spirit of continuing to ignite youth interest in science and offering inspiring, engaging learning opportunities during challenging times, we launched Curiosity Labs™ at Home, a virtual video series of scientific experiments that can be conducted with materials typically found around the house. In 2020, the program generated more than 2.7 million video views, reaching users in 132 countries.

Research Solutions*

In the pursuit of solving the toughest challenges in life science, we seek opportunities to support our global customers and collaborators with the skills and equipment they need to make critical advancements for the industry. Aligning with this goal, in January, we announced the opening of a non-profit, high-tech skill development center in collaboration with the Council of Scientific and Industrial Research's Institute of Microbial Technology (CSIR-IMTECH), an organization under the government of India's Ministry of Science and Technology. Located in Chandigarh, India, the center is equipped with genome-editing, single-molecule biomarker detection, and other technologies to help local students build life science skills.

To further the drug discovery process, in September, we launched the MILLIPLEX® SARS-CoV-2 antigen panels for IgG, IgA, and IgM, which utilize multiplexing technology. The panels are invaluable research tools for Covid-19 serologicals, epidemiological studies, and vaccine development.

Process Solutions*

A key goal for our Life Science business sector is to support our customers that manufacture drugs, from small to large innovator companies, bring life-enhancing medicines and therapies to market – and to patients – faster. To facilitate reaching this target, we continue to add building blocks to our BioContinuum™ Platform to address intensified bioprocessing and continuous manufacturing. In July, we acquired Resolution Spectra Systems, a Meylan, France-based leader in bioprocess analytical monitoring, whose Raman technology bioprocess monitoring sensors complement our newly launched Bio4C™ Software Suite. This acquisition further enhances our advanced bioprocess portfolio with Good Manufacturing Practice (GMP)-ready instrumentation and software to analyze and manage generated data.

In November, we announced our agreement with Donghao Lansheng (Group) Co., Ltd. to pilot a new customs clearance process in China. The new import policy means we will be able to process shipments with fewer application and technical dossier requirements. The agreement made us the first and only company to be accepted by the Shanghai government to pilot this new process, representing an important milestone in improving the availability of global research materials and ensuring more efficient flow of supplies critical to the development of life-saving therapies in China.

Our portfolio now includes 28 patents for CRISPR technology granted worldwide, including six patents granted in 2020. In April, we were awarded our second U.S. patent for CRISPR-chrom technology, making us the only provider with a patent covering the fusion of chromatin modulating peptides to CRISPR proteins. We were awarded two additional U.S. patents for foundational CRISPR-Cas9 technology in May, which both support scientists and researchers in their work to advance gene therapy development programs.

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A strategic fit with our goal of advancing cell-based therapies to patients, our numerous investments in viral and gene therapy manufacturing will allow further advancement toward potentially life-saving treatments. In April, we announced an expansion to this offering with plans for a second facility at our site in Carlsbad, California, USA. This € 100 million, 140,000-square-foot manufacturing facility will support viral and gene therapy production at the 1,000-liter scale using Mobius® single-use equipment and is expected to open next year. In September, we announced the expansion of our biosafety testing laboratory services, including our BioReliance® viral clearance offering, in Singapore. This increased viral capacity at our Singapore lab by 50% to meet demand from biopharmaceutical and cell and gene therapy developers and manufacturers in Asia-Pacific, allowing customers to continue developing life-saving medicines amid the Covid-19 pandemic.

We took many steps forward with our Life Science expansion plans throughout 2020. A key growth pillar for the Life Science business sector, our BioReliance® End-to-End Solutions are service offerings for process development and manufacturing for emerging biotech companies. In July, we opened our M Lab™ Collaboration Center in Shanghai, which will host a new BioReliance® End-to-End Solutions GMP manufacturing facility offering contract development manufacturing organization services to customers in China and Asia-Pacific. The new M Lab™ Collaboration Center, which is the largest of our nine centers worldwide and located in a hub for biomedical sciences and the research community in China, also offers customizable solutions to help advance drug development.

We announced continued expansion in September with a € 59 million addition to our facility near Madison, Wisconsin, USA, that supports high-potent active pharmaceutical ingredient (HPAPI) and antibody-drug conjugate (ADC) manufacturing. With more than 35 years of experience in the development and manufacturing of small molecules, biologics, and ADC technologies, we offer extensive experience in both clinical and commercial manufacturing. This investment allows large-scale manufacturing of increasingly potent compounds for therapies with the potential to treat cancer. The project is an addition to our campus in St. Louis, Missouri, USA, which was the first commercial ADC facility in North America, and which specializes in ADC bio-conjugation, active pharmaceutical ingredients, excipient and adjuvants manufacturing. Expected to be completed by mid-2022, it also creates one of the largest dedicated HPAPI manufacturing facilities specially designed to handle single-digit nanogram containment.

In October, we celebrated another expansion with the topping-out ceremony for our new € 140 million membrane production plant in Darmstadt, Germany. The project is part of our plan to invest € 1 billion in global headquarters by 2025, as announced in 2019. The new membrane manufacturing facility for aseptic filters will help meet customer demand in the growing biopharmaceutical market, expanding manufacturing of Millipore Express® membranes, which are critical components in Millipore Express® filters and help ensure the sterility of biological drug products. Broadening our global manufacturing footprint, we invested a combined € 40 million in our facilities in Jaffrey, New Hampshire, USA, and Danvers, Massachusetts, USA, which supply critical products to customers developing life-saving therapies, including Covid-19 vaccines. The expansion of our facility in Jaffrey will add 275 jobs to the filtration plant and a new, state-of-the-art water system that treats and reduces concentration of organic solvents. The expansion will allow the site to operate on a 24-hour cycle by the end of the year, delivering on increased demand for the manufacturing of filtration devices and membrane products, specifically Durapore® filters, Express® filters and the Viresolve® product lines, which are used to ensure the sterility of many life-saving therapies and to remove viral contamination for a variety of therapies. The expansion to our site in Danvers will add capacity for the manufacturing of Mobius® single-use consumables and virus filtration technologies, which have seen significantly increased demand. These expansions, significantly increasing our capacity at both sites, will help meet unprecedented demand of key life-saving products and demonstrate our commitment to growing our global presence while providing employment opportunities.

Applied Solutions*

An additional expansion to our site in Buchs, Switzerland, will support our offering of testing kits and services that ensure our food is safe to eat and our water is safe to drink. In July, we announced an investment of € 18 million to build a new laboratory facility that will support our reference materials business and allow increased support of researchers and testing labs in pharmaceutical, environmental, and food and beverage analysis. Completion of the expansion is scheduled for December 2021, adding modern, flexible space to one of our most important research and development centers.

To ensure safe laboratory work and analysis, our leading lab water offerings provide reliable, consistent sources of high-quality pure water. To further support our customers in this space, in May, we launched the Milli-Q® IX 7003/7005/7010/7015 Type 2 water purification system, a redesigned version of our benchtop pure water system.

We aim to optimize digitization across Life Science to increase lab productivity, efficiency, and safety. In February, we introduced the BrightLab™ platform, our cloud-based software solution bringing inventory management and instrument connectivity functionalities to research scientists. In March, we launched the LANEXO™ system for lab inventory, safety, and compliance management. Together, these two components of our laboratory informatics offering will boost our digital lab productivity business and commercial growth for Life Science.

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Performance Materials

Performance Materials is advancing digital living. Our main focus is on the electronics market with our materials and solutions changing the way we generate, access, store, process, and display information. In addition, our highly specialized, application-driven Surface Solutions business makes life more colorful. Together with our customers, we are discovering the next generation of high-tech materials and solutions. With strong growth trends such as 5G and Big Data, and new applications such as autonomous driving and Internet of Things (IoT), we have set the course for future growth.

The business sector consists of three business units: Semiconductor Solutions, Display Solutions and Surface Solutions. Comparing Performance Materials with a smartphone, Display Solutions represents the user interface, Semiconductor Solutions the intelligence, and Surface Solutions the aesthetics. We offer innovative solutions especially for the electronics industry – for microchips and displays – and for surfaces of every kind.

We are well on track with the execution of our five-year Bright Future transformation program announced in 2018. With the completion of the Intermolecular and Versum Materials acquisitions, we achieved two major milestones to transform Performance Materials into a strong solutions provider and leading player in the electronic materials market. After closing the acquisition of Versum Materials on October 7, 2019, our newly integrated organization went live on June 1, 2020. Effective March 4, 2021, we plan to change the name of the Performance Materials business sector to Electronics.

Performance Materials accounted for 19% of Group sales in 2020 and its share of EBITDA pre (excluding Corporate and Other) was 18%. The EBITDA pre margin was 30.3% of net sales.

Semiconductor Solutions*

Semiconductor Solutions is at the heart of electronics and enables transformation in communications, mobility, and healthcare. As almost every electronic device uses one of our products, we are advancing almost every aspect of digital development. We are developing solutions for smaller, faster, and more powerful devices. As an industry leader, we are pushing the boundaries of science and technology to help our customers create the next generation of digital devices and experiences.

Semiconductor Solutions is the largest business unit within Performance Materials. It consists of materials, delivery systems, and services for the semiconductor industry. Our Semiconductor Materials unit supplies products for every major production step in the wafer processing, including doping, lithography, patterning, deposition, planarization, etching, and cleaning. Specialty cleans, photoresists, and conductive pastes for semiconductor packaging round out the portfolio. Our material innovation accelerator Intermolecular is a trusted partner for materials innovation and is our Silicon Valley science hub. Its capabilities allow material combinations to be tested directly in the specific application environment. Compared to conventional methods, this means enormous time savings in the development process, considerably faster learning cycles, and findings on new material combinations, providing a unique service for customers.

The Delivery Systems & Services (DS&S) business enables the safe and responsible handling of gases and liquid chemicals for electronic manufacturers. It focuses on the development and deployment of safe and reliable delivery equipment. This allows our materials to be handled with the highest quality and safety standards for our customers.

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Display Solutions*

Our Display Solutions business unit consists of the Liquid Crystals, Organic Light-Emitting Diodes (OLED), Photoresists, and Liquid Crystal Windows businesses, among others. We are supporting our display customers in the development of novel display technologies and product concepts for applications, while also addressing new requirements that have emerged from the Covid-19 pandemic. With the proliferation of multiple use cases and display trends, technological requirements for the display industry are significantly expanding. We are in a leading position to develop required new display materials and technology concepts to contribute to the diverse display landscape. We remain active in the development of a broad range of display materials, including Liquid Crystals, OLED, Quantum Dots Pixel Color Converters (QDPCC), and Display Patterning Materials (DPM).

In Liquid Crystals we continue to see very dynamic market developments. Covid-19 has accelerated the market shift toward China and increased competition. We maintained our position as the technology leader, and with our XtraBright™ products we were able to win new projects for large-area displays as well as high-resolution mobile devices. Our OLED materials qualified for free-form display-based products that entered the market this year. Our photoresist materials are also being used in flexible displays. Our low-temperature processable positive tone photoresists are widely used to pattern on-cell touch sensors. These sensors enable a thinner display structure, which is crucial for foldable devices. Our Liquid Crystal Windows business reached a major milestone with the opening of the Niemeyer Sphere located at the headquarters of crane manufacturer Kirow in Leipzig, Germany, in July. The prestigious architectural piece is one of the last works of renowned Brazilian architect Oscar Niemeyer. The construction of the building was realized using triangular versions of our eyrise® dynamic liquid crystal windows. The Liquid Crystal Windows business is now preparing for the market launch of privacy-on-demand eyrise® windows in the first quarter of 2021.

Surface Solutions*

The core markets for Surface Solutions are automotive coatings, cosmetics, and, to a smaller extent, industrials. We are serving these markets with functional and decorative solutions. Our focus is on expanding our portfolio through innovation in all areas and proactive solution development in close cooperation with our customers. We provide our customers with solutions that help them to create innovative surfaces of all kinds. Our materials enable more beautiful, more resistant, and more effective products. Our pearlescent pigments allow striking automotive coatings, fascinating cosmetics, extraordinary packaging, and innovative product design. With a broad portfolio of active ingredients, we enable cosmetics manufacturers to enrich their skin care products with moisturizing, protecting, or anti-aging effects. Moreover, with our functional solutions we serve a large number of innovative applications, from dirt-repellent and easy-care surfaces to laser markings of plastic parts and cables. While Covid-19 has had significant impacts across the automotive and cosmetics markets, Surface Solutions is implementing measures to stabilize the business and to prepare for future growth.

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Strategy*

Strategy Fundamentals

We are curious minds dedicated to human progress. We believe that scientific exploration and responsible entrepreneurship are key to technological advances that benefit us all. Our values – courage, achievement, responsibility, respect, integrity, and transparency – guide us in every step we take and in every decision we make.

As a company, we have a strong foundation. These fundamentals have been defined by the Merck family. We always take them into consideration when discussing and deciding on our Group strategy.

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

Group Strategy

Ambition for the future

Over the past years, our company has grown significantly through a series of strategic moves that have enabled us to develop into a vibrant science and technology company. We have systematically and continuously strengthened and focused our portfolio of innovative science and technology throughout our business sectors.

In Healthcare, we focus on development and commercialization of innovative specialty medicines. To do so we actively managed our portfolio and acquired Serono SA in 2007. Today, we are focusing our R&D efforts on oncology, immuno-oncology, neurology, and immunology.

Within Life Science, we solidified our position as one of the industry leaders following the acquisition of Millipore Corporation in 2010 and Sigma-Aldrich Corporation in 2015.

Performance Materials is currently undergoing a major transformation by repositioning its overall business toward the highly attractive electronic materials market. With the acquisitions of Versum Materials Inc. and Intermolecular Inc., both in 2019, we have achieved a leading position in this market, with a focus on Semiconductor Solutions.

With our Group strategy, we want to become the vibrant science and technology company. By 2022, we aim to have strong, innovative science- and technology-focused business sectors with leadership positions in our areas. We want to be a top-tier company in relation to our peers in terms of sales growth and margin, and we aim to continue to deliver sustainable returns to our owners.

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We are now in the growth and expansion phase of our strategy and are well on track. Following the Versum Materials acquisition in 2019, we are giving priority to organic growth while rapidly lowering our debt and pursuing a sustainable culture of cost consciousness until 2022. We do not rule out making large transformative deals, yet in light of our strong business portfolio, it is more likely that we will complement our businesses through a number of small to medium-sized acquisitions after 2022.

In Healthcare, we intend to fully leverage our pipeline's potential. Our new product launches, Mavenclad® and Bavencio®, are increasingly contributing to earnings. We expect sales performance in our established products to remain at least stable through to 2022. By 2022, we aim to achieve additional annual sales of around € 2 billion with new medicines and see significant growth potential beyond that year.

Life Science's growth is driven by our robust product portfolio and backed by our global supply chain, our e-commerce platform, and our strong track record of service and innovation excellence. The business sector plans to deliver annual organic sales growth of 6% to 9% (CAGR) per year in the mid-term, continuing to outpace the market. Our strong positions in Process Solutions and selective pursuit of attractive segments in the Research Solutions and Applied Solutions markets all contribute to sustaining our profitable growth.

Performance Materials benefits from strong and long-term growth trends, especially from digitization and the heavily increasing data volumes. We expect Semiconductor Solutions to be the fastest-growing business unit of Performance Materials with annual organic sales growth in the mid- to high-single-digit percentage range in the coming years.

To achieve our strategic ambition of becoming the vibrant science and technology company, we focus on our three Group-wide priorities: Performance, People, and Technology.

Performance

Our priority Performance focuses on the financial aspects of our activities. It provides a clear definition and tangible targets of financial success. We focus on organic growth while rapidly lowering our debt and pursuing a sustainable culture of cost consciousness until 2022.

We have made significant progress on this journey in recent years. In the past months, the strengths of our business model with three innovation-driven business sectors have become particularly evident during the Covid-19 crisis.

Our three business sectors have moved forward in delivering on their strategic priorities in recent years. Healthcare has seen increasing sales contributions from the medicines Bavencio® and Mavenclad® and has made good progress with its development pipeline. The Life Science business sector continues to deliver above-market growth and has been operating more profitably than most of its competitors. With the acquisition of Versum Materials, Performance Materials has shifted its portfolio to focus on the high-growth semiconductor business and generates high margins.

The transformation in recent years and our clear focus on science and technology have paid off. All our business sectors operate in highly attractive markets and have excellent prospects for the future. Our Healthcare pipeline, our Process Solutions business with products and services for drug manufacturing, and our Semiconductor Solutions business will be the main growth drivers ("BIG 3") in the coming years.

People

To become the vibrant science and technology company, we focus on our people – their talent, their performance, their ideas. Our People strategy aims at building the capabilities we need to shape the future by attracting and retaining the right people as well as creating the right culture for them to collaborate and perform at their best.

The People strategy acts as a basis for our continuous efforts to attract, retain and develop our leaders and our talents. It serves as an illustration of our belief that strategic efforts can only be successful if we maintain a focus on our people.

The delivery concentrates on three key strategic cornerstones – empowered leaders, curious talents, and result driven teams and networks – that all play an instrumental role in distinguishing and focusing our actions.

Empowered leaders

We drive a high standard of leadership to sustain engaged and curious employees. Establishing a culture of inspiration and inclusion in which leaders set an example through their attitude and behavior, as well as selecting and placing the right employees, is key. To support our growth and innovation course, we need a working environment that actively promotes diversity. One of our strategic goals is to recognize unique voices and strengths and to foster a culture of inclusion by appreciating individual differences.

In this context, we actively engage and challenge our leaders to become “leaders of people”, and we empower them to support our company in its transformation. Our leaders are encouraged to embrace new technologies for data-driven decision-making and development of people.

As “leaders of innovation”, our leaders are encouraged to set a clear, inspiring direction to empower employees and to provide structure, resources, and clear prioritization to achieve our goals.

Curious talents

Curious talents play an instrumental role in achieving our goals in a globally competitive environment. Therefore, we have launched a number of new offerings to stimulate individual learning and deliver company-wide change, such as our new LinkedIn learning platform. By modeling the values and behaviors required to promote a culture of innovation and curiosity, we encourage our people to challenge the status quo, to think critically and to demonstrate a pioneering spirit and a passion for innovation. By doing so, our talents are motivated to break down ambiguous and complex questions and to embrace fast, effective, and unbiased decision-making.

Results-driven teams and networks

Our activities not only support our people but also the way they work together. In a highly connected world, we put special emphasis on results-driven teams and networks to ensure a stimulating work environment that fosters high performance. To enhance our growth and innovation potential over the long-term and ensure the necessary flexibility to allow us to respond promptly to new trends, we support the development of and collaboration among our employees. Our focus on team collaboration is underpinned by our endeavor to always provide future-oriented solutions. This applies to the way we work and also to the frameworks we provide as an employer to ensure flexibility for individuals and teams to drive results.

Technology

Our approach to technology paves the way for discovering and scaling the most exciting technologies. The majority of our innovations come from within our existing business sectors, with approximately 7,900 scientists and researchers working for our company. These innovations include everything from incremental innovations to disruptive opportunities in the fields of Healthcare, Life Science, and Performance Materials.

Generating new business

Complementary to the business sectors, we are also looking into innovations that fall between our business sectors or beyond our company’s current scope. With our Innovation Center in Darmstadt, Germany, and our Innovation Hubs in Menlo Park, California, United States, in Shanghai, China, and in Guangzhou, China, we are discovering new ideas and technologies, then scaling them up to build new businesses.

Propelling innovation fields

We are focusing on our activities within the following core innovation fields of interest: Clean Meat, Artificial Intelligence (AI)-enabled Health Solutions, and Liquid Biopsy.

A growing population, climate change, and the threats of antibiotic-resistant and zoonotic diseases demonstrate the need for sustainable, pathogen-free, and transparently produced animal protein. Our innovation field "Clean Meat" – also referred to as cultured, cultivated or cell-based meat – focuses on the biotechnology required to produce genuine meat and seafood grown in vitro using stem cells taken from animals. This will enable the production of animal protein that is healthier, more ethical, and environmentally sustainable. We aim to become the technology enabler for the emerging cultured meat industry, leveraging our vast expertise in cell culture, advanced materials, bioprocessing and cellular manufacturing. Cell culture media, free of any animal-derived material, is the major cost driver for cultured meat products. One of our projects in this innovation field is tackling this challenge by designing and commercializing custom formulations for the production of different cultured meat and seafood species.

The innovation field of AI-enabled health solutions is the first China-specific innovation field. It includes AI-related products and services, which mainly help our China Healthcare business grow, and focuses on AI solutions for patient journey and clinical trial in our therapeutic areas in China.

This approach is complemented by offering a platform to capture the full innovation potential of our company between and beyond our sectors. An example in this area is our Additive Manufacturing of Tablets project. Producing tablets for clinical trials today is still quite time-consuming and expensive when using traditional tablet manufacturing processes. Through a newly created partnership with AMCM GmbH, a sister company of 3D printing world-market leader EOS GmbH, a GMP (Good Manufacturing Practice)-certified 3D printing solution is being developed that will make tablet production simpler and more flexible, saving time and money. This novel, simplified process in clinical development of drugs can be enabled by using powder bed fusion methods, whereby a laser melts and fuses powder together layer by layer. In addition, 3D printing allows for API formulation to be scalable while avoiding costly reformulations throughout the entire pharmaceutical development and commercial production process.

Investing strategically in innovative technologies

When it comes to external innovation, we focus on investments in disruptive emerging fields adjacent to, in between, and beyond our established business sectors. We strive to transform groundbreaking scientific ideas into businesses with the potential to improve patients' lives, disrupt industries, and transform the way we live. This includes M Ventures, our € 400 million evergreen corporate venture capital fund. M Ventures has the mandate to drive innovation through equity investments in innovative and disruptive technologies and products with the potential to significantly impact the vitality and sustainability of our core and future business areas. The team invests globally in transformational ideas driven by great entrepreneurs, taking an active role in portfolio companies and teaming up with these entrepreneurs and our co-investors to translate innovation into commercial success. M Ventures has a significant focus on early stage investing and company creation including the creation of spin-offs to leverage our science and technology base. Since inception, M Ventures has invested in over 60 promising startups and companies that could impact our core and future business areas, while at the same time providing our company with strategic and financial returns, such as through the successful IPO of Progyny (October 19, 2019) and the recent IPO of Galecto (October 29, 2020), a phase II biotech developing therapeutics directed at biological targets which are at the heart of fibrosis, inflammation, and cancer. In addition, M Ventures runs multiple incubators in Israel and a China seed fund worth RMB 100 million (€ 13 million) to further foster early stage innovation in this market with strategic importance for us.

Digitalization

A major focus of our innovation efforts is digitalization. We are leveraging related opportunities through our Digital Organization in order to create value for patients, customers, and business associates. To us, digitalization means the digital integration of our entire value chain, the digitalization of our products, services, and communication interfaces to customers, as well as the development of new digital business models.

We believe that responsible data-driven collaboration has the power to transform healthcare and accelerate scientific discovery. Syntropy, our joint venture with Palantir Technologies Inc., is aimed at unlocking the value of scientific data and empowering the world's leading experts to collaborate in the fight against cancer and many other diseases. Syntropy's user-centric data integration platform safeguards data ownership while allowing users to structure and analyze data from disparate sources. Following a successful pilot, Syntropy has signed its first collaboration with a major NCI (National Cancer Institute) Designated Cancer Center in the United States. We also recently announced a partnership with MITRE Corporation, United States, to improve the overall quality and consistency of cancer data available to clinicians, patients, researchers, and other stakeholders.

Business Strategies

Healthcare

Global megatrends such as growing and aging populations as well as better access to healthcare continue to drive the demand for our products. To meet these demands and respond appropriately to the dynamics of our markets, we have significantly transformed our Healthcare business sector in recent years.

Following our successes over the past years, we continue to drive pipeline projects with the aims of bringing groundbreaking medicines to patients, maximizing our existing portfolio, and continuing our expansion in growth markets. Our ambition is to become a global specialty innovator, operating in franchises with significant unmet medical needs and bringing high value to patients. Therefore, we continue to invest in research and development to discover new treatment options and improve existing ones. Together with our stakeholders and partners, we want to ensure that people can access the medicines they need to stay healthy and live longer.

The first pillar of our strategy is to reinforce our global footprint, bringing the innovation of our pipeline to patients and growing our presence – in the United States and in China, for example. The emerging markets and China are expected to be the largest growth drivers for many of our established products in the future. Managing the balance between delivering innovative new medicines while expanding our reach and ensuring the profitable growth of the existing business will be one of the strategic challenges. Fertility and endocrinology, for instance, offer significant opportunities to bring value to patients. Given their high profitability and growth potential, maximizing the commercial potential of these areas will remain important.

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

The third strategic pillar is innovation: We aim to develop high-quality, first-to-market, and best-in-disease therapies and to build a portfolio in each of our franchises. We have streamlined our pipeline and expanded our innovation capabilities with strong investigational drug candidates and technologies. In order to maximize the output of our R&D investments and increase our chances of success in discovering and developing new therapies, we focus our expertise on specific franchises and are exploiting synergies in disease mechanisms and biological pathways. We are investing in digital technologies as well as personalized and translational medicine in order to drive continued pipeline success.

In this context, strategic collaborations are an integral part of delivering on our commitment to transform the lives of patients living with serious unmet medical needs. We recognize the value of collaboration in the research and development of breakthrough therapies, as well as in strengthening our current portfolio. Here, we focus on balancing the right blend of internal capabilities and external partnerships (for example, with Pfizer Inc. on Bavencio® and with GlaxoSmithKline plc on bintrafusp alfa) and on building strong collaborations with other leaders in the industry.

Life Science

Life Science continues to deliver above-market growth and profitability through a strategic pursuit of leading positions in attractive market segments.

We have become one of the top players in the industry and set the standard for financial performance and innovation, with average annual revenue growth of 6% to 8% since 2016. Our Research Solutions business unit holds solid positions across chemistry and biology consumables, which we are enhancing with innovations such as multiplex, high-sensitivity protein detection kits and genome-editing tools. Within our Process Solutions business unit, we offer a complete suite of products for monoclonal antibody production, hold a strong position in single-use systems, and are gaining scale in contract development and manufacturing services. Our Applied Solutions business unit provides the broadest range of reference materials and continues to strengthen our established position in lab water with sustained momentum from recent launches and new digital offerings.

The Covid-19 pandemic, rather than changing our outlook, has reinforced that we are going in the right direction. Our purpose – to solve the toughest problems in life science in collaboration with the global scientific community – has strengthened our resolve to accelerate access to better health for people worldwide. Whether it is in labs, on the manufacturing floor with templates to bring therapeutic breakthroughs to scale, or at the point-of-care as patients worldwide receive vaccines, therapies and diagnostic tests, this year has put our purpose into action.

Our aspiration is to sustain this momentum, which is reflected in our three-pillar strategy:

- Strengthen the core organization by expanding our long-held positions in chemistry, lab water and bioprocessing, as well as enhancing our e-commerce and supply chain capabilities.
- Establish new growth pillars and capabilities in gene editing, cell and gene therapies, contract development and manufacturing services, and digitization while exploring new ways to address bottlenecks and inefficiencies in drug discovery and development.
- Sustain momentum of our core through operational excellence and investments in our capacity and capabilities, such as expansions at our global manufacturing and production sites as well as testing labs.

Staying this course will reinforce our position as a leading, innovation-driven, global supplier of tools, technologies, and services. In 2021, we will continue to serve our customers combatting the Covid-19 pandemic and support research labs in adjusting to new ways of working. Our innovations will enable next-generation bioprocessing, streamline testing workflows, and drive new advances in biology and chemistry. We are investing for our future, especially to build scale in bioprocess services such as contract development and manufacturing services, and testing of monoclonal antibodies, viral vectors, and antibody-drug conjugates. Our pursuit of profitable growth from our strong core positions us to sustain momentum and shape the future of the life science industry.

Performance Materials

Performance Materials is currently undergoing a major transformation by repositioning its overall business to that of a global electronic materials, equipment, and service provider. The target markets are attractive due to their long-term growth and value potential. The electronic content of any product is increasing; electronics are now part of nearly every product, and our diversification is securing long-term stability. Effective March 4, 2021, we plan to change the name of the Performance Materials business sector to Electronics.

In 2019, we acquired Versum Materials, a leading industry player, and Intermolecular, a testing and prototyping expert for materials innovation. With those two acquisitions we have further expanded our offerings in innovative and critical technologies for the electronics industry. Based on our best-in-class portfolio of products and services, we are well positioned in high-growth segments. Our industry-spanning customer base with a strong focus on thought and investment leaders in the industry allows us to target growth above the highly attractive semiconductor market.

Megatrends like Internet of things (IoT), AI, and autonomous driving lead to high innovation pressure and drive the growth of data from every side. The global data volume grows exponentially at around 30% annually; the “data explosion” will transform electronics far beyond what today’s systems can handle. Data needs to be generated, transferred, processed, stored, and made comprehensible for humans through smart interfaces. Our strategy is to cover all aspects of this data handling and to enable processes by providing customized solutions for the production of innovative electronic components. We are the company behind the companies, advancing digital living. Performance Materials targets mainly the electronic materials market with a focus on the semiconductor and display industries in order to participate in the growth of data-driven electronic solutions.

The Bright Future program ensures the successful transformation of Performance Materials by driving the realization of our strategy. The main outcomes of the program are the shift of our portfolio into growing electronics segments, safeguarding our margin ambition, and changes in organization and culture within Performance Materials. The absolute growth of Semiconductor Solutions and future growth in OLED are expected to outweigh the decline in liquid crystal sales. We expect to stabilize the EBITDA pre margins at around 30% in the long-term, well above the industry average. Performance Materials expects an organic sales growth in the range of 3% to 4% (CAGR) per year in the mid-term. With Versum Materials and Intermolecular, we are able to obtain a leading position in the electronic materials market. Overall, our strategy realization within the electronics market is well on track, and we are working on measures in Surface Solutions to manage the Covid-19 effects and to stabilize the business.

Sustainability Strategy

Sustainability is enshrined in our strategy

Humankind is being confronted with global societal challenges. Issues such as climate change, resource scarcity, a growing global population, demographic change, and insufficient access to healthcare in low- and middle-income countries are becoming increasingly relevant.

Our businesses create long-term value. Our aim is to reconcile ecological, social, and societal aspects for our company, for our stakeholders, and for society as a whole. Our company has been guided by strong values for more than 350 years and across many generations. Sustainability has always been a high priority in all our business activities.

We believe that sustainable business and profitable growth go hand in hand: The only way for us to secure our future competitiveness is by creating sustainable added value for society.

Our sustainability strategy centers on a commitment to using science and technology to achieve sustainable progress for humankind. With this we help to solve the problems described in the United Nations' 17 global Sustainable Development Goals (SDGs). Another key objective is to make our business model resistant to challenges and sudden changes. For example, this includes protecting our supply chains against continued resource scarcity in order to ensure that we can reliably provide our customers and patients with our products and medicines.

Our new strategic sustainability goals build on what we have achieved in recent years. The rapidly growing challenges in society and the environment demand a clear perspective for the years ahead. This is why we have enshrined sustainability as an essential component of our company's overall strategy. Through our business activities, we want to be economically successful and create value for society. At the same time, we endeavor to avoid generating subsequent costs for society.

New sustainability goals

We have defined three new goals with our sustainability strategy:

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

In order to achieve our sustainability goals, we are concentrating on seven focus areas:

- Sustainable innovations and technologies for our customers
- Impact of our technologies and products on health and well-being
- Sustainability culture and values
- Sustainability and transparency in the supply chain
- Securing our social license to operate in all regions
- Climate change and emissions
- Water and resource intensity

Today and in the future, we are pursuing numerous initiatives and projects in these focus areas and measuring our progress. These efforts ensure that sustainability will become a key indicator of our success across all our business sectors. We are also planning to also link the long-term variable compensation of the Executive Board from 2022 onward with the progress made toward achieving the company's sustainability goals.

The goals we have set ourselves to 2030 and beyond will contribute to the attainment of the United Nations SDGs. Our business activities contribute to the following five SDGs in particular:

- SDG 3: Good Health and Well-being
- SDG 8: Decent Work and Economic Growth
- SDG 9: Industry, Innovation, and Infrastructure
- SDG 12: Responsible Consumption and Production
- SDG 17: Partnerships for the Goals

You can find more information about our sustainability activities in the "Sustainability" chapter and in our **2020 Sustainability Report**.

Strategic finance and dividend policy

We are pursuing a conservative financial policy characterized by the following:

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 businesses form the basis for our strong and sustainable cash flow generation capacity. Moreover, we have several funding resources in place. A € 2 billion syndicated loan facility, renewed in 2018, is in place until 2025 to cover any unexpected cash needs.

This credit line is a backup facility that should only be used in exceptional situations. In addition, we have a commercial paper program with a volume of € 2 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. Furthermore, in 2020, we used bilateral bank loan facilities with first-class banks to optimize our funding structure. For the acquisition of Versum Materials in 2019, our company also agreed on a US$ 2.3 billion term loan, which was partially drawn and further reduced in the course of 2020.

Additionally, as a general rule, the bond market represents a key element. The most recent bond issues took place in January 2020 (€ 1.5 billion euro bonds) and September 2020 (€ 1.0 billion hybrid bond). The use of various instruments provides a broad financing basis and addresses different investor groups.

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

We mainly work with a well-diversified, financially stable and reliable group of banks. Due to our long-term business approach, bank relationships typically last for many years and are characterized by professionalism and trust. The banking group consists of banks with strong capabilities and expertise in various products and geographic regions. We regard these banks as strategic partners. Accordingly, we 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 an important cornerstone of our financial policy, as it safeguards access to capital markets at attractive financial conditions. Our company currently has a Baa1 rating from Moody’s, an A rating from Standard & Poor’s (S&P), and an A– rating from Scope, each with a stable outlook. Continuing to reduce our debt after the Versum Materials acquisition is of utmost importance to us.

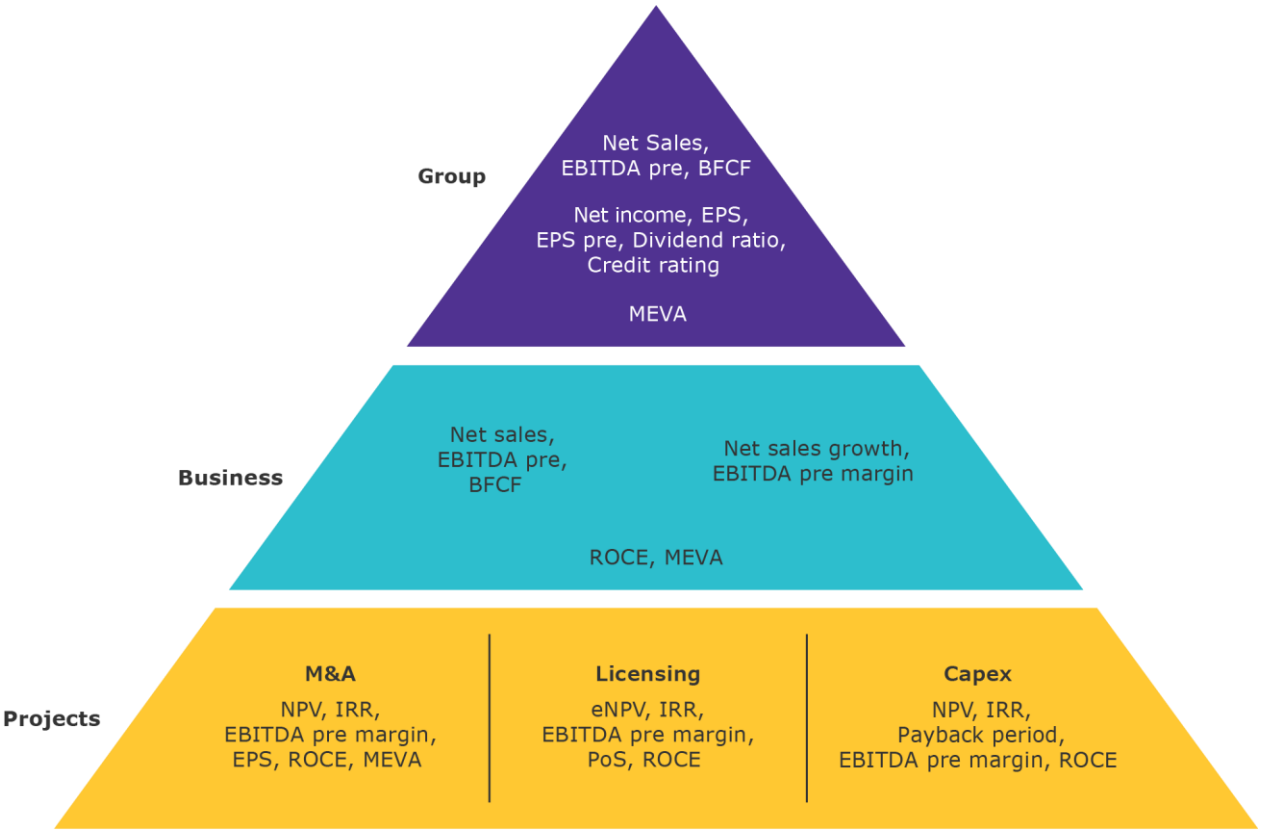
Sustainable dividend policy

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 the 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.

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: 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 (Ergebnis vor Zinsen, Ertragsteuern, Abschreibungen und Anpassungen).
EPS = Earnings per share (Ergebnis je Aktie).
MEVA[1] = Value added of Merck KGaA, Darmstadt, Germany (wirtschaftliche Wertschöpfung durch Merck KGaA, Darmstadt, Germany).
BFCF[1] = Business Free Cash Flow (Free Cash Flow des Geschäfts).
ROCE[1] = Return on capital employed (Rendite auf das investierte Kapital).
NPV[1] = Net present value (Kapitalwert).
IRR[1]= Internal rate of return (interner Zinsfuß).
eNPV[1] = Expected Net present value (erwarteter Kapitalwert).
PoS[1] = Probability of success (Erfolgswahrscheinlichkeit).
M&A = Mergers & Acquisitions (Fusionen und Übernahmen).

[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 business free cash flow (to be replaced by operating cash flow (OCF) in 2021) are the most important factors for assessing operational performance. Therefore, we refer to these KPIs in the Report on Economic Position, the Report on Risks and Opportunities, and the Report on Expected Developments. As the most important indicators of financial business performance, the KPIs are key elements of our performance management system.

Net sales

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

Group

Net sales

			Change	
€ million	**2020**	2019	€ million	%
Net sales	**17,534**	**16,152**	**1,383**	**8.6%**

EBITDA pre

EBITDA pre is the main performance indicator measuring ongoing operational profitability and is used internally and externally. To provide an alternative understanding of the underlying operational performance, it excludes from the operating result 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 selected 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 underlies strict governance at the Group level. Within the scope of internal performance management, EBITDA pre allows for necessary changes or restructuring without penalizing the performance of the operating business. The following table shows the composition of EBITDA pre in fiscal 2020 compared to the previous year. The IFRS figures have been modified to reflect the elimination of adjustments included in the respective functional costs.

Group

Reconciliation EBITDA pre[1]

€ million	2020 IFRS	2020 Elimination of adjustments	2020 Pre[1]	2019[2] IFRS	2019[2] Elimination of adjustments	2019[2] Pre[1]	Change Pre[1]
Net sales	**17,534**	**0**	**17,534**	**16,152**	**–**	**16,152**	**8.6%**
Cost of sales	-6,835	53	-6,782	-6,006	56	-5,950	14.0%
Gross profit	**10,699**	**53**	**10,752**	**10,145**	**56**	**10,202**	**5.4%**
Marketing and selling expenses	-4,207	60	-4,147	-4,576	10	-4,566	-9.2%
Administration expenses	-1,188	98	-1,090	-1,154	109	-1,045	4.3%
Research and development costs	-2,288	27	-2,262	-2,268	29	-2,239	1.0%
Impairment losses and reversal of impairment losses on financial assets (net)	-6	-0	-6	-8	0	-8	-24.8%
Other operating income and expenses	-25	169	144	-19	123	104	38.0%
Operating result (EBIT)[1]	**2,985**			**2,120**			
Depreciation/amortization/ impairment losses/reversals of impairment losses	1,938	-128	1,810	1,946	-9	1,937	-6.6%
EBITDA[1]	**4,923**			**4,066**			
Restructuring expenses	162	-162	–	120	-120	–	
Integration expenses/IT expenses	108	-108	–	95	-95	–	
Gains (-)/losses (+) on the divestment of businesses	10	-10	–	6	-6	–	
Acquisition-related adjustments	-10	10	–	84	-84	–	
Other adjustments	9	-9	–	13	-13	–	
EBITDA pre[1]	**5,201**	**–**	**5,201**	**4,385**	**–**	**4,385**	**18.6%**
thereof: organic growth[1]							16.8%
thereof: exchange rate effects							-4.6%
thereof: acquisitions/divestments							6.4%

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

Business free cash flow (BFCF)

Business free cash flow comprises the major cash-relevant items that the operating businesses can influence and that are under their full control. It comprises EBITDA pre less investments in property, plant, equipment, software, advance payments for intangible assets, changes in inventories, trade accounts receivable, and receivables from royalties and licenses. To manage working capital on a regional and local level, the businesses use the two indicators ”days sales outstanding” and ”days in inventory”.

Operating cash flow (OCF) from 2021

For fiscal 2021, the key performance indicator of business free cash flow will be replaced by operating cash flow (OCF). In the future, this means that our internal indicator for controlling cash flow will be the same as the externally relevant indicator OCF, which we already report.

Group

Business free cash flow[1]

€ million	2020	2019	Change € million	Change %
EBITDA pre[1]	**5,201**	**4,385**	**817**	**18.6%**
Investments in property, plant & equipment and software, as well as advance payments for intangible assets	-1,439	-1,026	-412	40.2%
Changes in inventories	48	-577	626	-108.3%
Changes in trade accounts receivable as well as receivables from royalties and licenses	144	-259	403	-155.3%
Lease payments[2]	-144	-136	-8	5.7%
Elimination of acquisitions/divestments	-45	346	-391	0.0%
Business free cash flow[1]	**3,765**	**2,732**	**1,033**	**37.8%**

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

[2] Excluding payments for low-value leases and interest components included in lease payments.

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 the prioritization of investment opportunities and portfolio decisions.

Net present value (NPV)

The main criterion for the prioritization of investment opportunities is the 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 projection period 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. Depending on the type and location of a project, different markups are applied to the WACC.

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

Payback period

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

Value added of Merck KGaA, Darmstadt, Germany (MEVA)

Value added of Merck KGaA, Darmstadt, Germany, 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, Darmstadt, Germany (net income) by the weighted average number of theoretical shares outstanding. The use of a theoretical number of shares takes into account the fact that the general partner's capital is not represented by shares. 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. Moreover, amortization of acquired intangible assets as well as impairment losses on property, plant & equipment, and intangible assets are eliminated. 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 company'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	**2020**	2019	€ million	in %
Net income	**1,987**	**1,320**	**667**	**50.5%**
Non-controlling interest	7	3	3	96.4%
Profit after tax from discontinued operation	0	-28	28	-100.0%
Income tax	637	440	197	44.8%
Amortization of acquired intangible assets	857	1,119	-262	-23.4%
Adjustments[1]	407	372	34	9.2%
Income tax on the basis of the underlying tax rate[1]	-974	-807	-167	20.7%
Non-controlling interests to be adjusted	**-7**	**-3**	**-3**	**96.4%**
Net income pre[1]	2,914	2,417	497	20.6%
Earnings per share pre[1] in €	**6.70**	**5.56**	**1.14**	**20.6%**

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

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, Standard & Poor's, and Scope. The most important factor for the credit rating is the ability to repay debt, which is determined in particular by the ratio of operating cash flow to net- or gross financial debt.

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.

Other 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. From a Group perspective, innovations in the businesses as well as the promotion of a diverse workforce, especially at the leadership level, and sustained planning for the filling of company-critical positions, are of particular importance.

Innovation

Innovations are the foundation of our business and will also be prerequisites for future success in changing markets. We are continuously working to develop new products and service innovations for patients and customers. Indicators for the degree of innovation are defined based on the specifics of the respective businesses.

Sustained employee development

We believe that a diverse workforce strengthens our ability to innovate. We actively promote diversity among our leaders to create an integrative culture that reflects our values and enables every employee to fulfill their potential. We ensure that our ambitious corporate goals can be realized through strategic succession planning for company-critical positions. To gauge the success of the related measures, we have introduced diversity and succession planning as focus issues and non-financial indicators.

Sustainability*

Through our business operations, we create long-term value while seeking to balance environmental, social, and business aspects – for our company, for our stakeholders, and for society. Sustainability is an essential component of our Group strategy. In 2020, we formulated new, strategic sustainability goals, which build on what we have achieved in recent years (for further information, see "Strategy"). The separate, combined **non-financial (Group) report** has been integrated into our **2020 Sustainability Report**.

Our sustainability strategy revolves around leveraging science and technology to achieve progress for mankind. With this we are help to to solve the problems described the United Nations' (UN) 17 global Sustainable Development Goals (SDGs). Through our business activities, we want to be economically successful and create value for society. At the same time, we endeavor to avoid generating subsequent costs for society.

With our sustainability strategy, we are pursuing three specific goals across seven focus areas. We are currently carrying out numerous projects and initiatives in these focus areas and will continue to do so in the future. This framework reflects those fields in which our business operations can contribute most to achieving five of the SDGs.

Measuring sustainability

In order to assess the sustainability of our products, technologies, and business activities, we have developed Sustainable Business Value (SBV), a method that enables us to evaluate our positive and negative impacts on society along our entire value chain. In addition to ESG (Environmental, Social, Governance) parameters, SBV also incorporates economic, ethical, and digital aspects as well as the benefit of the product itself. This gives rise to a monetary value that quantifies, for example, the societal benefits a product offers, which helps us drive sustainability across our business operations and position ourselves for future success.

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

Innovations and technology for our customers

We believe that we can harness science and technology to help tackle many global challenges. From supplying innovative therapies and empowering scientists around the world to advancing digital living, our business models are oriented around creating both business and societal value. Our goal is to minimize and ultimately exclude negative sustainability impacts – not only during production but also during their use. These efforts also help our customers achieve their own sustainability goals.

Life Science: Reducing environmental impacts throughout the product life cycle

We work to decrease the environmental impacts of our products. This applies to the entire life cycle – from production and use through to the disposal of our products. To reduce the environmental impact of our devices and instruments during their use by customers, we apply our Design for Sustainability (DfS) program. This comprehensive approach keeps sustainability criteria in the foreground during product development, capturing the improvements in a scorecard to help inform customers. When developing a new product, our aim is to improve as many of these criteria scores as possible. Beginning with the concept stage, product teams identify potential environmental impacts and opportunities to make improvements. By the end of 2020, 38% of these product development projects met at least three or more sustainability criteria.

In addition, our scientists are developing innovative solutions in line with the 12 Principles of Green Chemistry developed by chemists Paul T. Anastas and John C. Warner. The objective is to enable research that is as environmentally conscious as possible and to minimize adverse effects on human health. More than 1,100 greener alternatives to conventional products have been made available to date, such as the new bio-based solvent Cyrene™. Derived from waste cellulose, this product serves as an alternative to widely used solvents, which are subject to increasing regulatory restrictions due to their associated toxicity. Cyrene™ was awarded an EU Horizon 2020 grant to expand the production of the material in Europe.

With DOZN®, we developed a web-based quantitative Green Chemistry analysis tool. DOZN® 2.0 now brings new possibilities for sustainable product design to our customers and empowers them with data to make more environmentally friendly choices in their sourcing and development processes.

To ensure that our packaging impacts the environment as little as possible, we developed a sustainable packaging strategy for Life Science called SMASH. We have set four goals: reducing the amount of packaging, achieving zero deforestation, improving plastic sustainability, and maximizing recycling. For instance, thanks to the collaboration with our vendors and customers, we have conducted several product and distribution packaging improvement projects that will cut plastic and corrugated packaging by more than 100 metric tons annually. Additionally, for the shipment of our glass reagent bottles, we have been working continuously to replace expanded polystyrene inserts with molded pulp inserts, which resulted in the use of more than three million molded pulp inserts in 2020.

Performance Materials: Increasing the sustainability of end products

Thanks to our liquid crystal window (LCW) technology, windows can be darkened in a matter of seconds. We commercialize this technology under our eyrise® brand. These darkened windows regulate the heat generated by direct sunlight. Estimates based on planned customer projects show that this technology can reduce the energy consumed by building climate control systems and lighting by up to 10%, thereby replacing conventional shading. In addition, the people behind these windows feel more comfortable and work more efficiently thanks to the positive effects of natural daylight.

Over the past decade, our semiconductor materials customers have been increasing their efforts to use more environmentally sustainable materials in their chip manufacturing, while simultaneously improving the performance of their computer chips at lower costs. We have responded to this challenge by developing next-generation colloidal silica products using at least 30% less colloidal silica. This reduces the volume of product needed, which in turn shrinks our environmental footprint.

In the cosmetics industry, we are addressing the continuing trend towards ingredients that meet stringent sustainability criteria. Our portfolio of fillers eliminates the need for microplastic particles, which are highly resistant to environmental biodegradation, fragment into ever smaller pieces, and do not dissolve in water. Our cosmetic formulations comply with strict criteria. By the end of 2020, 78 of our cosmetic pigments and active ingredients had been certified according to Ecocert's COSMOS standard for organic and natural cosmetics.

Contribution of our technologies and products to health and quality of life

At least half of the world's population still does not have adequate access to health. We are striving to make health solutions affordable and raise awareness of diseases. Our aim is to create a healthier future for all. We use innovation in science and technology to improve the health of underserved populations mainly in low- and middle-income countries. To achieve this, we leverage our expertise from all business sectors and collaborate closely with a wide range of partners. We also participate in industry-wide initiatives to develop new approaches.

Our Global Health strategy

Our Global Health strategy focuses on the elimination of schistosomiasis and malaria as public health problems and the prevention and control of non-communicable diseases, such as diabetes and hypertension in low- and middle-income countries. Our projects and programs are guided by the concept of "shared value": We create a measurable and sustainable positive impact on society through our products and services. For us, this means developing business models that increase the value and competitiveness of our company by solving unmet health needs and strengthening local health systems.

Our fight against schistosomiasis

Schistosomiasis, a neglected tropical disease (NTD), is one of the most prevalent parasitic infections in Africa, placing a significant burden on public health and the local economy. The disease affects almost 240 million people worldwide, with more than 90% of cases occurring in Africa. An estimated 200,000 people die every year from long-term effects of schistosomiasis, such as liver and kidney infections, bladder cancer, genital schistosomiasis, and anemia. School-aged children are particularly vulnerable to the disease.

Our ultimate aim is to eliminate the disease as a public health problem. To help achieve this goal, we have adopted an integrated schistosomiasis strategy that we are implementing in close collaboration with multiple partners worldwide. This approach focuses on five building blocks: treatment; research and development (R&D); water, sanitation and hygiene (WASH); health education; and advocacy and partnerships.

As part of our longstanding partnership with the World Health Organization (WHO), we are committed to provide up to 250 million praziquantel tablets per year for distribution in endemic countries. To date, our tablets have been distributed in 47 endemic African countries to treat school-aged children. In 2020, we donated around 226 million tablets for distribution in 30 countries, 27 of which are in sub-Saharan Africa. Together with the Global Schistosomiasis Alliance, we held a consultation meeting with experts and stakeholders and provided feedback to WHO ahead of the new NTD Roadmap passed by the World Health Assembly in autumn 2020.

Over time, we have developed a portfolio of R&D projects on schistosomiasis. These include the development of a new pediatric formulation of praziquantel to treat children under the age of six. This project, implemented through a consortium of partners, is in Phase III clinical development to generate data for registration. Other projects include the setup of a platform to identify new drugs to prevent and treat schistosomiasis and the development of highly sensitive diagnostic methods for schistosomiasis and other neglected tropical diseases. In 2020, we entered into a strategic alliance with Janssen Pharmaceuticals Inc. to develop an artificial intelligence-based diagnostic tool and new technologies for transmission control.

As One Against Malaria

More than 200 million cases of malaria and over 400,000 related deaths are recorded every year, with almost 70% of deaths occurring in children under the age of five. Over 90% of cases and 90% of deaths occur in Africa. Through our As One against Malaria program, we are implementing several initiatives and projects for new treatments, diagnostics, prevention methods, and approaches to strengthen health systems. As part of this integrated program, we are in early clinical development with an innovative drug (M5717) for the prevention and treatment of malaria.

Furthermore, we are working toward making our insect repellent IR3535® available as a malaria prevention method in Africa. We joined forces with our partners in Ghana to implement a new program and test IR3535®, using a new formulation technology for long-lasting efficacy to reduce application times. This insect repellent is already used for protection against the bites of insects and ticks that can transmit diseases such as Lyme, Zika, dengue, and chikungunya.

Addressing affordability challenges

Our proactive approach to intellectual property enables research into solutions to the global health challenges that affect millions in developing low- and middle-income countries. We have adopted a framework of Open Innovation to accelerate research and development into innovative treatments for infectious diseases. We provide free access to our proprietary compound library for drug discovery activities to identify new drugs. We engage non-profit organizations and academia, as well as drive collaborative efforts in line with our mission to improve the health of underserved populations in low- and middle-income countries.

As part of our Open Innovation initiatives, we contribute to WIPO Re:Search, a partnership between the World Intellectual Property Organization (WIPO) and BIO Ventures for Global Health (BVGH) that engages private industry to early stage R&D for vaccines, diagnostics, and drugs against neglected tropical diseases (including schistosomiasis), malaria and tuberculosis. We are also a member of the DNDi (Drugs for Neglected Diseases initiative) to accelerate research of novel medicines for infectious diseases. This initiative has proved the success of a transformative open innovation model through which participating companies can simultaneously search for new treatments. In addition to our Open Innovation projects, including the new Open Global Health Library, we have adopted a policy to not file or enforce patents in many low- and middle-income countries and use a publicly available database (Pat-Informed) to be transparent about our patents and patent applications.

Promoting accessibility and improving supply chains

Our Access to Health approach aims to address the health system gaps that prevent underserved populations from receiving healthcare. We coordinate with our partners to identify and develop solutions, such as future-oriented access models for both neglected and non-communicable diseases in low- and middle-income countries.

We also promote initiatives to strengthen supply chains and to guarantee the targeted supply of medicines in those countries. For instance, NTDeliver is a digital information tool for improving transparency in medicine donation supply chains created through public-private partnerships. Deliveries from companies running donation programs are clearly tracked – from purchase orders made by the WHO through to delivery to the first warehouse in the destination country. This improves coordination and efficiency and provides a more transparent overview of the in-country inventory. We deploy our NTDeliver tool to monitor the amount of schistosomiasis medicine reaching schools, particularly those in last-mile deliveries to remote, rural locations, for example in Kenya.

Sustainability culture and values

Sustainability has been part of our company culture for centuries and is reflected in our values. Our new sustainability strategy is a natural step in our evolution and is actively supported by the Merck family. To put this strategy into practice, we are focusing on amplifying this aspect of our company culture, which includes educating our workforce on sustainability. Additionally, the company is planning to also link the long-term variable compensation of the Executive Board from 2022 onward with the progress made toward achieving the company's sustainability goals.

For us, sustainable entrepreneurship also means taking social responsibility. We see ourselves as part of the community – both at our individual sites as well as worldwide. Our mission is to help shape society, not only through our products and technologies but also through our community engagement. We therefore work with our employees to promote a diverse array of social initiatives that help tackle challenges at the local level.

Our community outreach primarily focuses on those areas where we can leverage the expertise from our core business. For instance, we promote health and educational initiatives – especially in the natural sciences – along with cultural programs. Moreover, we provide disaster relief and offer support to people in need in the vicinity of our sites. In 2020, we spent around € 53 million in total on community engagement, carrying out 274 charitable projects in 96 countries worldwide. We empower and encourage our employees to take action and engage in activities that benefit the community. Employees are granted up to two days of leave per year to support volunteer efforts on behalf of our company.

Boosting scientific education

Because education is key to raising awareness for sustainability, we focus our community engagement in part on the holistic promotion of science and education. In doing so, we nurture characteristics that are essential to our business activities as a science and technology company, namely creativity, enthusiasm for new discoveries, curiosity, and the courage to transcend boundaries. For instance, we grant scholarships and, through the volunteer efforts of our employees, help make science classes more engaging.

In 2020, Covid-19 prompted us to take our science education program virtual; our Curiosity Labs™ at Home program features 20 simple experiments that can be conducted using materials commonly found around the home. Each experiment is explained via video and comes with step-by-step instructions. In 2020, the program generated more than 2.7 million video views, reaching users in 132 countries.

Sustainability and transparency in the supply chain

By securing social, ethical, and environmental standards, sustainability is a key aspect of managing supply chains. We procure many raw materials, packaging materials, technical products, components, and services worldwide. We aim to promote supply chain stability while providing our customers with high-quality products and services. Our supplier management focuses on compliance with fundamental environmental and social standards in addition to high-quality, delivery reliability, and competitive prices. To achieve this, we have introduced relevant strategies, processes, and guidelines that we are continuously improving to prevent violations of supply chain standards. We make sure that all legal requirements are considered and corresponding measures are initiated where necessary. In this context, we are closely monitoring the developments relating to a potential supply chain law and the resulting requirements. To ensure supply security, we select our suppliers based on diverse criteria such as country risk, material risk, supplier risk, and business criticality. This helps our sourcing employees to identify potential mitigation actions with relevant suppliers and work on improvements.

We expect all our suppliers to comply with the labor, social, and environmental standards defined in our Responsible Sourcing Principles, which are primarily derived from the core labor standards of the ILO (International Labour Organisation) and the UN Global Compact. We are continuously working to ensure adherence to our supply chain standards. As a member of the industry initiative Together for Sustainability (TfS), we have access to the supplier self-assessments and audit results shared among all member companies, who in turn abide by all restrictions stipulated within antitrust law.

Securing our social license to operate in all regions

We do our best to mitigate the ethical, financial, and legal risks of our business activities, thereby advocating for and ensuring our social license to operate. To this end, we have comprehensive structures and systems in place to ensure compliance with legal requirements, along with ethical, social, and ecological standards in all the countries where we operate. In view of the dynamic environment of change across all regions with respect to our social license to operate, we pay special attention to regional aspects.

Safety of our products

The safety of our products is at the core of our sustainability efforts. When used properly, they must pose no risk to customers, patients, consumers, or the environment. We regularly examine safety throughout the product's entire life cycle and continuously take steps to minimize risks. We provide patients, consumers, and customers with extensive informational material so that they can use our products in a safe, responsible, and proper manner.

Chemical product safety is all about protecting human health and the environment from negative impacts resulting from the use of chemical products throughout their entire life cycle. We support developments related to the European Green Deal and are preparing to implement the European Commission's Chemicals Strategy for Sustainability in our company. During the import, manufacture, and commercialization of our products, we provide relevant information to our customers and the public. This helps them understand the hazards, how to mitigate risks, and how to use the products safely, in line with local and regional regulatory requirements. We have automated and standardized most of our hazard communication processes within our business sectors. Information is communicated via the pertinent digital channels, the Safety Data Sheets, and the labels of our products.

Throughout the entire life cycle of our medicines, we provide patients and physicians with up-to-date safety information based on benefit-risk evaluations. Patient safety is a top priority in everything we do. To this end, company experts process safety-relevant information from various sources such as clinical trials, adverse reaction reports, and medical and scientific literature. Our Global Patient Safety unit continuously monitors and evaluates the safety and benefit-risk ratio of our pharmaceutical products worldwide (pharmacovigilance). Our Medical Safety and Ethics Board oversees the safety and benefit-risk assessments of all our commercialized products and investigational drugs worldwide. For the safety of patients, we have established a global pharmacovigilance system that we are always working to enhance.

Attractive workplace for our employees

Our employees contribute to groundbreaking progress in science and technology across the world. They are the basis of our success and therefore play a central role in our responsible business conduct. In accordance with our values, we live a culture of mutual esteem and respect. We are dedicated to upholding international social and labor standards. These are stipulated in our Social and Labor Standards Policy, which complements our Human Rights Charter and our Code of Conduct. This policy is the foundation for fair and open interactions with our employees.

To remain successful going forward, we want to attract people to our company who contribute their curiosity, courage, and spirit of invention. We therefore place a strategic focus on employee development, leadership, and performance management. Furthermore, we strive to foster diversity among our employees (more information can be found under "People").

Supporting relevant responsible governance initiatives

As a participant in the United Nations Global Compact, we have committed ourselves to 10 principles based on key UN conventions regarding human rights, labor standards, environmental protection, and anti-corruption. We actively support the implementation of the principles within our sphere of influence and regularly communicate on our progress. We follow the guidelines of the Responsible Care® Global Charter, which is an initiative of the International Council of Chemical Associations (ICCA). Responsible Care® aims to help the chemical industry enhance its environmental, health, and safety performance. We are also a member of the Chemie^3 initiative in Germany, a collaboration between the German Chemical Industry Association (VCI), the German Employers' Federation of the Chemical Industry (BAVC), and the German Mining, Chemical, and Energy Industrial Union (IG BCE). This globally unique alliance seeks to make sustainability a core part of the chemical industry's guiding principles and to drive the sector's position within the German economy as a key contributor to sustainable development. In implementing sustainability in our business, the frequent dialogue with our various stakeholders is very important to us. These stakeholders include employees, business associates, the Merck family, investors, regulatory agencies, industry associations, and non-governmental organizations (NGOs). This continuous exchange creates transparency and clearly demonstrates how we live our values.

Comprehensive environmental management system

Defining our principles and strategies for environmental stewardship, health and safety (EHS), our Group EHS Policy is an integral part of our EHS management system, which undergoes an external ISO 14001 audit every year. At all our sites, local EHS managers are in charge of operational environmental protection. Because our business is constantly evolving, we conduct internal audits to review our environmental management system and also have external audits regularly performed to confirm that ISO 14001 requirements are still being met. In 2020, we obtained an ISO 14001 group certificate for the 11th consecutive year, which covers 92 sites around the world.

Climate change and emissions

Climate change is one of the major challenges facing us in the 21st century. Because our company is no exception when it comes to generating greenhouse gases, we had set a goal to reduce total direct (Scope 1) and indirect (Scope 2) greenhouse gas emissions by 20% by 2020 (2006 baseline), irrespective of production growth. We have now accomplished this objective. In 2020, we recorded a 25% overall reduction relative to 2006, despite growth in our operating business. However, this excludes emissions from the 2019 acquisition of Versum Materials, which could not be incorporated into our emission footprint because the available emissions data available does not reach back to our 2006 baseline. This acquisition increased our emissions significantly. In total, we emitted approximately 2,010,000 metric tons of CO_2 equivalents in 2020.

Building on our previous target, we drew up new climate action goals in 2020. By 2030, we intend to reduce our direct (Scope 1) and indirect (Scope 2) emissions by 50% compared to 2020 and to source 80% of our purchased electricity from renewable sources. Moreover, we plan to set a new reduction target for our emissions from the upstream and downsteam value chain (Scope 3). We are currently setting up processes to record non-reported Scope 3 data more precisely. We will validate the data basis for a specific target in 2021.Overall, by 2040 we are aiming for climate neutrality across our entire value chain in terms of our Scope 1, Scope 2 and Scope 3 emissions.

In 2020, we improved our rating from CDP for our greenhouse gas emissions performance to B (2019: C). CDP assesses companies in terms of their performance and transparency when it comes to climate action and water management.

Greenhouse Gas Emissions, Scope 1 and Scope 2[1]

In metric kilotons	2006[2]	2017	2018[3]	2019	**2020[4]**
Total CO_2eq[5] emissions	**754**	**653**	**636**	**630**	**2,010**
Thereof:					
Direct CO_2eq emissions	352	341	332	341	1,706
Indirect CO_2eq emissions[6]	402	312	304	289	304
Biogenic CO_2 emissions	**–**	**13**	**13**	**13**	**13**

[1] In line with the Greenhouse Gas Protocol, for all previous years (up to the 2006 baseline) greenhouse gas emissions were calculated based on the current corporate structure as of December 31 of the reporting year and retroactively adjusted for acquisitions or divestments of (parts of) companies, or for changes in emission factors (portfolio-adjusted). Exceptions to this are company units that were added as a result of the acquisition of Versum Materials. Figures dating back to the 2006 baseline are not available for these units.

[2] Baseline for our emission targets is 2006.

[3] Since 2018, our reported figures have excluded the Consumer Health business, which was divested on December 1, 2018.

[4] Includes Versum Materials as of 2020. Excluding Versum Materials, our greenhouse gas emissions totaled 563 kilotons in 2020.

[5] eq = equivalent.

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

Energy management plays a key role in energy efficiency and climate impact mitigation. Our production sites in Darmstadt and Gernsheim – Germany, account for around 25% of our global energy consumption. Both sites fulfill the requirements of ISO 50001, the international standard for energy management systems. Currently, 13 of our production sites have a certified energy management system.

Energy Consumption[1]

In gigawatt hours	2017	2018[2]	2019[3]	**2020**
Total energy consumption	**2,073**	**2,158**	**2,178**	**2,372**
Direct energy consumption	**1,205**	**1,261**	**1,288**	**1,265**
Natural gas	1,140	1,194	1,222	1,178
Liquid fossil fuels[3]	32	33	33	52
Biomass and self-generated renewable energy	33	34	33	35
Indirect energy consumption	**868**	**897**	**890**	**1,107**
Electricity	723	749	745	944
Steam, heat, cold	145	148	145	163
Total energy sold	**0.1**	**0.0**	**0.1**	**0.2**
Electricity	0.1	0.0	0.1	0.2
Steam, heat, cold	–	–	–	–

[1] In line with the Greenhouse Gas Protocol, for all previous years (up to the 2006 baseline) energy consumption has been calculated based on the current corporate structure as of December 31 of the reporting year and retroactively adjusted for acquisitions or divestments of (parts of) companies, or for changes in emission factors (portfolio-adjusted). Exceptions to this are company units that were added as a result of the acquisition of Versum Materials. Figures dating back to the 2006 baseline are not available for these units.

[2] Since 2018, our reported figures have excluded the Consumer Health business, which was divested on December 1, 2018.

3 Light and heavy fuel oil, liquefied petroleum gas (LPG), diesel, biodiesel, gasoline and kerosene.

Additional facts and figures can be found in our **Sustainability Report 2020**.

Water and resource intensity

In 2020, we successfully finished implementing a sustainable water management system across all high water use sites, a process we started in 2016. At sites that consume large quantities of water and are also located in water-stressed areas, we reduced our water use by 27% relative to 2014, surpassing our original target of 10%.

Building on this success, in 2020 we developed a new set of goals for 2025 and 2030 aimed at enhancing the water efficiency of our processes and reducing the environmental impacts of our waste water. For instance, we defined an intensity score aimed at boosting water efficiency, which we intend to improve by 10% by 2025 (2019 baseline). Furthermore, it is our stated goal to exceed regulatory water-quality requirements. In an effort to minimize our negative environmental impacts, we plan to reduce potentially harmful emission residues in our waste water to below a scientifically defined threshold by 2030. In 2020, CDP gave our Water Security efforts a B rating (2019: B).

Water is not the only resource growing scarcer, which makes it imperative for us to use raw materials as efficiently as possible while simultaneously reducing our waste. We use a variety of methods for recycling, recovering and disposing of the waste we generate, each of which has a different impact on the environment. To systematically account for these effects, we have put in place the company Waste Score. We aim to reduce this score by 5% by 2025 compared with 2016. In order to support waste reduction, we are also constantly evaluating ways to enhance our production processes and waste disposal methods. By the end of 2020, we had achieved a 4.6% reduction.

Research and Development

Science is at the heart of everything we do. We conduct research and development (R&D) worldwide in order to develop new products and services to improve the quality of life of patients and satisfy the needs of our customers. Further optimizing the relevance and efficiency of our research and development activities – either on our own or in cooperation with third parties – is one of our top priorities.

In 2020, approximately 7,900 employees worked for our company, researching innovations to address long-term health and technology trends in both established and growth markets (2019: approximately 7,800).

Expenditures for R&D amounted to € 2.3 billion in 2020 (2019: € 2.3 billion). In our R&D activities, we focus on both in-house research and external collaborations that enable us to increase the productivity of our research while simultaneously reducing financial outlay. The organizational setup of our R&D activities reflects our structure with three business sectors. With our Healthcare business sector's research pipeline, we aspire with our research pipeline to make a positive difference for patients – always with the goal to help create, improve, and prolong life. Our main research areas include oncology, immuno-oncology, and immunology including multiple sclerosis. In the Life Science business sector, our research activities focus on technologies for laboratory and life science applications as well as the support of new developments. We continue to focus on digitized and automated labware, DNA purification for downstream applications and emerging chemical synthesis, as well as software for our BioContinuum™ Platform to accelerate Biopharma 4.0. We remain dedicated to delivering on our core competencies, such as filtration, pure lab water, and diagnostic solutions. The main focus of our Performance Materials business sector's research is on the development of innovative materials and technologies required for the latest generations of memory chips and processors. In addition, Performance Materials develops materials for OLED and LC displays as well as new effect pigments for use in the automotive, cosmetics and printing industries.

Research and Development Costs

			Change	
€ million	**2020**	2019	€ million	%
Healthcare	1,640	1,666	-26	-1.5%
Life Science	313	276	37	13.3%
Performance Materials	274	267	6	2.4%
Corporate and Other	62	59	3	4.3%
Total	**2,288**	**2,268**	**20**	**0.9%**

The ratio of research expenditure to Group sales was 13.0% (2019: 14.0%). The decline is due to the positive sales development.

Healthcare*

With our Healthcare research pipeline, we aspire to make a positive difference for patients – always with the purpose to help create, improve, and prolong life. Our main focus areas include oncology, immuno-oncology, and neurology & immunology.

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

Neurology & Immunology

Multiple sclerosis (MS) is one of the world's most common neurological disorders. Despite the emergence of a number of therapies in the last two decades, there are still significant unmet needs for MS patients. We have more than 20 years of experience in MS, and we remain committed to finding solutions for patients' significant unmet medical needs.

We continue to receive regulatory approvals for our oral treatment option Mavenclad® (cladribine tablets) around the world. Mavenclad® is now approved in more than 80 countries worldwide, including those of the European Union, the United States, Australia, Canada, and Switzerland.

New data for both our marketed MS treatments Mavenclad® and Rebif® (interferon beta-1a) and our investigational treatment evobrutinib, the first and only Bruton's tyrosine kinase inhibitor (BTKi) to demonstrate high and sustained efficacy through 108 weeks in clinical studies, have been presented across key congresses this year, including the 6th Congress of the European Academy of Neurology (EAN). We presented a total of 16 abstracts at this congress, which took place virtually from May 23-26.

In June, the U.S. Food and Drug Administration (FDA) cleared our investigational new drug application (IND) for M5049 for the potential treatment of patients with Covid-19 pneumonia. The first patient was dosed in the Phase II trial at end of July. M5049 is a potentially first-in-class small molecule that blocks the activation of Toll-like receptor (TLR)7 and TLR8, two innate immune sensors that detect single-stranded RNA from viruses such as SARS-CoV-2, the virus responsible for Covid-19. The aim of the study is to investigate if M5049 intervention at a critical point in the course of Covid-19 disease may prevent or ameliorate the hyper-inflammatory response in patients with Covid-19 pneumonia and prevent progression to "cytokine storm". Successful intervention with the investigational drug may reduce life-threatening complications of Covid-19, including severe respiratory symptoms that often necessitate further medical interventions such as mechanical ventilation.

Generating data around our MS treatments and the risk of respiratory viral infections has been important this year to help support clinicians as they make treatment decisions for their patients living with MS. At MSVirtual2020: 8th Joint ACTRIMS-ECTRIMS Meeting that took place virtually from September 11-13, we presented a total of 54 abstracts across our MS portfolio, including data providing insights on how Mavenclad® and Rebif® do not affect the risk of respiratory viral infections and Covid-19 outcomes in MS patients. Other important data presented at ACTRIMS-ECTRIMS included new efficacy and real-world safety data on Mavenclad®:

- Early onset of action: Efficacy results from the Phase IV MAGNIFY-MS study, demonstrating an early onset of action from end of month one through a reduction in mean combined unique active (CUA) lesion count in the first six months of Mavenclad® treatment for highly active RMS
- Sustained efficacy: New data evaluating cumulative relapse incidence over five years in patients enrolled in the CLARITY and CLARITY Extension trials, showing the sustained efficacy of Mavenclad®
- Late-breaking interim data from the CLASSIC-MS study on the long-term efficacy and real-world treatment patterns for patients receiving Mavenclad®, with eight to 14 years of follow-up
- Disability improvement: Results from a post hoc analysis from the CLARITY Extension, showing patients receiving early treatment with Mavenclad® had a greater prevalence of disability improvement over five years, as measured by the Expanded Disability Status Scale (EDSS)
- The global Phase III clinical development program evaluating evobrutinib in relapsing MS includes two pivotal studies, EVOLUTION RMS 1 and 2. Evobrutinib was developed within our own laboratories and further demonstrates our commitment to improving the lives of people with MS and other chronic progressive diseases.

We have continued to deliver on the strategic evolution of our immunology pipeline this year, which includes out-licensing certain assets to allow us to focus on our priority areas and assets. In September, we announced that we are looking for a partner to take sonelokimab (M1095), an investigational anti-IL-17 A/F Nanobody® that neutralizes both IL-17A and IL-17F in patients with moderate to severe chronic plaque-type psoriasis, into Phase III. In October, we announced the out-licensing of M6495, an anti-ADAMTS5 Nanobody® for the potential treatment of osteoarthritis (OA), to Novartis, and in November, we entered into an out-licensing agreement with Vera Therapeutics for atacicept.

Oncology & Immuno-Oncology

Oncology and immuno-oncology are core focus areas in our R&D portfolio. With an emphasis on biology-driven research, we aim to deliver transformative treatments. Translational research is embedded into the whole R&D process, with several projects addressing unmet needs in hard-to-treat cancers through innovative treatment approaches and novel combinations. In 2020, we achieved a number of significant milestones across our oncology and immuno-oncology pipeline.

Treating more than 1 million patients since authorization, Erbitux® (cetuximab) is a standard of care for patients with epidermal growth factor receptor (EGFR)-expressing, RAS wildtype metastatic colorectal cancer (mCRC), as well as both recurrent and/or metastatic and locally advanced squamous cell carcinoma of the head and neck (SCCHN). We continue to invest in cetuximab and are committed to making it available to those patients it will benefit most. In March, Erbitux® obtained the approval of the National Medical Products Administration of China for the first-line treatment of patients with recurrent and/or metastatic squamous cell carcinoma of the head and neck in combination with platinum-based therapy with fluorouracil.

We continue to develop much-needed new treatment options for patients with hard-to-treat cancers and have made key progress in this area with avelumab, an anti-PD-L1 antibody we are co-developing and co-commercializing with Pfizer. To date, avelumab has received approval in more than 50 countries across the world under the brand name Bavencio®.

On January 6, we announced top-line results from the Phase III JAVELIN Bladder 100 trial, which showed that patients with previously untreated locally advanced or metastatic urothelial carcinoma (UC) whose disease did not progress on initial chemotherapy and who were randomized to receive first-line maintenance therapy with Bavencio® and best supportive care (BSC) lived significantly longer than those who received BSC only. These results were subsequently published online ahead of print on September 18 in The New England Journal of Medicine simultaneously with the presentation of additional analyses at the European Society for Medical Oncology (ESMO) Virtual Congress 2020, describing the efficacy of Bavencio® as a first-line maintenance treatment across various subgroups of patients and highlighting exploratory biomarkers as well as patient-reported outcomes.

On April 9, Merck KGaA, Darmstadt, Germany, and Pfizer announced that the FDA granted Breakthrough Therapy Designation for Bavencio® in first-line maintenance treatment of locally advanced or metastatic UC, and that the companies had submitted a supplemental Biologics License Application for review under the FDA's Real-Time Oncology Review (RTOR) pilot program.

On June 22, we announced that the European Medicines Agency (EMA) had validated for review the Type II variation application for Bavencio® for this proposed indication. A supplemental application was also submitted in Japan.

We also have continued to progress our efforts to bring Bavencio® in combination with axitinib to patients with advanced renal cell carcinoma (RCC). On July 31, we and our Alliance partner Pfizer announced that in the United Kingdom, the National Institute for Health and Care Excellence (NICE) recommended Bavencio® in combination with axitinib for first-line treatment of adult patients with advanced RCC. This is the first combination of an immunotherapy with a targeted antiangiogenic therapy to be recommended by NICE as a first-line treatment option for advanced RCC for use within the Cancer Drugs Fund in the United Kingdom.

Other highlights from our development pipeline included the advancement of several potential first-in-class/best-in-class compounds. The development program for tepotinib, our oral MET inhibitor designed to inhibit the oncogenic MET receptor signaling caused by *MET* (gene) alterations, has continued to see pivotal clinical, regulatory, and commercial milestones in 2020. Discovered in-house at our company, tepotinib underscores our strategic focus on delivering innovative precision medicines to patients with cancer.

On March 25, tepotinib was approved in Japan for the treatment of patients with unresectable, advanced or recurrent non-small cell lung cancer (NSCLC) with *MET*ex14 skipping alterations. The treatment, known as TEPMETKO® in Japan, was the first MET inhibitor to have received a regulatory approval for NSCLC with *MET* gene alterations.

On May 29, The New England Journal of Medicine published the primary analysis of the Phase II VISION study of tepotinib in advanced NSCLC with *MET*ex14 skipping alterations. Also presented during the ASCO20 Virtual Scientific Program, results showed consistent response and durable anti-tumor activity across lines of treatment in patients assessed by both liquid biopsy (LBx) and tissue biopsy (TBx).

On August 25, the U.S. FDA accepted and granted Priority Review to our New Drug Application for once-daily, orally dosed tepotinib for the treatment of patients with metastatic NSCLC whose tumors have a mutation that leads to mesenchymal-epithelial transition exon 14 (*MET*ex14) skipping. Tepotinib is being reviewed by the FDA under its Real-Time Oncology Review (RTOR) pilot program. Tepotinib was granted Breakthrough Therapy Designation by the FDA in September 2019.

Several new clinical studies were initiated in 2020 for bintrafusp alfa (M7824), discovered as a result of our own research and under clinical development through an alliance with GlaxoSmithKline (GSK). Bintrafusp alfa is a potential first-in-class investigational bifunctional fusion protein designed to simultaneously block two immunosuppressive pathways, TGF-β and PD-L1, within the tumor microenvironment. This approach is thought to control tumor growth by potentially restoring and enhancing anti-tumor responses. In preclinical studies, bintrafusp alfa has demonstrated antitumor activity both as monotherapy and in combination with chemotherapy. Based on its proposed mechanism of action, the compound offers a potential targeted approach to addressing the underlying pathophysiology of difficult-to-treat cancers. Studies initiated in 2020 included a new Phase II monotherapy study in mobility group AT-hook 2 (HMGA2) expressing triple negative breast cancer (INTR@PID BREAST 020), a Phase I monotherapy study in metastatic or locally advanced urothelial cancer (INTR@PID UROTHELIAL 152) and two studies in HPV-associated tumors, including the Phase II monotherapy study in platinum-experienced cervical cancer (INTR@PID CERVICAL 017) and Phase I combination study with other anti-cancer therapies in participants with locally advanced or advanced cervical cancer (INTR@PID CERVICAL 046). A Phase I combination study evaluating bintrafusp alfa and M6223, a t-cell immunoreceptor with immunoglobulin and ITIM domains (TIGIT), which is an immune checkpoint receptor thought to inhibit t-cell activation and contribute to t-cell exhaustion was initiated (NCT04457778). Like bintrafusp alfa, M6223 was also discovered in our research labs.

Additionally, bintrafusp alfa is under investigation as a Phase II monotherapy study in patients with locally advanced or metastatic biliary tract cancer (BTC) who did not respond to, or were intolerant to, first line platinum-based chemotherapy (INTR@PID BTC 047) and in a Phase II/III combination study as a first-line treatment of gemcitabine plus cisplatin with or without bintrafusp alfa in BTC patients. It is also being studied in two lung cancer studies a Phase II study of bintrafusp alfa with concurrent chemoradiation therapy (cCRT) in unresectable Stage III non-small cell lung cancer (NSCLC) (INTR@PID LUNG 005), and a Phase Ib/II, open-label study of bintrafusp alfa in combination with chemotherapy in participants with Stage IV NSCLC regardless of PD-(L)1 expression status (INTR@PID LUNG 024). On January 20, 2021, our company announced the discontinuation of the INTR@PID Lung 037 clinical trial, a randomized, open label controlled adaptive Phase III study of bintrafusp alfa compared with pembrolizumab as a first-line (1L) treatment in patients with PD-L1 expressing advanced NSCLC after a review of the totality of clinical data by the independent data monitoring panel concluded that the study was unlikely to meet the co-primary endpoint, specifically progression-free survival.

To date, more than 1,300 patients have been dosed globally in the bintrafusp alfa INTR@PID clinical development program.

At the 2020 American Society of Clinical Oncology (ASCO) Annual Virtual Meeting held on May 31 and June 4, we had a significant presence at the Virtual Scientific Program. Potential first-in-class early and late stage pipeline compounds, and investigational uses of our approved medicines were featured at the meeting:

- Data from the Phase III JAVELIN Bladder 100 study (Abstract# LBA1) of Bavencio® in the first-line maintenance treatment of patients with locally advanced or metastatic urothelial carcinoma (UC) were highlighted in the ASCO embargoed presscast on May 26 and at the plenary session on May 31. The data showed that Bavencio® as first-line maintenance significantly improved overall survival in the primary population of all randomized patients by 7.1 months, with a 31% reduction in the risk of death compared with initial chemotherapy followed by BSC alone.
- In addition, a late-breaking oral presentation of results of the investigator-sponsored, multicenter Phase II TROPHIMMUN study of Bavencio® for the treatment of chemotherapy-resistant gestational trophoblastic tumors (Cohort A), was also featured in the ASCO press program.
- Several oral presentations for both the TPExtreme ISS and the independent BEACON-CRC study data featuring Erbitux®, the standard of care for patients with epidermal growth factor receptor (EGFR)-expressing, RAS wildtype metastatic colorectal cancer (mCRC), as well as both recurrent and/or metastatic and locally advanced squamous cell carcinoma of the head and neck (SCCHN), demonstrated its steady role across the continuum of care in mCRC and as the backbone of treatment of SCCHN.
- For oral MET inhibitor tepotinib, results from the primary analysis of the Phase II VISION study showed consistent response and durable anti-tumor activity across lines of treatment in patients assessed by both liquid biopsy (LBx) and tissue biopsy (TBx).
- For bintrafusp alfa, two-year follow-up data from a Phase I global study of bintrafusp alfa, an investigational bifunctional fusion protein targeting TGF-β and PD-L1, in second-line treatment of patients with NSCLC (INTR@PID SOLID TUMOR 001) were presented. These data highlighted the potential of this dual-targeting proposed mode of action in NSCLC, and additionally, the potential to offer new ways to fight difficult-to-treat cancers beyond PD-1/PD-L1 in the future.
- Abstracts also showcased the scientific innovation and diversity of our pipeline, with results from a number of high-priority clinical development programs, including tepotinib, bintrafusp alfa and our comprehensive DNA Damage Response (DDR) portfolio.
- At the 2020 European Society of Medical Oncology Annual Virtual Meeting in September, we had a significant presence at the ESMO20 Virtual Scientific Program. Data from more than 30 abstracts across multiple tumor types highlighted our biology-driven approach with breakthrough innovations and significant advances in cancer care across our oncology assets.
- Data from the Phase III JAVELIN Bladder 100 study (Presentations #6990; 704MO; 745P) of Bavencio® in the first-line maintenance treatment of patients with locally advanced or metastatic urothelial carcinoma (UC) versus best supportive care were presented. In addition, the primary results of the Phase III JAVELIN Head and Neck 100 (Presentation #9110) were presented.
- For tepotinib, three posters were presented from VISION, the largest study in patients with NSCLC harboring *MET*ex14 skipping treated with tepotinib, with data highlighting durable clinical activity consistent across clinically relevant subgroups (Poster #1283P); health-related quality of life shown to be maintained, with clinically meaningful delays in the time to deterioration of cough, dyspnea, and chest pain (Poster #1286P); and a safety profile consisting of mostly mild to moderate adverse events with few treatment discontinuations. Additionally, trial in progress data was presented from the INSIGHT 2 study assessing the combination of osimertinib and tepotinib in patients with EGFR-mutant NSCLC that has developed resistance to first-line osimertinib treatment due to MET amplification is ongoing and actively recruiting patients (Poster #1415TiP).

- Erbitux® (cetuximab) demonstrated its steady role across the continuum of care in mCRC, and as the backbone of treatment of SCCHN. And a number of investigator-sponsored studies (ISS), including in combination with Bavencio® (avelumab), demonstrating the role of Erbitux® as a promising combination partner. Data was presented in an oral presentation investigating avelumab plus cetuximab in pre-treated RAS wild type metastatic colorectal cancer patients as rechallenge strategy: the phase II CAVE (cetuximab-avelumab) mCRC study (Presentation #397O).
- For bintrafusp alfa, our investigational bifunctional fusion protein targeting TGF-β and PD-L1, two long-term follow-up studies in BTC and NSCLC assessing the efficacy of and safety from the INTR@PID clinical trial program were presented. These data highlighted notably the potential to offer new ways to treat difficult-to-treat cancers beyond PD-1/PD-L1 in the future.
- Three-year follow-up results from a global Phase I study (INTR@PID SOLID TUMOR 001) of bintrafusp alfa as a second-line treatment for patients with NSCLC represent the longest treatment and observational period with bintrafusp alfa in this setting to date and further deepen the understanding of bintrafusp alfa's potential long-term efficacy and safety profile. Results demonstrated a promising duration of response (DOR) and long-term clinical benefit, especially in patients with high PD-L1 expression, as well as a manageable safety profile in a setting of high medical need where there is no globally accepted standard of care. Data presented at ESMO reinforced prior two-year follow-up results for this study presented at ASCO 2020.
- Data presented at ESMO 2020 for bintrafusp alfa in patients with pretreated BTC represent the longest treatment and observational period to date in this setting and further deepen the understanding of the long-term efficacy and safety profile of bintrafusp alfa in BTC. Results presented were from an expansion cohort in an ongoing Phase I, open-label trial in patients with locally advanced/metastatic BTC for which first-line chemotherapy failed (INTR@PID SOLID TUMOR 008). After 28 months, bintrafusp alfa demonstrated a manageable safety profile with durable responses and long-term survival in patients with pre-treated BTC.
- Our investigational ATR inhibitor berzosertib (M6620), was first presented as a late-breaking oral presentation from a randomized Phase II study of M6620, in combination with gemcitabine compared with gemcitabine alone in patients with platinum-resistant high-grade serous ovarian cancer, as well as published in *The Lancet Oncology*, in June. The study is sponsored by the National Cancer Institute (NCI) under its Cooperative Research and Development Agreement with our company for M6620, and these results were the first-ever randomized data to be presented for an ATR inhibitor.

Our broad portfolio of small-molecule DDR inhibitors represents multiple development paths, including combinations with other agents and modalities, and we are investing in this promising approach with the objective of becoming a leader in this therapeutic class. Peposertib inhibits DNA-dependent protein kinase (DNA-PK), a key enzyme needed for DNA repair, which may enhance the efficacy of agents such as radiotherapy and chemotherapy. Ataxia telangiectasia and rad3-related (ATR) kinase inhibitors target the ATR protein believed to be a key sensor for DNA damage and may enhance the efficacy of DNA-damaging agents and potentially also be efficacious as monotherapy against tumors with high levels of replication stress induced by overexpression of oncogenes.

Fertility

The Pergoveris® Pen, a convenient and ready-to-use fertility combination treatment option for women with severe follicle-stimulating hormone and luteinizing hormone deficiency, was successfully launched in several countries in Europe, Asia-Pacific, and Latin America in 2019.

During the Covid-19 pandemic, we supported patients with advancing their treatment at home with the release of our Gonal-f® (follitropin alfa) 150 IU pen. In January, the European Commission granted Marketing Authorization for the Gonal-f® 150 IU pen. Since then, it was launched in Germany, Spain and Sweden. Further launches are planned next year. A series of studies conducted with fertility patients and nurses highlighted both the ease of use and the patient-friendliness of our Gonal-f pen®.

We continue to support efforts to save the northern white rhinoceros from extinction. We are a partner of the BioRescue Project of the Leibniz Institute for Zoo and Wildlife Research (Leibniz-IZW) in the Forschungsverbund Berlin e.V., donating technology and financial support, as well as sharing expertise and experience in fertility.

General Medicine & Endocrinology

The new formulation of Euthyrox® (levothyroxine) for the treatment of hypothyroidism obtained further regulatory approvals in 2020, resulting in a total of 65 countries where this incremental innovation is registered, allowing for more precise dosing. The product is currently launched in 31 countries worldwide such as Germany, Spain, China, United States and Colombia.

Glucophage®, containing the active ingredient metformin, is now approved in 61 countries for prediabetes when lifestyle intervention is not enough to control the condition. With the successful submission and launch in Brazil of Glucophage® XR 850 for prediabetes in July 2019, in 2020 this project was expanded at the global level to be rolled out to additional countries to serve prediabetes patients, and we have successfully submitted in the Central America Region (El Salvador, Guatemala, Honduras, Nicaragua, Dominican Republic, Panama) according to our rollout plan for this product indication.

Concor® AM, a fixed-dose combination of Bisoprolol and Amlodipine, continues its worldwide rollout to include new countries, taking the total number to 59.

The number of patients taking Saizen® (somatropin) enrolled on Easypod® Connect continued to grow in 2020, reaching 23,762 in October. Saizen® is our main endocrinology product and is indicated for the treatment of growth hormone deficiency in children and adults, while Easypod® Connect is a unique web-based platform that allows HCPs to monitor their patients' adherence to treatment with real-time injection data collected and transmitted from their Easypod® devices.

The launch of Aluetta®, our new pen for the injection of Saizen®, complements our device portfolio and supports the growth of Saizen® by expanding our business in key geographies like Germany. Aluetta® is currently available in 23 countries.

Building for the Future

As part of our commitment to speed up the availability of new medicines for patients in need, we are investing € 250 million from 2019 to 2022 in a new facility in Corsier-sur-Vevey, Switzerland – our Biotech Development Center – dedicated to biotech development and manufacturing for clinical studies. Driven by the growth of our Healthcare business sector R&D pipeline, this investment will help to sustainably secure capacity and high agility to deliver clinical trial material in a cost-effective way, contribute to accelerated development timelines of new biological entities, and address the increasing manufacturing complexity of the next generations of biotech compounds. The Biotech Development Center adds to recent investments aiming to further increase our capacities in the research, development, and manufacturing of medicines, such as the expansions of the R&D facility of Billerica, Massachusetts, United States, of the biotech manufacturing site of Aubonne, Switzerland, and of the pharma manufacturing site of Darmstadt, Germany.

Healthcare Pipeline

As of: December 31, 2020

Therapeutic area		
Compound	Indication	Status
Neurology		
Evobrutinib (BTK inhibitor)	Multiple sclerosis	Phase III
Oncology		
Tepotinib (MET kinase inhibitor)	Non-small cell lung cancer, METex14 skipping [1,2]	Registration
Tepotinib (MET kinase inhibitor)	Non-small cell lung cancer, METex14 skipping	Phase II
Tepotinib (MET kinase inhibitor)	Non-small cell lung cancer, EGFR mutant, MET amplified [3]	Phase II
Peposertib (M3814) (DNA-PK inhibitor)	Rectal cancer	Phase II
Peposertib (M3814) (DNA-PK inhibitor)	Solid tumors [4]	Phase I
Berzosertib (M6620) (ATR inhibitor)	Solid tumors [5]	Phase I
M1774 (ATR inhibitor)	Solid tumors	Phase I
M3258 (LMP7 inhibitor)	Multiple myeloma	Phase I
M4344 (ATR inhibitor)	Solid tumors	Phase I
M8891 (MetAP2 inhibitor)	Solid tumors	Phase I
Immuno-Oncology		
Avelumab (anti-PD-L1 mAb)	Urothelial cancer, 1st line maintenance [6]	Registration
Avelumab (anti-PD-L1 mAb)	Non-small cell lung cancer, 1st line	Phase III
Bintrafusp alfa (TGFbeta trap/anti-PD-L1)	Non-small cell lung cancer, 1st line	Phase III
Avelumab (anti-PD-L1 mAb)	Non-small cell lung cancer [7]	Phase II
Avelumab (anti-PD-L1 mAb)	Urothelial cancer [7]	Phase II
Avelumab (anti-PD-L1 mAb)	Solid tumors [7]	Phase II
Bintrafusp alfa (TGFbeta trap/anti-PD-L1)	Non-small cell lung cancer 1st and 2nd line	Phase II
Bintrafusp alfa (TGFbeta trap/anti-PD-L1)	Locally advanced non-small cell lung cancer	Phase II
Bintrafusp alfa (TGFbeta trap/anti-PD-L1)	Biliary tract cancer 1st line	Phase II
Bintrafusp alfa (TGFbeta trap/anti-PD-L1)	Biliary tract cancer 2nd line	Phase II
Bintrafusp alfa (TGFbeta trap/anti-PD-L1)	Cervical cancer 2nd line	Phase II
Bintrafusp alfa (TGFbeta trap/anti-PD-L1)	Triple negative breast cancer	Phase II
Bintrafusp alfa (TGFbeta trap/anti-PD-L1)	Cervical cancer 1st line	Phase I
Bintrafusp alfa (TGFbeta trap/anti-PD-L1)	Solid tumors	Phase I
M6223 (anti-TIGIT mAb)	Solid tumors [8]	Phase I

Footnotes on next page

Healthcare Pipeline

Immunology		
Atacicept (anti-BLyS/anti-APRIL fusion protein)	Systemic lupus erythematosus [9]	Phase II
Atacicept (anti-BLyS/anti-APRIL fusion protein)	IgA nephropathy [9]	Phase II
Sprifermin (fibroblast growth factor 18)	Osteoarthritis	Phase II
Sonelokimab (M1095) (anti-IL-17 A/F nanobody)	Psoriasis [10]	Phase II
M5049 (TLR7/8 antagonist)	Covid-19 pneumonia	Phase II
M5049 (TLR7/8 antagonist)	Immunology	Phase I
Global Health		
M5717 (PeEF2 inhibitor)	Malaria	Phase I

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

[1] As announced on August 25, 2020, the US Food and Drug Administration (FDA) has accepted and granted Priority Review to the new drug application (NDA) in non-small cell lung cancer (NSCLC).

[2] As announced on November 26, 2020, the European Medicines Agency (EMA) has validated for review the application for Tepotinib for the treatment of adult patients with advanced non-small cell lung cancer.

[3] In combination with Osimertinib.

[4] Includes studies in combination with Avelumab.

[5] Includes studies (phase I/II) in collaboration with NCI.

[6] As announced on December 11, 2020, the Committee for Medicinal Products for Humans Use (CHMP) of the European Medicines Agency adopted a positive opinion recommending approval of Avelumab as monotherapy for the first-line maintenance treatment of adult patients with locally advanced or metastatic urothelial carcinoma.

[7] Avelumab combination studies with Talazoparib, Axitinib, ALK inhibitors, Cetuximab or chemotherapy.

[8] Includes study in combination with Bintrafusp alfa.

[9] As announced on November 09, 2020, our company has entered into an out-licensing agreement with Vera Therapeutics.

[10] Pending Phase III initiation in 2021.

APRIL: A proliferation-inducing ligand
ATR: Ataxia telangiectasia and Rad3-related kinase
BLyS: B-lymphocyte stimulator
BTK: Bruton's tyrosine kinase
IgA: Immunoglobulin A
IL: Interleukin
mAb: Monoclonal antibody
MetAP2: Methionine aminopeptidase 2
METex14: MET exon 14
MET: MET proto-oncogene, receptor tyrosine kinase
PD-L1: Programmed cell death ligand 1
PeEF2: Plasmodium eukaryotic elongation factor 2
PK: Protein kinase
TGFbeta: Transforming growth factor beta
TIGIT: T cell immunoreceptor with Ig and ITIM domains
TLR7/8: Toll-like receptors 7 and 8

Life Science*

Across our three business units, Research Solutions, Process Solutions, and Applied Solutions, our R&D teams of more than 2,000 employees continue to bring expertise and a diversified and relevant portfolio of products and services to our customers around the world. In 2020, our Life Science business sector focused on delivering the promise of accelerating access to health for people everywhere by collaborating with the global scientific community.

As such, we launched more than 18,300 products in 2020, including those launched through our "faucet program" for antibodies, reference materials, chemicals, and nanomaterials. These included key innovations from all our business units, such as our GenElute™-E Single Spin DNA kits, MILLIPLEX® immunoassay kits and ZooMAb® recombinant antibodies from Research Solutions; the sodium-acetate granulated, Bio4C™ Orchestrator, our perfusion-ready bioreactor, Cellicon™ perfusion device and controller, and VirusExpress™ Lentiviral production cells from Process Solutions; and the Milli-Q® IX 7003/7005/7010/7015 Type 2 water purification system from Applied Solutions.

The engine behind the solutions for Covid-19

As a global life science tools and equipment supplier, we are committed to providing the critical research and diagnostic tools, products, and reagents, therapy manufacturing and vaccine development products, as well as biosafety testing that can aid the global scientific effort to fight this novel virus. We continue to support many of our customers working on Covid-19 projects through our products and services, providing for more than 35 different testing solutions across RT-PCR, antigen and antibody diagnostics for both high-throughput centralized and distributed point-of-care settings; more than 50 different vaccine candidates, consisting of several platforms that include DNA, inactivated, live attenuated virus, viral vector, protein subunit and mRNA; and more than 20 monoclonal antibody, plasma products, and antivirals.

We remain conscious of ensuring ease of access to our broad product portfolio, especially amid the rush to develop solutions for Covid-19. Leveraging our industry-leading e-commerce website, **www.sigmaaldrich.com**, we created a dedicated Covid-19 webpage that provides a one-stop-shop of more than 200 products and corresponding information for scientists working on Covid-19 research and potential vaccines. In doing so, we continue to support the significant increase in research of Covid-19, coronaviruses and related immune responses, much of which uses our products such as enzyme-linked immunosorbent assays (ELISAs), ZooMAb® recombinant antibodies, and MILLIPLEX® multiplex panels to study Covid-19-related serological and immunological responses.

To expand our capacity for manufacturing Covid-19 related products and critical therapies, in November, we invested US$ 47 million in a combined expansion of our facilities in Jaffrey, New Hampshire, USA, and Danvers, Massachusetts, USA. Both sites supply critical products to customers developing life-saving therapies, including Covid-19 vaccines, such as single-use and virus filtration technologies.

Collaboration remains an important focus for the Life Science business sector as we work to drive innovation and solve the industry's toughest problems, especially those related to Covid-19. While delivering on our own portfolio and capabilities, we also seek to collaborate with other key players in the industry to work toward our shared goal of bettering and increasing access to health globally. As such, we joined Oxford University in the United Kingdom in their announcement that they laid the foundation for large-scale production of the Covid-19 vaccine candidate, ChAdOx1 nCoV-19, which leveraged our previous collaborative work to develop the manufacturing process for a rabies vaccine candidate. Our support enabled the development of the manufacturing process, which would normally take at least six months to a year, to take place in just two months' time, saving valuable time for the vaccine developer.

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

We also announced an extension of our ongoing collaboration with Baylor College of Medicine in Houston, Texas, USA, which previously focused on vaccine development for tropical disease outbreaks, to now advance a vaccine manufacturing platform for Covid-19. Our joint work supports the accelerated transition to Phase I clinical trials, optimizing the production process to advance two Covid-19 vaccine candidates, including the CoV RBD219-N1 vaccine candidate originally developed to target SARS. Additionally, our new collaboration with the Massachusetts Institute of Technology's (MIT) Center for Collective Intelligence and Community Biotechnology Initiative began with the release of a report detailing potential paths to solutions for pandemic response. The report summarizes the results of a three-week collective intelligence exercise conducted with more than 180 science, healthcare, and policy experts from around the world, which generated suggestions to combat Covid-19 via transmission control, diagnostics, and monitoring, and accelerating access to vaccines and therapies, among other technical topics.

We announced another new collaboration with Mammoth Biosciences Inc., of San Francisco, California, USA, for the development, scale-up and commercial production of their CRISPR-based DETECTR BOOST™ SARS-CoV-2 Reagent Kit. Once this new test isapproved by the FDA, Clinical Laboratory Improvement Amendments labs in the U.S. will be able to significantly improve capacity to regularly perform testing. Mammoth recently secured funding from the National Institute of Health's RADx program to scale its CRISPR-based testing workflow and we will serve as contract manufacturer for this high-throughput Covid-19 test.

Additionally, we have worked with academic partners to license or co-develop ELISAs, monoclonal antibodies, MILLIPLEX® panels, and proteins and scaled up those tools to become more broadly available to the research community.

Further, we are empowering virtual R&D by leveraging smart technology to collaborate with our customers and stakeholders. Our teams provided virtual offerings and interactions, including a self-service portal for audit stakeholders, a global pilot study of Emprove® Smart Glasses Kits, and digital collaborations and trainings at our M Lab™ Collaboration Centers using cutting-edge tools like Microsoft Surface Hub that allow customers to get a first-hand view from the lab floor and explore solutions virtually.

Research Solutions

Throughout the year, our R&D teams have demonstrated exceptional agility while navigating the impacts of the Covid-19 pandemic. Our colleagues have worked swiftly and diligently to accelerate necessary product launches, pause on others and bring new, innovative ideas into the pipeline and launch within months.

In September, we launched the MILLIPLEX® SARS-CoV-2 antigen panels for IgG, IgA and IgM. These panels utilize multiplexing technology to simultaneously detect the presence of different antibody classes against four different SARS-CoV-2 protein antigens in a single reaction from human serum or plasma samples. These panels were developed in close collaboration with academic researchers to deliver excellent sensitivity and specificity.

We continue to support the significant increase in research about Covid-19, coronaviruses, and related immune responses, much of which uses our products such as enzyme-linked immunosorbent assays, ZooMAb® recombinant antibodies and MILLIPLEX® multiplex panels to study Covid-19-related serological and immunological responses. We also collaborated with academic partners to apply our retrosynthetic analysis software for novel synthesis of critical antiviral drugs with cheaper or alternate starting materials, alleviating supply chain problems. Furthermore, we focused on delivering critical raw materials for use in antiviral drug synthesis or for Covid-19 diagnostic kit manufacturing.

Our major launches in 2020 include the Scepter™ 3.0 handheld cell counter, Genelute™-E Single Spin DNA kits, a full DNA Encoded Library (DEL) technology, proteolysis targeting chimeras (PROTACS), MILLIPLEX® kits, and an additional 200 ZooMAb® recombinant antibodies.

Process Solutions

Over the course of the year, we continued to deliver solutions for today's biomanufacturing processes while developing leading-edge technologies for the factories of the future. In April, we unveiled our Bio4C™ Software Suite, a first-of-its kind digital ecosystem that combines process control, analytics and plant-level automation. It includes two browser-based platforms: the Bio4C™ ProcessPad, which will allow users to acquire, aggregate and analyze data from disparate sources such as equipment, batch records, databases and historians across the bioprocess; and the Bio4C™ Orchestrator, which will provide remote access to systems, recipes, reports, user accounts, and alarms from a holistic process dashboard. Part of our expanding BioContinuum™ Platform, this transformative software suite allows users to look across the entire manufacturing process versus individual operational units, giving biomanufacturers complete process control and deep insights, bringing Bioprocessing 4.0 to the here and now.

With this launch and others, our BioContinuum™ pipeline continues to drive the biopharmaceutical industry on a journey to evolve and digitize the next generation of bioprocessing to increase speed and reduce costs. Additional launches from this year include our BioContinuum™ Buffer Dilution 30L System, part of the BioContinuum™ Buffer Deliver Platform; our perfusion-ready bioreactor, Cellicon™ perfusion device and controller for seed train intensification with optimized process control; and the Cellvento® 4CHO-X expansion medium.

In October, we announced our collaboration with D1Med, a Shanghai-based biopharmaceutical startup and precision-medical company, to advance the application of three-dimensional (3D) cell culture technology in China. As part of the collaboration, we will provide D1Med with 3D cell culture products and application support, including local and global expertise to co-develop the 3D cell culture protocol for PDO applications, which come from humans and mimic the biological characteristics of the original tumor as tools to study cancer development, drug screening and disease modelling.

Additionally, in November, we announced our collaboration with Transcenta, a global biotherapeutics company, to advance continuous biomanufacturing with strategic technology implementation. The collaboration will co-develop a first-of-its-kind, single-use, flow-through polishing system for GMP operation. The first phase of this multi-year partnership will focus on developing and designing the process technologies, single-use system and automation, while the second phase will focus on an expanded scope of process and digital technologies to optimize a continuous manufacturing process.

With more than 35 years of experience in the development and manufacturing of small molecules, biologics, and antibody-drug conjugates (ADCs), we offer extensive experience in both clinical and commercial manufacturing. In September, we continued investing in ADC technologies with an expansion of our manufacturing capacities at our site in Madison, Wisconsin, USA, marking another critical advancement of increasingly potent compounds for therapies that have the potential to treat cancer.

To further advance our portfolio of gene-editing and novel modalities, in October, we launched the VirusExpress™ Lentiviral Production Platform to bolster our viral vector manufacturing capabilities and offer a simplified upstream workflow that makes processes easier to manage, adjust, and scale. This new platform helps to overcome lentiviral production challenges and can reduce process development time by approximately 40%, based on our experience as a contract development and manufacturing organization. In addition to accelerating process development, the VirusExpress™ Platform's suspension culture format allows each batch of virus to be larger, yielding more patient doses while being amenable to true scale-up and less labor-intensive. The chemically defined medium also eliminates the safety, regulatory, and supply chain concerns related to animal- and human-derived materials. This marks the latest of our continued investments in the rapidly growing cell and gene therapy market.

Our company has 16 years of experience in genome editing, from early development to manufacture. Our portfolio now includes 28 patents for CRISPR technology, granted worldwide, including six additional patents granted in 2020. We were awarded our second U.S. patent for CRISPR-chrom technology and two U.S. patents for foundational CRISPR-Cas9 technology. In June, we joined 10x Genomics, a single-cell and spatial genomics

technologies company, in announcing our development of two linked technologies: single-cell transcriptomics and pooled CRISPR screening. This is the first solution for simultaneous gene perturbation measurement and unbiased single-cell gene expression. Further, in October, we announced our agreement to license CRISPR technology to two companies: PanCELLa, a cell therapy firm based in Toronto, Canada, and Takara Bio USA, Inc., a biotechnology company based in Mountain View, California, USA. The licenses aim to accelerate drug discovery leading to development of new therapies.

The growing potential of CRISPR technologies also raises scientific, legal, and social questions. We support genome-editing research only after careful consideration of ethical and legal standards. Our work is guided by our Bioethics Advisory Panel, an independent panel made up of a diverse group of international biomedical experts that provides guidance for research in which our businesses are involved.

We also announced a global licensing agreement with ReForm Biologics, a pharmaceutical technology company in Woburn, Massachusetts, USA, for excipient development and commercialization. The collaboration will accelerate R&D activities and GMP manufacturing for ReForm's excipients, making them available to our customers for use in biologic formulations.

Since 2018, 63% of drugs in the pipeline were being developed by biotech start-ups focused on innovative therapies, including those intended to treat niche diseases with small patient populations. Our global health commitment focuses on these companies and supports bringing their drugs to market through our grant programs. Grants provide selected companies with access to our products and services to help accelerate market entry for new therapies. Through our Advance Biotech Grant Program, which we run in North America, Europe, and Asia, we announced two grant recipients for 2020, selected based on the scientific and societal merit of their respective therapies in development, as well as process challenges and expertise gaps. Additional finalists were also announced.

Applied Solutions

To continue strategically advancing our core capabilities, in May, we launched the Milli-Q® IX 7003/7005/7010/7015 Type 2 water purification system, a redesigned version of our benchtop pure water system that provides laboratories with a reliable and consistent source of high-quality pure water. This is a smaller and more intuitive and ergonomic device than previous generations of the water purification system. For half a century, we have been the partner of choice for water purification systems and services for lab scientists who need to ensure their water is free of contaminants. This new system goes a step further to incorporate a range of sustainable purification technologies and design features aimed at minimizing environmental impact. Additionally, in January, we launched the new Milliflex Oasis® System to provide enhanced result reliability, increased productivity, and advanced traceability. The system offers enhanced benefits for pharmaceutical bioburden and water testing, including 96 new features, while streamlining the bioburden testing workflow.

Life Science has more than 30 years of experience in the diagnostics space, and our products and capabilities have played a significant role in Covid-19 testing efforts, as evidenced by our collaboration with Mammoth Biosciences. Covid-19 developments and other advancements in the area of innovative personalized medicines have resulted in an increased demand for more rapid sterility testing solutions to support the development and release of these products. Additionally, we continue to establish new growth opportunities and capabilities in contract development and manufacturing services. In February, we announced that our business was selected by Elypta, a molecular diagnostics firm in Sweden, as the contract manufacturer for their Research Use Only (RUO) clinical diagnostic liquid biopsy kits. Once validated and commercialized, the kits will be intended to improve the accuracy of cancer diagnoses by analyzing metabolites deregulated in several cancer types. The kits will be manufactured at our facility in St. Louis, Missouri, USA.

We remain focused on advancing digitalization, especially our offering of digital lab productivity tools. To continue growing our laboratory informatics solutions to create the labs of the future, in February, we introduced the BrightLab™ platform. The tool brings Internet of Things (IoT) integrations to R&D, meeting the increasing demand for data automation and accessible, real-time monitoring of centralized and synched lab

data. Additionally, in March, we launched the LANEXO™ system. This first-to-market digital lab informatics solution offers radio-frequency identification (RFID) labels, cloud-based integration, mobile and web applications for easily accessible digital data capture and real-time documentation. These solutions recognize the increasing demand for data automation that can be easily set up and rapidly integrated into existing lab workflows to ultimately help speed up the discovery process.

Increasing digital tools while adding to our titration portfolio, in March, we launched a new SmartChemicals technology that uses Supelco® SmartTitrants and Supelco® SmartStandards to transfer data seamlessly to a titrator. With this new technology, an RFID label is embedded on our Titripur® volumetric solutions, Certipur® volumetric standards and all Aquastar® Karl Fischer titrants and standards. These RFID labels store all relevant data from the Certificate of Analysis, which helps eliminate time-consuming steps and errors by transferring data wirelessly and instantly to titration instruments.

Recognized for award-winning innovation

To begin the year, Life Science received a 2020 CMO Award from Life Science Leader and Outsourced Pharma, an honor determined based on primary market research and customer feedback. The award honors outsourcing respondents who exceed customer expectations with their capabilities, compatibility, expertise, quality, reliability, and service.

In July, our DOZN™ green chemistry tool won Environment + Energy Leader's Top Project of the Year award. The award recognizes excellence in environmental, sustainability, and energy management. With more than 300 active, registered users, the DOZN™ system helps customers make data-driven decisions to increase environmental sustainability by evaluating the relative greenness of chemicals and chemical processes against the 12 Principles of Green Chemistry. Additionally, in recognition of our continued effort to create safer, more sustainable solutions, our Stericup®E and Steritop®E filtration devices were awarded New Product of the Year by Business Intelligence Group through its BIG Awards for Business program.

Also in July, we were recognized with two awards at INTERPHEX 2020, which honors the future of pharmaceutical, biotech and device development and manufacturing innovation. Our BioReliance® Blazar™ Platform won the Editor's Choice Award while our BioContinuum™ Buffer Delivery Platform, one of our BioContinuum™ Platform's newly launched building blocks, received Best in Show. We received two additional awards at the 2020 Asia-Pacific Bioprocessing Excellence Awards. Our BioContinuum™ Platform was awarded Best Bioprocessing Innovation of the Year, and the Life Science business sector was awarded Best Bioprocessing Supplier of the Year in Downstream Processing.

Our Blazar™ platform was honored with two additional awards in 2020. First, the CPhI's Excellence in Pharma award for its analysis, testing, and quality control, which recognizes innovations for and dedication to driving the pharmaceutical industry forward. Second, the Blazar™ platform also won a prestigious R&D 100 Award for analytical and testing capabilities, recognizing the global best that are pioneering revolutionary ideas in science and technology. Bio4C™ ProcessPad, part of our expanding BioContinuum™ Platform, also made the shortlist for the 2020 CPhI Awards.

We also received the CiteAb award for Innovative Product of the Yearfor our ZooMAb® Recombinant Antibodies. This new range of recombinant monoclonal antibodies is manufactured using a proprietary expression system as well as with less preservatives and freeze-dried, making shipping easier and giving long-term stability. Further, our LANEXO™ system won the Gold German Design Award for excellent communications design apps, recognizing how helpful digitalization can be in boosting efficiency, optimizing safety, and simplifying compliance in the regulated analytical and research laboratory.

Performance Materials*

Within our Performance Materials business sector, we are a market and technology leader in most of our industries. As a science and technology company, we offer leading-edge products and solutions that, in many cases, set us apart from the competition. We integrated our supply chain units into the respective business units to fully reflect business accountability in the organizational design across the entire supply chain. In order to bring our R&D closer to our businesses and reflect our new organizational structure, we transferred our research activities to our business units. Our Chief Technology Office (CTO) focuses on identifying trends and vetting technologies that are beyond the time horizon or scope of our business units. As a dedicated technology organization, the CTO is managing research partnerships, shaping our technology roadmaps, and managing our long-term R&D portfolio. We have also created a Technology Leadership Board to review and optimize our technology investment across the business sector.

In September, we opened a new Research Center for electronic applications in Darmstadt, Germany. With this investment we are scaling up our research & development capabilities for next-generation display and semiconductor materials to further expand our position a as leading supplier to the electronics industry. In October, we announced a € 20 million investment to expand OLED manufacturing capacities in South Korea and China. In November we also announced our plans to build a new Electronics Technology Center in Shanghai, China, which will focus on semiconductor and OLED materials.

To better support our customers, in late August, we made significant investments in developing advanced analytical and container capabilities in Kaohsiung, Taiwan to continually drive quality enhancement. The facility is in close proximity to many of our Taiwanese customers and aims to provide local collaboration support and faster time to market.

Our Planarization business continues to make significant progress in new product development in memory and logic across both slurry and cleans products. To better support our customers, in late June, we inaugurated a new R&D center in Korea to develop next-generation chemical mechanical planarization (CMP) materials. Since the opening, our team has been able to support several demos with key Korean customers, which is critical to enable rapid local collaboration.

Semiconductor Solutions

We are addressing our customers' critical material needs through every step of the wafer manufacturing process. The outstanding capabilities and competencies of the businesses are diverse and will enable us to bring game-changing innovations for our customers into the market faster.

In Semiconductor Materials, our Thin Film Solutions business achieved significant progress in advancing critical PORs (Process of Record) for new organosilanes for conformal high-performance atomic layer deposition (ALD) and progressed our plasma-enhanced chemical vapor deposition (PECVD) for low dielectric constant applications. We also continue to make progress in developing high-purity metal-containing precursor offerings enabled by new engineered container delivery systems. We continue to focus on developing new spin-on dielectric formulations for processes with improved dielectric characteristics for faster and better logic and memory devices.

With our Specialty Gases we continue to make progress with our new etch gas technology program, which is focused on advancing the development of new chemistries to enable more than 100-layer single-stack etching for advanced memory devices such as V-NAND. We continue to see significant performance in new POR wins across our existing portfolio and new product introductions.

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Our material innovation accelerator Intermolecular saw an increase in the amount of work done in their labs for quantum computing and neuromorphic computing companies. These companies benefit from the flexible device processing infrastructure and deep materials knowledge to quickly achieve tangible products in these emerging technology areas. Intermolecular is a trusted partner for materials innovation and is our Silicon Valley science hub. For more than 15 years, Intermolecular has being exploring, testing, and developing advanced materials that are revolutionizing the next generation of electronics.

Delivery Systems & Services (DS&S) develops, deploys, and operates equipment that enables safe and reliable delivery of hazardous materials in the manufacturing process of our customers. The unit is in the process of increasing its manufacturing capacity to meet the growing demand in memory and foundry, and we commenced a project to manufacture our second CHEMGUARD product line, BCD100 and 200, state-of-the-art bulk chemical delivery systems. We also released our CHEMGUARD CG600 model for bulk Tetrakis(dimethylamino)titanium (TDMAT) delivery. This product extends our prior TDMAT technology to remote, bulk supply to support our customers' ever-increasing flow rate and uptime requirements of advanced nodes. The first container changes were successfully completed and executed much faster than anticipated, reducing container change time significantly.

DS&S has successfully applied its GASGUARD Active Control technology to low vapor pressure compressed gases. Originally, it was developed to maintain, repeat and stabilize pressure for high vapor pressure gases under varying manufacturing conditions and with zero pressure drift. GASGUARD Active Control now allows semiconductor fabs to achieve much greater precision in controlling the pressure of low vapor pressure compressed gases, such as WF_6 and others.

This technology and all DS&S equipment are operated and maintained by our MEGASYS® Total Gas and Chemical Services at many of our customer sites. As part of a global operations infrastructure, we are a premier supplier of semiconductor fab and subfab services to the worldwide electronics industry.

Display Solutions

In our Display Solutions business unit, our liquid crystal technology UB-FFS (ultra-brightness fringe-field switching) continues its successful growth, thanks to new product qualifications and rising demand in the liquid crystal displays (LCD) sector for mobile devices, especially mobile phones and tablet PCs. The development of high-resolution 4K and 8K TV sets continues to pose a challenge, as the LCD backlight transmission and efficiency will be reduced due to higher pixel density. We are therefore actively working to expand our ultra-bright (UB) technology offering with our UBplus liquid crystal materials for the TV market. With such technologies, we increase the light transmission efficiency of applications for large-format TV sets and display panels by 10% to 15%.

Our VA (vertical alignment) liquid crystal platform including PS-VA (polymer-stabilized vertical alignment) technology remains predominant when it comes to large-format TV sets. Here, our latest materials provide additional performance benefits and improve processing efficiency in the production of TV sets. Moreover, we have successfully demonstrated our manufacturing expertise with respect to the new liquid crystal technology SA-VA (self-aligned vertical alignment). We are now focusing our attention on applications for specialized display products from the premium segment through to TV applications produced in large numbers, as this technology offers the high contrast and image quality of the PS-VA technology while also enabling improvements in display design and panel production, for example through the reduction of waste and energy consumption in the production of LCDs.

Our display materials are contributing to the fast-growing market of free-form displays, which includes foldable smartphones and rollable TVs. We further strengthened our ability to drive innovations in the fast-growing OLED market by acquiring OLED patents from Konica Minolta in April. Additional sublimation units will be built at our sites in Pyeongtaek, South Korea, and Shanghai to help meet customer demand in the growing OLED market. The investment will further increase our local OLED production footprint in Korea and establish OLED production capacity in China. In late November, we announced partnership agreements with Optitune Oy and Solip Tech Co., Ltd. to advance display patterning materials for free-form applications. The partnerships will enable the commercialization of liviFlex™-H, the first product from the company's new range of display materials that addresses challenges in the manufacturing of free-form OLED displays.

Surface Solutions

In our Cosmetics business, we are putting sustainability at the center of our efforts by more and more focusing on natural materials in our portfolio of active ingredients. For example, we will add to our offerings through the launch of a series of cosmetic applications containing four superfood extracts, which are backed by in-house scientific efficacy studies. Another new development will offer our customers an attractive portfolio of algae extracts that unlock the power of the ocean for the skin, together with RonaCare® RenouMer. Furthermore, we are tapping into the potential of the haircare market with the launch of a series of third-party products enabling the formulation of multi-tasking haircare products. Our well-established Functional Fillers portfolio RonaFlair® will be extended by a new ingredient combining two features, soft focus effect and transparency. RonaFlair® Infinity will address market needs like flawless skin without a masking effect.

In our automotive pigments business, we continue to focus on developing achromatic pigments. The latest example is Xirallic NXT Amur Black, a blue-black effect pigment with a silky-silvery fine texture including Living Sparkle®. In our pipeline, we address the special requirements that radar and lidar sensor applications have for coating pigments. Another key topic in our development is fueled by the evolution of autonomous driving.

People*

"Bring Your Curiosity to Life" – our promise as an employer – describes how we collaborate at Merck KGaA, Darmstadt, Germany, how we advance our business, how our employees can develop within the company, and who we are. Becoming a global science and technology company would not have been possible without the passion, creativity, and curiosity of our employees. And we are certain that our current and future employees ensure our economic success. They create innovations for patients and customers, and they secure our ability to compete. For this reason, the development of all our employees is very important to us. In short, we are working to create an environment where people are able to develop and reach their full potential.

A career with Merck KGaA, Darmstadt, Germany, is enriching – both professionally and personally. We offer conditions that meet the individual needs of our employees and encompass an exciting range of tasks and advanced training possibilities, furthering flexible forms of cooperation and a culture of mutual esteem and respect. The latter is particularly important, as our workforce represents a broad range of nationalities, cultures, religions, and age groups, as well as a variety of personal and professional backgrounds. We are committed to an inclusive culture in which each individual can develop their full potential and contribute their individual perspectives. We are convinced that the diversity of our workforce and our open, international corporate culture have a positive impact on our company's business success and innovative strength.

Overview of our headcount figures

As of December 31, 2020, we had 58,127 employees worldwide (previous year: 57,071). In 2020, we were represented by a total of 221 legal entities with employees in 66 countries.[1]

Distribution of Employees

by Region

[1] The Group also has employees at sites that are not fully consolidated subsidiaries. These figures refer to all people directly employed by our company and therefore may deviate from figures in the financial section of this report.

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

Building empowered leaders

Good leaders are key to the success of not only our employees but also our company. Because they provide our talent with the right framework to unleash their potential and generate new ideas, we highly value the continuing education and development of our managers.

Strategic competency development

A transparent competency model is the pillar of our personnel development efforts. Managers and employees should show strategic competence by being purposeful, future-oriented, innovative, results-driven, collaborative, and empowering. By demonstrating these qualities, our managers can build a strong culture of collaboration based on curiosity, creativity, and trust. In addition, our leaders are expected to set an example by living our values and taking responsibility for their own decisions. Based on this competency model, we have defined six leadership behaviors that summarize the conduct we expect from our leaders. To assess the performance and potential of every individual and to establish an effective leadership culture, regular and differentiated feedback is also of great importance. In this way, employees and supervisors can develop a shared vision, execute the business strategy, and further develop a unifying corporate culture.

Management programs for executives

In recent years, we have initiated three programs to enhance the skills of our people managers. The Managerial Foundation program imparts the basics of leadership, such as communication techniques, leadership styles, conflict management, motivation, and emotional intelligence. The Advanced Management program covers topics such as change management, self-reflection, and resilience. The third initiative is our Global Leadership program, which focuses on competencies needed to ensure successful international collaboration. Due to the Covid-19 pandemic, we also offer the majority of the programs entirely virtually. We have also introduced a range of support programs for leaders (e.g. group coaching and virtual workshop formats). We will also continue to work with our leaders to ensure that they gain the necessary skills to manage their employees responsibly in uncertain and challenging times.

For the past 21 years, we have been partnering with top international universities to offer our company University program. Over a period of around a year, senior executives take classes on management techniques and strategic business development. To date, a total of 522 executives have completed this program.

Another initiative we have been offering our up-and-coming leaders since the 1990s is our International Management Program, where participants work on an interdisciplinary project over a period of eight months. The results are then presented to the Executive Board. In the reporting period, 25 of our employees worked on a project as part of this program.

In addition to these various programs, we partner with universities across the globe to enable our employees to obtain qualifications such as an executive MBA.

Diversity and management

In order to manage our global and diverse organization, we need managers who can build international teams and promote international collaboration so as to contribute to a productive and flexible working environment. We seek managers whose inclusive leadership style also reflects different employee and customer traits. This opens up career opportunities for talented employees from all areas of our company and ensures a broad experience base as well as differentiated decision-making.

At Merck KGaA, Darmstadt, Germany, many teams work across sites and internationally. The diversity of competencies and experiences among the team members offers tremendous potential that our leaders can use. Internationality and a global mindset characterize our company culture and are therefore mirrored by our international management team. At present, 66% of our managers are not German citizens. All in all, 75 different nationalities are represented in such positions.

At the end of 2020, women occupied 35% of leadership roles Group-wide, meaning that we again exceeded our goal of maintaining the proportion of female leaders at a stable level of 30% by 2021. At the same time, we developed goals and measures to ensure a balance of men and women when filling vacancies at the different levels of our businesses. Factors such as the stronger female presence in leadership programs are already helping to ensure that female candidates are taken into account to a greater extent when filling vacancies. Our flexible working models and unconscious bias training are also helping to increase the percentage of women in the Group.

The report on stipulations to promote the proportion of women in leadership positions at the Group pursuant to section 76 (4) and section 111 (5) of the German Stock Corporation Act (AktG), can be found in the Corporate Governance statement. This is made available on the website **https://www.emdgroup.com/en/investors/corporate-governance/reports.html**.

Leveraging the opportunities of digitalization

Digital transformation has been leaving its mark on the world of work for a long time now. New, agile ways of working and artificial intelligence (AI) are thus increasingly gaining ground, a shift we are actively supporting. For example, we have been developing an intelligent humanoid robot in collaboration with Darmstadt Technical University since 2017. The aim is to find out how employees and managers respond to intelligent robots and AI in the workplace and in which areas they could be used. Another goal is to prepare our executives and staff for the introduction of AI in the working environment. The studies are also intended to make new technologies hands-on so as to create acceptance of them early on.

State-of-the-art big data applications provide leaders with rapid and specific answers to HR-related questions. In addition to conventional master data, this may take the form of information on compensation, performance, and potential as well as strategic succession and HR planning. The Visier software developed by the People Analytics HR unit can connect this data in order to allow trends to be identified at an early stage. This means that managers have access to an extensive trove of data that they can utilize for operational and, above all, strategic (HR) decisions as long as this is consistent with data privacy regulations.

Data and technology at Merck KGaA, Darmstadt, Germany, have become more important than ever before in light of the Covid-19 pandemic. So far, our strong foundations have helped us to overcome the crisis and keep our employees safe and active. We want to make even greater use of innovative technologies like artificial intelligence in order to advance the way in which our employees work.

Digitalization is also impacting our vocational training and continuing education programs, where IT skills are becoming increasingly crucial. At the same time, digital media is creating new opportunities for learning, which is why we are increasingly integrating 3D printing, robotics, big data, and artificial intelligence into our curricula. Moreover, we are testing novel learning and innovation methods such as Scrum and design thinking. To learn how to operate machinery, our apprentices also utilize virtual reality environments, initially learning how to operate the machinery through virtual images before developing the corresponding expertise in real environments.

Furthering and asking more of talent

We believe that curiosity can make great things happen. We therefore seek to provide an environment that gives our employees plenty of scope for creativity and awakens their desire to innovate. In particular, training and career development play a key role. Focusing on their individual strengths, aspirations, and skills, we support their personal and professional development, thereby laying the groundwork for an enriching and challenging career with our company. We endeavor to discover qualified employees at an early stage in their career and develop their talents.

A holistic recruitment approach

When filling job vacancies, we pursue a holistic recruitment approach coupled with globally uniform and binding procedures. This starts with an internal job posting before external channels such as job portals and recruitment agencies are used. This process enables us to offer employees better development opportunities. For employees with leadership responsibility, we offer targeted interview coaching to support them in selecting candidates and to establish uniform quality standards.

A globally accessible welcome portal is available to new employees in order to help them prepare for their new job at the Group and to support their onboarding phase. To further improve the onboarding process, supervisors, Human Resources, and new employees can exchange information and documents before their first day of work. In addition, all new employees are assigned an experienced colleague who can help familiarize them with the daily work routine. Our managers are also given detailed information such as onboarding plans and process descriptions to support them with this task.

Vocational training to recruit young people

Although the conditions were more difficult on account of the Covid-19 pandemic, we maintained a consistently high vocational training rate in Darmstadt, Germany, our largest site, in 2020. A total of 600 young people were enrolled in vocational training in 28 different occupations at our headquarters in the reporting period. We give unlimited employment contracts to all employees in vocational training who work in occupations for which we have sustainable demand. On average, the post-vocational training hiring rate – taking voluntary terminations into account – was more than 90% over the past five years. We also offer vocational training at other sites in Germany, with a total of 607 young employees participating. We promote the professional and social expertise of our employees in vocational training through numerous regional and global project activities.

In Darmstadt, the Starting Vocational Training and Integrating Refugees through Training programs help young people to enter the job market: The 11-month preparation program gives them an insight into working life and readies them to enter vocational training. In this way, we assist young people who have a school-leaving qualification but have been searching for a vocational training position for at least one year without success, as well as refugees who have been forced to leave their home country and are seeking to build a new life in Germany. In the reporting year, we combined the programs so that the participants can learn and benefit from each other. Encouraging cultural awareness in both directions, promoting language development through personal contact with native speakers, and integrating the role model function of highly motivated people are just a few of the benefits of the Starting Vocational Training program. In 2020, the program accepted participants ages 16 to 30.

Targeted advanced training and maximizing performance capability

Our focus on systematic personnel development allows us to sustainably strengthen the performance potential within our company and to increase the motivation of our people. Only by expanding the abilities of each individual can we count on innovative and curious employees and managers in the future and flexibly respond to different requirements.

Employee development at Merck KGaA, Darmstadt, Germany, is founded on regular exchanges and a culture in which employees aspire to high levels of performance and engagement. As the basis for internal strategic talent management, the performance and potential management process is globally aligned for all employees in accordance with the same principles and is part of a shared IT system. We systematically combine talent recognition with performance assessments based on employee target agreements, as we are convinced that ongoing feedback helps all employees to grow in terms of their performance and potential. Regular individual assessments permit us to more readily identify high-potential employees and to further them accordingly. Clear objectives, differentiated and open feedback, and individual development plans are thus important prerequisites for both the personal development of every individual and the success of the company.

Global training courses and workshops developed specifically for teams help our employees develop and build individual abilities in line with new requirements and perspectives. Digital solutions in the form of e-learning and language courses are also available to our employees. To enable our employees and managers to realize their full potential, we also provide local business and function-related offers. In response to the crisis, we offered global training in 2020 on topics such as virtual leadership, employee well-being, and working from home. This also included guidance on conducting team meetings in order to help teams adapt their cooperation to the new situation and to create an inclusive atmosphere. The range of training is supplemented by individual and group coaching on topics such as self-resilience and self-motivation.

All measures are documented in a globally standardized development plan. Individual development opportunities are also supported by our job architecture, which applies globally and enables us to harmonize all positions and simplify their classification. This job architecture defines three fundamental career types: managers, experts, and project managers. They are all equal. Employees who wish to advance in their careers and aim for a top position within the company can also do so via the expert and project manager career paths.

A transparent and flexible employee reward system

At Merck KGaA, Darmstadt, Germany, we reward the performance of every individual through appropriate and competitive total compensation. For years, we have been achieving this through global processes and programs that are supported by digital platforms. We also offer our managers flexible, market-, and needs-oriented compensation tools. These support well-informed decisions and thus provide comprehensible, performance-, and position-based compensation. Apart from monetary compensation components, we also offer our employees attractive fringe and social benefits. Our fringe benefits feature globally under the internal benefits4me brand. Its offerings comprise three pillars:

- Company benefits including a company pension
- Health and well-being
- Service offers

Specific benefit packages are in place at a national level to meet the different needs of our employees using well-established management mechanisms. Focusing more closely on individualized fringe and social benefits in the future will continue to enable our employees to individually choose those benefits that best meet their personal situation and stage of life.

Valuing diversity and dialogue

We appreciate the diversity that our employees bring to our workforce in terms of their gender, national or ethnic background, sexual orientation, religion, or personal life experience. We are committed to an inclusive culture in which each individual can develop their full potential and contribute their individual perspectives. We deeply believe that a diverse workforce and a respectful corporate culture are indispensable for our ability to innovate and that they contribute significantly to our business success.

Our diversity strategy

Our Chief Diversity Officer is responsible for strategic management with regard to the topics of diversity and inclusion. In addition, all the business sectors and larger Group functions have active leadership teams that implement our diversity and inclusion strategy in their respective area of responsibility. A committee with responsibility for diversity – the Diversity Council – is composed of high-ranking managers from all the business sectors and selected Group functions. The work of the committee focuses on advancing our diversity strategy, which involves two key areas. First, we aim to promote the advancement of women into leadership positions and give talented people from the Asian region greater opportunities. Secondly, we aim to develop a better understanding of this growth market. The focus has recently been expanded to include LGBTQI+ (lesbian, gay, bisexual, transgender, queer or questioning, intersex and other gender identities), disability and ethnic background as additional dimensions, with activities in North America and Europe concentrating in particular on the topic of ethnicity.

At the same time, our other goals remain unchanged: We aim to recruit people representing a breadth of qualifications, skills, and experiences. In order to foster exchanges among like-minded individuals, we also support the specific employee networks in which several thousand of our employees participate. As well as our women's networks in various countries, we support networks that promote the interests of the LGBTQI+ community, employees from different ethnic groups and international employees, for example. In China, Generation Now is a network for young people that provides them with access to mentoring and innovation projects. Our Carer network brings together employees from all over the world who care for a relative. In addition, we organize regular events to mark occasions such as our Diversity Days, International Women's Day, Pride Month, Coming Out Day, and Black History Month, where we discuss current developments that are particularly relevant to us.

We also raise awareness of unconscious bias throughout the Group. We help executives to identify and reassess these thought patterns in their daily encounters as well as in decision-making processes and to bring about long-term changes in their own behavior in this regard. We also use the Job Analyzer, an online tool that allows job advertisements to be checked for critical wordings prior to their publication, to foster gender-neutral communication with those applying for jobs.

In Germany, we have signed the Charta der Vielfalt (Diversity Charter), the Charta der Gleichstellung (Equal Opportunity Charter), and the Inclusion Action Plan of the German Mining, Chemical, and Energy Industrial Union (IG BCE). At an international level, we support the Women's Empowerment Principles, an initiative of UN Women and the UN Global Compact aimed at empowering women in the workplace. We are also a member of the Business Coalition for Equality Act, a group of leading employers in the United States that supports the Equality Act. By joining these initiatives, we underscore our commitment to fairness and tolerance in the workplace.

Different aspects of diversity

As a global employer with intercultural expertise, people from a total of 141 nations work for our company; 21% of our employees are German citizens, and 77% of our employees work outside Germany. At our headquarters in Darmstadt, 11% of staff are not German citizens.

Women currently account for 43% of our workforce. However, the ratio of women to men varies widely across the different regions, businesses, and functions. We are therefore working to raise the proportion of women wherever they are underrepresented, taking into account the situation typical for the industry as well as regional differences.

Demographic change is posing challenges to society in Germany as well as several other European Union countries, the United States, China, and Japan. The average age of our employees is approximately 42. We assume that this figure will continue to rise in the coming years and are preparing for this situation. As part of our range of Health and Well-Being offerings, we specifically promote our employees' physical and psychological well-being throughout their entire career.

Understanding our employees

We want to create a working environment that empowers our employees to think outside of the box and find new solutions, opening the door to creative ideas and the discovery of new market opportunities. In order to promote this and to allow us to carry out even better comparisons both within the company and with our competitors, we conduct Group-wide employee engagement surveys every year. In this way, we ensure a regular exchange between employees, leaders, and senior management. The honest feedback we receive from staff shows us whether the measures and initiatives specified here are successful and highlights areas where we can improve further.

In October, the global employee engagement survey was again conducted in 21 languages and the status of implementation was reviewed. Around 50,500 employees (86%) took part. In the midst of the pandemic, our Group-wide score, which indicates how attached our employees feel to the company, was actually three percentage points higher than in the previous year at 77%. In addition, regular snapshot surveys have been conducted during the peak phases of Covid-19 to determine the mood of employees in light of the changes in their working situation. The results are used to identify strategic focus areas and feed into company-wide work on an ongoing basis.

Differentiated solutions to support employee well-being

As an employer, we take responsibility for the well-being of our people and offer a wide range of opportunities to optimize work-life balance and protect their health and safety.

Covid-19-related activities

Social distancing and face coverings, home working and home schooling: The Covid-19 pandemic is presenting our employees with new challenges. Our overriding priority is to ensure the health and safety of our employees and their families. However, maintaining our business processes and supporting customers and institutions, including in areas such as vaccine development, are also important aspects.

Supporting our employees is an integral component of our crisis management throughout all phases of the crisis. For example, we offer online training and coaching. We have also established a global hotline for our employees, allowing them to ask questions at any time of day and obtain assistance with whatever professional or personal problems they may have.

One particular focal point is the provision of guidelines and tools aimed at helping employees to achieve a healthy balance between their work, childcare, and family obligations and supporting employees who are at a particularly high health risk.

One thing has become particularly clear to us in the months since the crisis began: Flexible working models and virtual cooperation are more important than ever before. In many countries, we were fortunate in that we were able to fall back on proven flexible working models like Mywork at Merck KGaA, Darmstadt, Germany, and digital work tools.

We have established a special working group to address the experiences gained from the Covid-19 pandemic. Its aim is to establish what lessons can be learned from the pandemic and how they can be applied to the potential workplace of tomorrow. The working group has identified three focus areas:

- Flexible working models: We want to create even more flexible working models that enable employees to work flexible hours in the office, in their workplace, at home, or elsewhere – whatever the nature of their work. We will also make increased use of part-time work and job sharing in order to provide employees with flexible alternatives to full-time work. Another special feature will be the creation of location-independent roles, allowing us to recruit talented employees who meet the respective job requirements regardless of where in the world they may live.
- Investments in new technologies: We want to make even greater use of innovative technologies like artificial intelligence in order to advance the way in which our employees work.
- Leadership development: We want to provide our leaders with the skills they need to manage their employees successfully in a new world of work and make the right decisions.

Fostering work-life balance

We know that people's priorities in life can change. The Covid-19 pandemic has provided a vivid demonstration of how important it is to achieve a healthy balance between work, childcare, and family obligations. We take this into account by offering flexible working time/location models, working time accounts for early retirement, and the possibility of taking an extended break from work, among other things. We also place great emphasis on family life. Here our commitment ranges from parental leave to childcare as well as support of employees caring for a relative.

Even before the Covid-19 pandemic, our employees had the choice between different flexible working models. Thanks to the consistently positive experiences in terms of performance and commitment during the pandemic, we decided to roll out our proven Mywork at Merck KGaA, Darmstadt, Germany, program at all of our locations worldwide. The program allows employees to freely choose their working hours and location (in the same country) in agreement with their teams and supervisors. Employees agree with their direct supervisors on when and how often all team members are required to be in the office. Time tracking and time control are no longer required. The model reinforces our company's performance culture and culture of trust and forms part of our global Future Ways of Working program. Workplace suitability permitting, the model can be taken up both by employees formally covered by collective agreements and employees exempt from them. Implementation will be complete by the end of 2021.

By offering information, advice, and assistance in finding childcare and nursing care as well as home and garden services, we help employees to reconcile the demands of their professional and personal lives. At various sites, employees benefit from childcare options that we subsidize. As an example, our headquarters in Darmstadt has featured a daycare center offering 150 slots in crèche, kindergarten, and after-school care for more than 50 years now. The Parents at Merck KGaA, Darmstadt, Germany, program makes it easier for our employees to return to work following parental leave by giving mothers and fathers on parental leave the chance to talk and interact, as well as helping them to keep in touch with the company. Moreover, they can make use of our various training and networking opportunities. We have also established similar programs in other locations.

A constant focus on health and safety

The health and safety of our employees constitute an important part of our daily responsibilities – especially in times of new challenges like the Covid-19 pandemic. We do everything to protect our employees against accidents and work-related illnesses, including in the areas of stress prevention, nutrition, and exercise. We employ preventive measures that can be easily incorporated into the daily work routine. They are designed to help our employees to avoid health problems.

As part of our response to the Covid-19 pandemic, we established global and local working groups to develop risk scenarios and plans of action. We built up internal coronavirus testing capacities, developed and implemented work safety standards, ensured the procurement of protective equipment, and made employees fully aware of the need to maintain social distancing and wear a face covering.

At our Darmstadt and Gernsheim sites, our Health Management unit conducts an array of campaigns and programs to promote the health of our workforce. Our employees have access to a health catalog detailing our Health Management services in both English and German. Among other things, this contains information on ergonomics, nutrition, stress, and mental health issues.

Workplace safety and health protection are the highest priority at Merck KGaA, Darmstadt, Germany. It is especially important to us to do everything we can to prevent workplace-related illnesses and accidents. We apply the lost time injury rate (LTIR), which describes the number of accidents worldwide resulting in lost time of one day or more per million working hours, as a key indicator in measuring the success of our occupational safety measures. We calculate the LTIR for our employees as well as for temporary staff. Our previous target was to reduce the LTIR to 1.5 (accidents resulting in lost time of one day or more per million working hours) by 2020. The LTIR in 2020 was 1.3. We are currently developing a new target for the period beyond 2020.

Experience shows that most workplace accidents can be prevented by proper conduct. Through our BeSafe! safety culture initiative, we are working to educate our employees on dangers in the workplace and provide them with rules of conduct that help keep them safe. Uniform standards as well as local modules to meet specific safety requirements at individual sites can help achieve a steady improvement in the current situation. The program focuses on engaging managers in the safety culture and building their buy-in, aiming to make safety an intrinsic value and empower our employees to take responsibility for their own safety. The Covid-19 pandemic and the resulting restrictions meant it was not possible to conduct as many awareness campaigns in 2020. We are also working hard on the next phase of the safety culture initiative. Its new name, TeamSafe, reflects the fact that all employees bear collective responsibility for safety. In the next phase, the initiative will focus on enthusiasm, empowerment, and a role model function in the area of occupational health and safety.

Overview of employee figures[1]

			Group (overall) Dec. 31, 2018	Group (overall) Dec. 31, 2019[3]	**Group (overall) Dec. 31, 2020**
Number of employees	global, total		51,749	57,071	58,127
	by region	Asia-Pacific (APAC)	10,486	12,728	13,518
		Europe	25,792	26,715	26,587
		Latin America	3,340	3,433	3,387
		Middle East and Africa (MEA)	1,153	1,366	1,323
		North America	10,978	12,829	13,312
Number of employees in FTE (FTE = full-time equivalents)	global, total		51,039.8	56,204.6	57,358.3
	by region	Asia-Pacific (APAC)	10,462.9	12,694.2	13,489.6
		Europe	25,126.8	26,013.1	25,896.8
		Latin America	3,339.5	3,427.8	3,383.8
		Middle East and Africa (MEA)	1,151.1	1,365.2	1,322.2
		North America	10,959.6	12,704.4	13,265.9
Number of countries			66	66	66
Number of legal entities	global, total		207	222	221
Number of nationalities	global, total		136	139	141
Number of nationalities working in Germany			95	96	100
Percentage of employees with German citizenship			24.1%	22.4%	21%
Percentage of employees working outside Germany			73.9%	75.8%	77.1%
Percentage of employees with global managers			10.6%	11.0%	11.6%
Percentage of women in the workforce	global, total		44.0%	43.0%	42.9%
	In Germany		38.9%	38.9%	37.7%
Percentage of women in leadership positions (= role 4 or higher)	global, total		32.3%[2]	33.5%[4]	34.6%
	In Germany		30.9%[2]	31.6%[4]	32.9%
Percentage of executives (= role 4 or higher)	global, total		6.5%[2]	6.2%[4]	6.6%
	Percentage of executives who are not German citizens		63.6%[2]	64.0%[4]	65.5%
	Number of nationalities		70[2]	73[4]	75
Number of employees in vocational training in Germany			604	589	607
Vocational training rate			4.5%[5]	4.3%	4.6%
Number of employees in the Mywork at Merck KGaA, Darmstadt, Germany, model (Germany)			5,698	5,990	6,384
Percentage of employees working part-time	global, total		4.8%	4.9%	5.0%
	Men		12.5%	16.9%	19.1%
Percentage of employees aged 17 – 29 years			14.5%	15.0%	14.7%
Percentage of employees aged 30 – 49 years			61.1%	60.2%	60.2%
Percentage of employees aged 50+			24.4%	24.8%	25.1%
Average age globally			41.7	41.7	41.7
Average age by region	Asia-Pacific (APAC)		36.9	36.8	37.0
	Europe		42.8	43.0	43.1
	Latin America		40.4	40.3	40.7
	Middle East and Africa (MEA)		39.2	38.6	39.1
	North America		44.1	44.4	44.4
	Germany		43.3	43.7	43.8
Average length of service	global, total		10.0	9.5	9.6
Average length of service in Germany			14.5	14.8	15.0

[1] The Group also has employees at sites that are not fully consolidated subsidiaries. These figures refer to all people directly employed by the Group and therefore may deviate from figures in the financial section of this report.

[2] Not including the Sigma-Aldrich legal entity in Steinheim, Germany, or Allergopharma.

[3] With the completion of the acquisition of Versum Materials on October 7, 2019, around 2,300 employees joined the Group.

[4] Not including the Versum Materials legal entities or Allergopharma.

[5] Ratio adjusted retrospectively.

Report on Economic Position

Macroeconomic and Sector-Specific Environment

Based on the World Economic Outlook published by the International Monetary Fund (IMF) on January 26, 2021, the recession in the second quarter of 2020 was followed by a recovery in the global economy from the second half of 2020 onward. However, there is considerable variation between individual countries when it comes to the pace of the continued recovery. Key factors include the comprehensive rollout of vaccines as quickly as possible, the extent to which those vaccines are effective against Covid-19 mutations, and effective containment measures. Government fiscal policy measures could also have a further positive impact. Yet, the IMF does not expect the global economic activity to return to the level forecast prior to the outbreak of the Covid-19 pandemic by 2022.

According to the latest forecasts by the IMF, global gross domestic product (GDP) fell by -3.5% in 2020 (previous year: +2.8%). Activity resumed more quickly after the lockdowns than had been initially anticipated, especially in the advanced economies, although there are general differences in terms of the impact of the pandemic in the individual countries. While economic output in the industrialized nations fell by -4.9% (previous year: +1.6%), the emerging markets and developing economies saw a less pronounced downturn of -2.4% (previous year: +3.6%). GDP in the United States declined by -3.4% (previous year: +2.2%). The eurozone was hit harder by the pandemic, with GDP decreasing by -7.2% (previous year: +1.3%). The downturn in GDP in the emerging economies of Asia was relatively minor at -1.1% (previous year: +5.4%). While the Indian economy contracted by -8.0% (previous year: +4.2%), the rapid recovery of the Chinese economy to record growth of 2.3% (previous year: 6.0%) meant that the overall figure decreased only slightly. As part of the advanced economies, Japan reported a downturn of -5.1% (previous year: +0.3%).

As in the previous year, our organic sales growth was significantly higher than the IMF’s global growth expectations at 6.0%. With the exception of the Middle East and Africa, all regions contributed to this growth in the reporting year. North America accounted for the highest share of Group-wide growth at 42.4%, followed by Europe with 33.4%, Asia-Pacific with 17.8%, and Latin America with 8.2%. The organic downturn in the Middle East and Africa region was reflected in a slightly negative contribution to Group growth of -1.8%.

The overall growth was driven in particular by the Life Science business sector, with Healthcare also making a positive contribution to organic growth. Performance Materials was down on the previous year in terms of organic sales. This illustrates the fact that the growth in the North America and Europe regions is primarily attributable to the Life Science business sector. In the Asia-Pacific region, the growth contributions from the Life Science and Healthcare business sectors were more than enough to offset the downturn in the Performance Materials business sector.

Development in 2020 and 2019

	Change 2020[1]	Change 2019
Healthcare		
Global pharmaceutical market	3.0%	6.2%
Market for multiple sclerosis therapies[2]	0.9%	1.0%
Market for type 2 diabetes therapies[2]	12.4%	12.8%
Market for fertility treatment[2]	-2.5%	6.9%
Market for the treatment of colorectal cancer[3]	-10.5%	5.7%
Life Science		
Market for laboratory products[4]	6.1%	4.4%
Share of biopharmaceuticals in the global pharmaceutical market[5]	32.3%	30.5%
Monoclonal antibody (mAb) pipeline[6]	10.8%	13.3%
Performance Materials		
Growth of wafer area for semiconductor chips	2.4%	-6.9%
Growth of liquid crystal display surface area[7]	-2.0%	4.2%
Global sales of cosmetics and care products	-2.5%	2.0%
Global number of produced light vehicles	-16.7%	-5.6%

[1] Predicted development. Final development rates for 2020 were not available for all industries when this report was prepared.

[2] Growth rates based on market data in local currency, translated at a constant euro exchange rate. The IQVIA market data on the growth of indications are based on current figures, including the third quarter of 2020. Annual growth based on the values for the past 12 months. The type 2 diabetes market excludes the United States, since this market is insignificant to Merck KGaA, Darmstadt, Germany.

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

[4] The Global Market for Laboratory Products, December 2020, Frost & Sullivan. Acceleration attributed to Covid related tailwinds (Covid-19 testing, research, and vaccines).

[5] Growth rates based on market data in local currency, translated at a constant euro exchange rate. IQVIA market data on the growth of indications are based on current figures, including the third quarter of 2020. Annual growth based on the values for the past 12 months.

[6] EvaluatePharma. Deceleration since 2019 is due to global lockdowns in response to Covid-19 causing a pause in manufacturing and clinical trials. Volatility is expected to persist in the near term as routine healthcare use resumes with lower clinic capacities.

[7] Growth of display area is a pure volume indicator, which is counteracted by a negative price momentum.

Healthcare

In a study from September 2020, the pharmaceutical market research firm IQVIA forecast growth in the global pharmaceutical market of 3.0% in 2020 (previous year: 6.2%). Due to Covid-19, the pharmaceutical market is therefore expected to see lower growth in the reporting year than was originally anticipated at the start of the year. The reduced growth forecast is due to people making fewer visits to physicians, and hence slower growth in the number of new patients. This particularly affected the areas of gastroenterology, oncology, and cardiology, while endocrinology and dermatology were least affected. In particular, the lockdowns and the rules on social distancing have made it harder for patients to access hospitals, leading to reduced demand for these products.

The developments at a regional level are extremely heterogeneous. Latin America reported significant growth of 10.6% (previous year: 11.8%). The EMEA (Europe, Middle East, and Africa) region also enjoyed solid if slower year-on-year growth of 4.4% (previous year: 6.8%). In North America, growth also slowed compared with the previous year, amounting to 3.9% (previous year: 5.3%). In absolute terms, the pharmaceutical market in the United States remains the biggest and most important market by some distance. Market growth in the Asia-Pacific region (excluding China) stagnated at 0.5% (previous year: 5.0%). Individual positive developments, particularly in India, were offset by a sharp downturn in Japan. Despite the downturn of -2.9% in China, which was largely due to the impact of the Covid-19 pandemic, the continued development of the local healthcare system and the shift from spending on generic products as a result of price regulation (e.g. volume-based procurement) in favor of innovative treatments mean that China will remain an attractive market, and we are forecasting a return to substantially positive growth from 2021 onward.

Besides the growth of the pharmaceutical sector as a whole, the development of the biopharmaceutical market is particularly relevant to our business. According to IQVIA, the market volume for biological pharmaceuticals totaled approximately € 316 billion in 2020 (previous year: approximately € 288 billion), thus continuing the recent trend of a continuous increase in market share. These products accounted for 32.3% of the global pharmaceutical market in 2020 (previous year: 30.5%). The most important market for biological pharmaceuticals remains the United States, with a 61.0% share of the global market volume.

The developments in the therapeutic areas of relevance to the Group saw differing trends in the reporting year. The global market for type 2 diabetes excluding the United States followed the positive trend of previous years, achieving growth of 12.4% in 2020 (previous year: 12.8%). The therapeutic area of infertility saw a downturn of -2.5% in the reporting year (previous year: +6.9%). Following a strong upturn in recent years, the market for colorectal cancer also declined by -10.5% in 2020 (previous year: +5.7%). The growth trend in the market for multiple sclerosis patients remains at previous year's level with 0.9% (previous year: 1.0%).

Life Science

Our Life Science business sector is a leading global supplier of products, tools and services for research laboratories, pharma and biotech production, and industrial and testing laboratories. While Covid-19 is having a pronounced impact on many sectors and the global economy as a whole, the life science market has proven itself to be robust.

According to the market research firm Frost & Sullivan, the market for laboratory products, which is relevant to our Research Solutions and Applied Solutions business units, grew 6.1% in 2020 (previous year: +4.4%). This was primarily due to a surge in demand for products related to Covid-19 testing, research, and vaccination. These developments served to more than offset the temporary reduction in laboratory activity during the lockdowns that were imposed in response to the Covid-19 pandemic. The impact of the closures was most pronounced in the second quarter of 2020, when just 12.2% of the laboratories surveyed by the market research firm Bioinformatics were fully operational. Lab activity picked up steadily throughout the fall and winter (39% of laboratories were fully operational in the fourth quarter of 2020) and is expected to return to pre-pandemic levels in 2021. Market development for 2021-2022 is expected to continue growing between 4% and 6%.

In the pharma and biotech production market in which our Process Solutions business unit is active, demand is driven by the development and manufacture of therapeutics and vaccines. According to IQVIA, the end market for biopharmaceuticals grew by 9.9% in 2020 (previous year: 13.9%) to € 316 billion (or 32.3% of the global pharmaceutical market). Monoclonal antibodies, currently the leading area of biopharmaceuticals, continued on their growth path in 2020 with positive development of 10.8% (previous year: 13.3%). The slowdown compared with the previous year is due to the global lockdowns in response to Covid-19, which led to production and clinical trials being suspended. Volatility is expected to persist in the near term as routine healthcare applications start to resume, albeit with reduced hospital capacities. The rapid development of treatment methods and vaccines in connection with Covid-19 is giving the pharma and biotech production a considerable boost. As of January 21, 2021, a total of 1,083 programs for the development and production of billions of vaccine doses were in progress.

Performance Materials

The semiconductor industry is the most important market for our business with materials for the production of integrated circuits (Semiconductor Solutions). In particular, the growth in demand for semiconductor materials depends on the wafer area produced for semiconductors. The silicon wafers required as raw materials are used as an indicator to estimate the demand for semiconductor materials. According to the global industry association SEMI.org, the area of delivered silicon wafers increased by approximately 2.4% in 2020 (previous year: -6.9%). Although the global economy fell into a severe recession in the first half of 2020 as a result of the global lockdowns to protect public health in response to Covid-19, demand for semiconductor chips remained robust. This was due to the strict social distancing rules, which triggered a significant wave of IT spending on the part of companies, governments, and individuals. With entire production facilities, offices, schools, and companies closing their doors temporarily, working from home, home schooling, online shopping and online entertainment suddenly became considerably more important as a means of enabling economic activity to resume, at least in part. To this end, demand for electronics – and hence semiconductor chips – remained robust and even intensified as the digitalization of the world picked up pace. McKinsey estimates that the global digital transformation has accelerated by around five years as a result of the Covid-19 lockdowns. As a consequence, the production capacities of semiconductor manufacturers remained largely constant with sustained high utilization rates throughout 2020, meaning that the development of the semiconductor and electronics industry was entirely decoupled from the wider GDP trend. As social distancing rules look set to remain in place or be intensified in order to prevent a renewed rise in new infections from the fourth quarter of 2020 onward, demand for laptops/PCs, servers, communication infrastructure, storage capacity, and similar products will be high, especially in 2021.

With its Liquid Crystals business, we are the leading producer of liquid crystal mixtures for the display industry. According to surveys by market researchers at Omdia (formerly IHS), growth in the display surface area was negative at around -2.0% in 2020 (previous year: +4.2%). This was primarily due to the low level of demand for televisions and mobile phones as a result of the weaker consumer demand in connection with Covid-19, as well as the trade dispute between the United States and China. Liquid crystals will continue to play a key role in the display industry in the future. OLED technology, for which we are also one of the leading material suppliers, is becoming increasingly important in high-end display applications.

The markets for automotive coatings and cosmetics are crucial to our Surface Solutions business. Global automobile production fell by -16.7% in 2020 (previous year: -5.6%). Factory closures in response to Covid-19, supply chain interruptions and a slump in consumer demand are the main reasons for this development. In China, one of the most important markets, the recovery has already progressed well, whereas in Europe and North America the markets are not yet on the pre-Covid-19 level.

The market for cosmetics and care products fell by -2.5% overall in 2020 (previous year: +2.0%). Our relevant market of color cosmetics declined by as much as -8.4% in 2020 due to Covid-19-related effects such as lockdowns and social distancing. The trade conflicts between the United States and China and uncertainties in connection with Brexit also served to slow market growth further.

Review of Forecast against Actual Business Developments

The forecast of the Group for fiscal 2020 published in the Annual Report for fiscal 2019 comprised the forecast for the Group as well as the forecast for the three business sectors: Healthcare, Life Science, and Performance Materials.

Net sales

We forecast solid organic net sales growth for the Group in 2020. Over the course of the year, the Group reported more dynamic organic sales growth, driven by the strong organic growth of the Life Science business sector in particular. This meant we slightly exceeded our forecast with strong overall organic net sales growth of 6.0% in fiscal 2020. At the start of the year, we still anticipated a slightly negative to slightly positive exchange rate effect on our net sales. However, several currencies saw increasingly unfavorable development as the year progressed, particularly the US dollar. The negative exchange rate effect in 2020 as a whole was -2.6% and thus slightly outside our most recent update in the third quarter, which provided for a range of -3% to -4%. The positive portfolio effect of 5.3% was primarily due to the acquisition of Versum Materials and developed in line with our original assessment.

Healthcare

We originally forecast solid organic sales growth for our Healthcare business sector compared with the previous year. Despite the impact of the Covid-19 pandemic, the business sector recorded moderate organic growth of 3.4% in 2020 as a whole. This was slightly above the forecast we updated in the third quarter, which provided for organic growth of between 2% and 3%. This development was driven in particular by the significant growth contribution of our most recently approved products, especially Mavenclad®. Together with the positive sales performance of the rest of our base business, this more than offset the downturn in sales in the fertility business in the second quarter as a result of Covid-19.

Life Science

Our Life Science business sector significantly exceeded our original forecast, generating organic sales growth of 11.8% in 2020. Following an especially strong fourth quarter, this was also above the most recently updated range of 9% to 10%. Thanks in particular to the extreme relevance of our product and service range in the context of the pandemic, Process Solutions was the most dynamic business unit, as expected, and delivered the largest contribution to organic sales growth within Life Science. Applied Solutions and Research Solutions also contributed positively to the organic sales performance, as anticipated, albeit to a considerably lesser extent than Process Solutions.

Performance Materials

Since we expected the growth in semiconductor business to exceed the downturn in sales in the Display Solutions business unit, we originally forecast slight organic growth for our Performance Materials business sector. In light of the impact of Covid-19 on our display, automotive, and cosmetics end markets in the first quarter, we were forced to significantly downgrade our forecast to a moderate to strong organic decline. Our key assumption of high growth momentum in the Semiconductor Solutions business unit proved to be correct. Thanks to a particularly strong fourth quarter for Semiconductor Solutions in particular, the business sector closed the year with an organic sales decline of -3.2%, ahead of our most recent forecast of between -4% and -5%. As consistently forecast, the portfolio effect of 35.4% primarily resulting from the Versum Materials acquisition, was in the mid-thirties percentage range.

EBITDA pre

For 2020, we originally forecast strong year-on-year organic growth in EBITDA pre for the Group. This assumption was based on the expectation of strong organic growth in Life Science, supported by solid organic growth in Healthcare and slight organic growth in Performance Materials. Furthermore, because of the expected unfavorable foreign exchange environment, we still expected moderate negative exchange rate effects to burden EBITDA pre by between 0% and -3% compared with the prior year. In 2020, EBITDA pre amounted to € 5,201 million, equivalent to an increase of 18.6% compared with the prior year (2019: € 4,385 million). The organic growth of 16.8% included in this figure was slightly above the forecast range of 14% to 16% we issued in the third quarter of 2020. Both figures included € 365 million from the reversal of a provision for a patent dispute. However, exchange rate effects had a more negative impact than expected at the start of the year, which is why we narrowed our forecast range to between -3% and -5% in our reporting over the course of the year. We ultimately closed 2020 at -4.6%.

Healthcare

For our Healthcare business sector, we originally forecast solid year-on-year organic growth in EBITDA pre thanks to substantial anticipated earnings contributions from our new products, particularly Mavenclad®, and a decline in marketing and selling expenses and development expenses in relation to sales. This was expected to offset the effect of the forecast downturn in sales of Rebif®. In light of the impact of Covid-19 on our fertility business in particular in the first quarter, we significantly downgraded our forecast to a slight organic decline. In 2020, EBITDA pre in the Healthcare business sector amounted to € 2,267 million thanks to a rapid recovery from the middle of the year onward (2019: € 1,922 million). This is equivalent to an increase of 18.0% over 2019; the organic rise of 26.6% corresponded to the upper end of the forecast range we issued at the end of the year. Both figures included € 365 million from the reversal of a provision for a patent dispute. By contrast, the foreign exchange effect on EBITDA pre in 2020 as a whole was substantially more negative than expected at the start of the year at -8.5%, although this was within the range of between -7% and -9% to which we had adjusted in the course of our reporting on the third quarter of 2020.

Life Science

For the Life Science business sector, we originally forecast strong organic growth in EBITDA pre on the back of the expected organic sales growth and a slight improvement in margins. However, the impact of the Covid-19 pandemic on the three Life Science business units became increasingly evident as the year progressed. Thanks to a particularly strong fourth quarter, EBITDA pre amounted to € 2,405 million in fiscal 2020 and year-on-year organic growth came in at 17.2%, thereby exceeding the forecast range that had already been significantly raised to between 13% and 15% in the course of our reporting on the third quarter. Foreign exchange development impacted EBITDA pre in the Life Science business sector by -3.8%, thereby developing in line with our most recent forecast.

Performance Materials

Due to the expected sales growth accompanied by the Bright Future transformation program, we also originally forecast slight organic growth in EBITDA pre in the Performance Material business sector. In the light of the impact of Covid-19 on our display, automotive, and cosmetics end markets in the first quarter, we were forced to significantly downgrade our forecast to an organic decline in the low to mid-teens percentage range. Thanks to sustained positive development in our semiconductor business, we most recently raised our forecast to an organic decline of between -6% and -9%. For 2020 as a whole, Performance Materials achieved an EBITDA pre of € 1,024 million (2019: € 803 million). This represented an organic decline of -7.5% compared with the previous year, which was within our most recent forecast range of -6% to -9%. As consistently forecast, the portfolio effect of 36.3% primarily resulting from the Versum Materials acquisition was in the mid-thirties percentage range. The foreign exchange effect of -1.3% was also at the upper end of our forecast range from the third quarter of -1% to -3%.

Corporate and Other

EBITDA pre of Corporate and Other amounted to € -495 million in fiscal 2020, thus exceeding the forecast range of € -460 million to € -490 million that we specified in the reporting on the third quarter of 2020. Compared with the prior-year figure of € -469 million, this corresponded to a rise in costs of 5.5%. The higher expenditures compared to the last forecast were mainly due to higher losses from our currency hedging transactions.

Business free cash flow

We originally expected the business free cash flow of the Group to see an increase in the mid-twenties percentage range in 2020. Even excluding the € 365 million reversal of a provision for a patent dispute, this forecast was achieved with growth of 24.5% to € 3,400 million (2019: € 2,732 million). Including the reversal of the provision in the amount of € 365 million, business free cash flow rose by 37.8% to € 3,765 million.

The year-on-year increase of 22.2% in the Healthcare business sector (less € 365 million from the reversal of provisions) exceeded the growth in the low double-digit teens percentage range that we forecast at the start of the year. At € 1,895 million (including € 365 million from the reversal of provisions), it was also above the third quarter forecast range of between € 1,625 million and € 1,775 million. At 16.0%, business free cash flow in the Life Science business sector fell below the original forecast range of growth in the low to mid-twenties percentage range. At € 1,595 million, it also fell slightly short of the range of € 1,600 million to € 1,750 million that we forecast in the third quarter. In the Performance Materials business sector, we originally forecast growth rates in the low thirties percentage range, which we achieved with an increase of 32%. At € 847 million, Performance Materials also fell within the third quarter forecast range of between € 770 million and € 870 million.

Group

	Net sales	EBITDA pre	Business free cash flow	EPS pre
Actual results 2019 in € million	16,152	4,385	2,732	€ 5.56
Forecast for 2020 in the 2019 Annual Report	- Solid organic growth - Portfolio effect in the mid-single-digit percentage range - Slightly negative foreign exchange effect of 0% to -3%	- Strong organic growth - Positive portfolio effect in the mid-single-digit percentage range - Slightly negative foreign exchange effect of 0% to -3%	Percentage growth in the mid-twenties percentage range	
Main comments	- Organic growth driven by Healthcare and Life Science; Performance Materials with slight organic growth - Positive portfolio effect in the mid-single-digit percentage range, mainly resulting from the acquisition of Versum Materials - Foreign exchange effect due to emerging market currencies and the US Dollar	- Strong organic growth in Life Science supported by solid organic growth in Healthcare and Performance Materials with slight organic growth - Realization of synergies from the integration of Versum Materials in Performance Materials as planned - Foreign exchange effect due to emerging market currencies and the US Dollar	Rise in EBITDA pre and positive effects from working capital; higher investments in property, plant, and equipment	
Forecast for 2020 in the interim report:				
Q1/2020	~16,800 to 17,800 - Slight to moderate organic growth - Portfolio effect in the mid-single-digit percentage range - Exchange rate effect of -2% to +1%	~4,350 to 4,850 - Stable organic development - Positive portfolio effect in the mid-single-digit percentage range - Slightly adverse foreign exchange effect of 0% to -3%	~2,650 to 3,250 Slight to strong increase	€ 5.50 to € 6.35
Q2/2020	~16,900 to 17,700 - Slight to moderate organic growth - Portfolio effect in the mid-single-digit percentage range - Exchange rate effect of -2% to +0%	~4,450 to 4,850 - Slight to moderate organic growth - Positive portfolio effect in the mid-single-digit percentage range - Negative foreign exchange effect of -4% to -2%	~2,750 to 3,200 Stable to strong increase	€ 5.60 to € 6.25
Q3/2020	~17,100 to 17,500 - Organic growth between 4% and 5% - Portfolio effect in the mid-single-digit percentage range - Exchange rate effect of -2% to -3%	~5,050 to 5,250 (thereof income from the release of a provision for a patent dispute + 365 million) - Organic growth between 14% and 16% (excluding income from a release of a provision between 6% and 8%) - Positive portfolio effect in the mid-single-digit percentage range - Negative foreign exchange effect of -3% to -5%	~3,475 to 3,775 (thereof from the release of a provision for a patent dispute + 365 million) Growth in the low to mid-thirties percentage range (excluding release of a provision: increase in the high teens to low twenties percentage range)	€ 6.50 to € 6.80 – thereof € 0.63 from the release of a provision for patent litigation
Results 2020 in € million	**17,534 (+8.6%: +6.0% organic, +5.3% portfolio, -2.6% currency)**	**5,201 (+18.6%: +16.8% organic, +6.4% portfolio, -4.6% currency)**	**3,765 +37.8%**	**€ 6.70 +20.5%**

Healthcare

	Net sales	EBITDA pre	Business free cash flow
Actual results 2019 in € million	6,714	1,922	1,252
Forecast for 2020 in the 2019 Annual Report	- Solid organic growth - Slightly negative foreign exchange effect	- Solid organic growth - Moderate negative foreign exchange effect	Increase in the low-double-digit teens percentage range
Main comments	- Stable development of the base business in organic terms - Substantial growth contribution by our newly approved products, particularly Mavenclad® - Negative foreign exchange effect due to foreign exchange developments in several growth markets and of the US Dollar	- Expected substantial earnings contributions from our new products, especially Mavenclad®, offset negative mix effects associated with the projected decline in Rebif® sales - Marketing and selling expenses as well as research and development costs decrease in percent of sales due to systematic cost management and strict pipeline prioritization - Negative foreign exchange effect due to foreign exchange developments in several growth markets and of the US Dollar	- Rise in EBITDA pre - Improved management of working capital offsets higher investments in property, plant and equipment
Forecast for 2020 in the interim report:			
Q1/2020	- Organic stable - Adverse portfolio effect in the mid-double-digit million range - Neutral to moderately adverse foreign exchange effect	- Organic slightly negative - Slightly to moderately adverse foreign exchange effect	Moderate decline
Q2/2020	- Slight organic growth - Adverse portfolio effect in the mid-double-digit million range - Slight to moderately adverse foreign exchange effect	- Organic stable - Significantly negative foreign exchange effect	Stable to slight decline
Q3/2020	~6,500 to 6,700 - Organic growth of 2% to 3% - Adverse portfolio effect in the mid-double-digit million range - Negative foreign exchange effect of between -3% and -4%	~2,220 to 2,290 (thereof income from the release of a provision for a patent dispute + 365 million) - Organic growth between 25% and 27% (excluding income from the release of a provision 6% and 8%) - Foreign exchange effect of between -7% and -9%	~1,625 to 1,775 (thereof income from the release of a provision for a patent dispute + 365 million) - Growth in the mid-thirties percentage range (excluding release of a provision: increase in the mid-single-digit percentage range)
Results 2020 in € million	**6,639 (-1.1%: +3.4% organic, -0.9% portfolio, -3.6% currency)**	**2,267 (+18.0%: +26.6% organic, -0.1% portfolio, -8.5% currency)**	**1,895 +51.4%**

Life Science

	Net sales	EBITDA pre	Business free cash flow
Actual results 2019 in € million	6,864	2,129	1,375
Forecast for 2020 in the 2019 Annual Report	- Strong organic growth - Slightly negative foreign exchange effect	- Strong and profitable organic earnings growth - Foreign exchange effect slightly negative	Strong increase in the low- to mid-twenties percentage range
Main comments	- All businesses contribute to growth - Process Solutions remains the main driver of growth, followed by Applied Solutions - Negative foreign exchange effect on account of the US Dollar and foreign exchange developments in several growth markets	- Organic earnings growth on account of the expected sales growth and slight margin improvement - Negative foreign exchange effect due to the trend of exchange rates on several growth markets	- Rise in EBITDA pre - Improved management of working capital - On the other hand, increase in capital spending on strategic projects
Forecast for 2020 in the interim report			
Q1/2020	- Strong organic growth - Neutral to slightly adverse foreign exchange effect	- Strong organic growth - Neutral to moderately adverse foreign exchange effect	Increase in the low-tens range percentage
Q2/2020	- Strong organic growth - Slightly negative foreign exchange effect	- Strong organic earnings growth - Moderately negative foreign exchange effect	Increase in the low-tens percentage range
Q3/2020	~7,250 to 7,450 - Organic growth between 9% and 10% - Exchange rate effect of -2% to -3%	~2,300 to 2,370 - Organic growth between 13% and 15% - Foreign exchange effect between of -3% and -4%	~1,600 to 1,750 - Increase in the low-twenties percentage range
Results 2020 in € million	**7,515 (+9.5%: +11.8% organic, 0.0% portfolio, -2.3% currency)**	**2,405 (+13.0%: +17.2% organic, -3.8% portfolio, -0.5% currency)**	**1,595 +16.0%**

Performance Materials

	Net sales	EBITDA pre	Business free cash flow
Actual results 2019 in € million	2,574	803	641
Forecast for 2020 in the 2019 Annual Report	- Slight organic growth - Portfolio effect in the low- to mid-thirties percentage range - Slightly negative foreign exchange effect	- Slight organic growth - Portfolio effects in the low- to mid-thirties percentage range - Slightly negative foreign exchange effect	Increase with growth rates in the low-thirties percentage range
Main comments	- Strong growth momentum in the Semiconductor Solutions business unit - Continued price decline in Liquid Crystals business, slightly mitigated by a volume increase - Slight growth of Surface Solutions - Portfolio effects due to Versum Materials in the low to mid-thirties percentage range, no material portfolio effect from Intermolecular - Negative foreign exchange effect due to the trend of exchange rates on several growth markets and of the US Dollar	- Growth in Semiconductor Solutions could offset price decline in Liquid Crystals supported by active cost management - Versum Materials earnings contribution in the low to mid-thirties percentage range leads to slight margin improvement - Planned realization of synergies of around € 25 million from the integration of Versum Materials - Negative foreign exchange effect due to the foreign exchange developments in several growth markets and of the US Dollar	Rise in EBITDA pre including the contribution from Versum Materials, reduced by higher capital investments
Forecast for 2020 in the interim report			
Q1/2020	- Moderate to strong organic decline - Portfolio effect in the low- to mid-thirties percentage range - Slightly positive foreign exchange effect	- Organic decline in the low to mid-teens percentage range - Portfolio effect in the low to mid-thirties percentage range - Moderately positive foreign exchange effect	Increase with growth rates in the low-twenties percentage range
Q2/2020	- Moderate to strong organic decline - Portfolio effect in the mid-thirties percentage range - Neutral to slightly positive foreign exchange effect	- Organic decline in the low teens percentage range - Portfolio effect in the mid-thirties percentage range - Slightly positive foreign exchange effect	Increase with growth rates in the low-twenties percentage range
Q3/2020	~3,250 to 3,400 - Organic decline between -4% and -5% - Portfolio effect in the mid-thirties percentage range - Exchange rate effect of 0% to -2%	~980 to 1,030 - Organic decline between -6% and -9% - Portfolio effect in the mid-thirties percentage range - Foreign exchange effect between -1% and -3%	~770 to 870 - Increase with growth rates in the high-twenties percentage range
Results 2020 in € million	**3,380 (+31.3%: -3.2% organic, +35.4% portfolio, -0.9% currency)**	**1,024 (+27.5%: -7.5% organic, +36.3% portfolio, -1.3% currency)**	**847 +32.1%**

Corporate and Other

	EBITDA pre	Business free cash flow
Actual results 2019 in € million	-469	-536
Forecast for 2020 in the 2019 Annual Report	We expect Corporate and Other to be below the prior year in fiscal 2020. This is mainly due to a substantially lower burden from foreign currency hedging, which will partly offset opposing foreign exchange effects in the sectors.	
Main comments		
Forecast for 2020 in the interim report		
Q1/2020	Slightly higher than in 2019	
Q2/2020	Costs slightly below the year-earlier level	
Q3/2020	~-440 to -460 - Costs slightly below the year-earlier level	~-510 to -550
Results 2020 in € million	**-495 (+5.5%: +17.7% organic, -0.4% portfolio, -11.8% currency)**	**-571 +6.6%**

Course of Business and Economic Position

Group

Overview of 2020

- Group net sales up € 1.4 billion or 8.6% to € 17.5 billion (2019: € 16.2 billion)
- Organic (6.0%) and acquisition-related (5.3%) sales growth offset by negative exchange rate effects (-2.6%)
- Group EBITDA pre increases by 18.6% to € 5.2 billion (2019: € 4.4 billion); this includes income of € 365 million from the release of a provision for patent dispute
- Profitable growth for the Group: EBITDA pre margin rises to 29.7% (2019: 27.1%)
- Earnings per share pre increases by 20.5% to € 6.70 (2019: € 5.56)
- Business free cash flow of the Group amounts to € 3.8 billion (2019: € 2.7 billion)
- Reduction in net financial debt of 13.0% to € 10.8 billion (December 31, 2019: € 12.4 billion)

Group

Key figures

			Change	
€ million	**2020**	2019	€ million	%
Net sales	17,534	16,152	1,383	8.6%
Operating result (EBIT)[1]	2,985	2,120	865	40.8%
Margin (% of net sales)[1]	17.0%	13.1%		
EBITDA[1]	4,923	4,066	857	21.1%
Margin (% of net sales)[1]	28.1%	25.2%		
EBITDA pre[1]	5,201	4,385	817	18.6%
Margin (% of net sales)[1]	29.7%	27.1%		
Profit after tax	1,994	1,324	670	50.6%
Earnings per share (€)	4.57	3.04	1.53	50.3%
Earnings per share pre (€)[1]	6.70	5.56	1.14	20.5%
Business free cash flow[1]	3,765	2,732	1,033	37.8%

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

Development of sales and results of operations

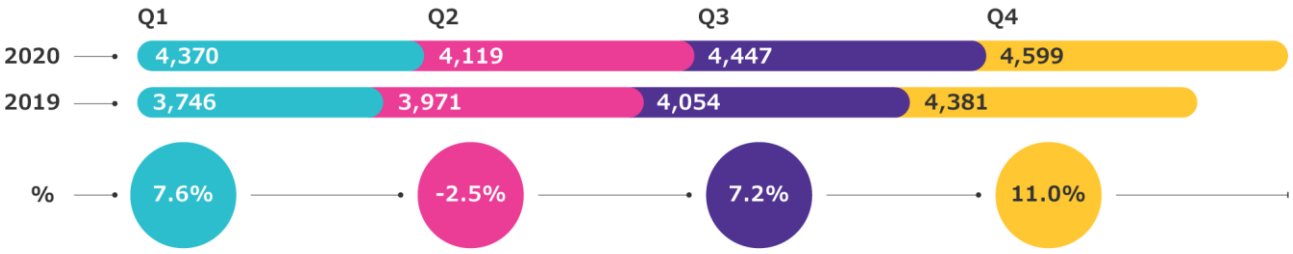
In fiscal 2020, the Group generated net sales of € 17,534 million (2019: € 16,152 million), representing a year-on-year increase of € 1,383 million or 8.6%. This positive development was attributable to organic sales growth in the Life Science and Healthcare business sectors as well as acquisition-related sales growth in the Performance Materials business sector. Group-wide organic net sales growth totaled € 961 million or 6.0% in fiscal 2020. Information on the impact of the Covid-19 pandemic on net sales can be found in the sections on the individual business sectors. Exchange rate effects negatively impacted net sales in the amount of € -428 million or -2.6% in fiscal 2020. They resulted in particular from the U.S. dollar, the Brazilian real, and the Chinese renminbi. Group net sales rose by € 849 million or 5.3% due to portfolio changes in the year under review. This was primarily due to the acquisition of Versum Materials, Inc., United States (Versum Materials), which was completed on October 7, 2019, and which supplements the semiconductor business of the

Performance Materials business sector. The disposal of the Allergopharma allergy business effective March 31, 2020, served to reduce net sales in the Healthcare business sector.

The net sales in the individual quarters as well as the respective organic growth rates in 2020 are presented in the following graph:

Group

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

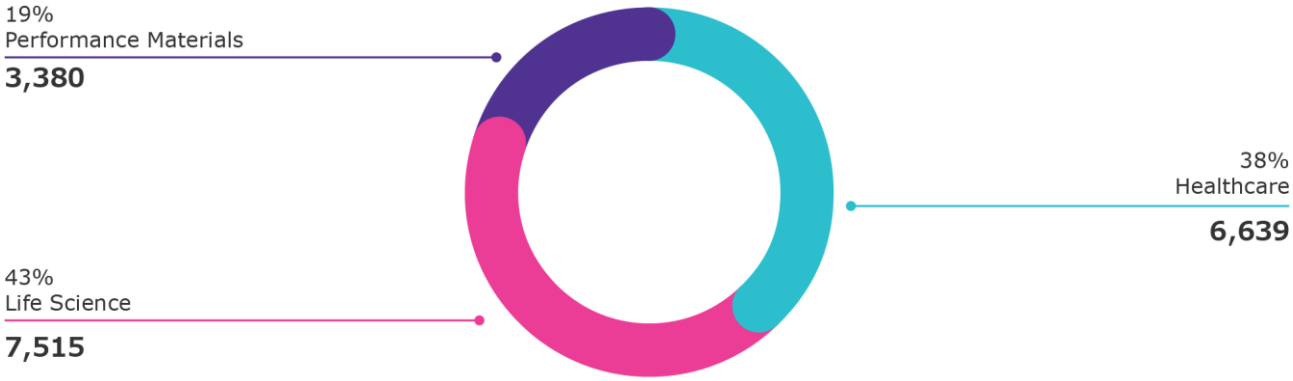


[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Quarterly breakdown unaudited.

The Life Science business sector increased its net sales by 9.5% year-on-year to € 7,515 million (2019: € 6,864 million). Double-digit organic growth of 11.8% was offset by negative exchange rate effects of -2.3%. Accounting for 43% of Group sales (2019: 42%), Life Science was the strongest business sector in terms of net sales. The net sales of the Healthcare business sector declined by -1.1% to € 6,639 million in fiscal 2020 (2019: € 6,714 million). This was due to negative exchange rate and portfolio effects, which exceeded the organic growth of 3.4%. Accordingly, the share of Group sales attributable to Healthcare fell by 4 percentage points to 38% (2019: 42%). The 31.3% increase in Performance Materials sales to € 3,380 million (2019: € 2,574 million) was primarily attributable to the acquisition of Versum Materials. In organic terms, net sales declined by -3.2%. The share of the Group's net sales attributable to Performance Materials increased by 3 percentage points to 19% (2019: 16%).

Group

Net sales by business sector – 2020
€ million/% of net sales



Group

Net sales by business sector

€ million	2020	Share	Organic growth[1]	Exchange rate effects	Acquisitions/ divestments	Total change	2019	Share
Healthcare	6,639	38%	3.4%	-3.6%	-0.9%	-1.1%	6,714	42%
Life Science	7,515	43%	11.8%	-2.3%	–	9.5%	6,864	42%
Performance Materials	3,380	19%	-3.2%	-0.9%	35.4%	31.3%	2,574	16%
Group	17,534	100%	6.0%	-2.6%	5.3%	8.6%	16,152	100%

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

In fiscal 2020, the Group recorded the following regional sales performance:

Group

Net sales by region

€ million	2020	Share	Organic growth[1]	Exchange rate effects	Acquisitions/ divestments	Total change	2019	Share
Europe	4,991	29%	6.8%	-1.1%	-0.3%	5.4%	4,735	29%
North America	4,739	27%	9.7%	-2.4%	5.2%	12.5%	4,214	26%
Asia-Pacific (APAC)	6,313	36%	3.0%	-1.4%	11.1%	12.7%	5,599	35%
Latin America	910	5%	7.8%	-18.0%	0.1%	-10.1%	1,012	6%
Middle East and Africa (MEA)	581	3%	-3.0%	-2.2%	3.5%	-1.7%	591	4%
Group	17,534	100%	6.0%	-2.6%	5.3%	8.6%	16,152	100%

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

The Consolidated Income Statement of the Group is as follows:

Group

Consolidated Income Statement

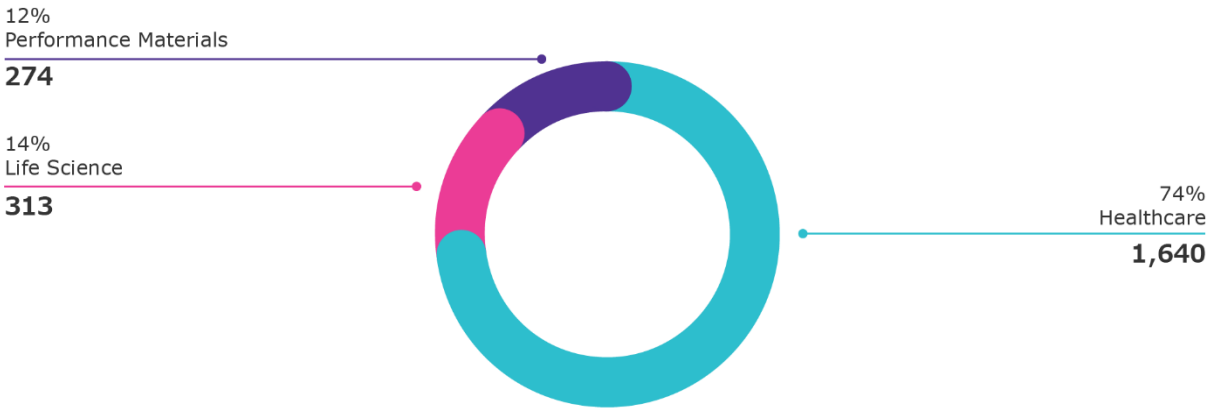
					Change	
€ million	2020	%	2019	%	€ million	%
Net sales	**17,534**	**100.0%**	**16,152**	**100.0%**	**1,383**	**8.6%**
Cost of sales	-6,835	-39.0%	-6,006	-37.2%	-829	13.8%
Gross profit	**10,699**	**61.0%**	**10,145**	**62.8%**	**554**	**5.5%**
Marketing and selling expenses	-4,207	-24.0%	-4,576	-28.3%	369	-8.1%
Administration expenses	-1,188	-6.8%	-1,154	-7.1%	-34	3.0%
Research and development costs	-2,288	-13.0%	-2,268	-14.0%	-20	0.9%
Impairment losses and reversals of impairment losses on financial assets (net)	-6	0.0%	-8	0.0%	2	-24.8%
Other operating income and expenses	-25	-0.1%	-19	-0.1%	-6	31.8%
Operating result (EBIT)[1]	**2,985**	**17.0%**	**2,120**	**13.1%**	**865**	**40.8%**
Financial result	-354	-2.0%	-385	-2.4%	30	-7.9%
Profit before income tax	**2,630**	**15.0%**	**1,735**	**10.7%**	**895**	**51.6%**
Income tax	-637	-3.6%	-440	-2.7%	-197	44.8%
Profit after tax from continuing operations	**1,994**	**11.4%**	**1,296**	**8.0%**	**698**	**53.9%**
Profit after tax from discontinued operation	**–**	**0.0%**	**28**	**0.2%**	**-28**	**-100.0%**
Profit after tax	**1,994**	**11.4%**	**1,324**	**8.2%**	**670**	**50.6%**
Non-controlling interests	-7	0.0%	-3	0.0%	-3	96.4%
Net income	**1,987**	**11.3%**	**1,320**	**8.2%**	**667**	**50.5%**

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

The positive business performance in the year under review led to an increase of 5.5% in the gross profit to € 10,699 million (2019: € 10,145 million). The resulting gross margin of the Group, i.e. gross profit as a percentage of net sales, amounted to 61.0% (2019: 62.8%). The -8.1% reduction in marketing and selling expenses to € 4,207 million (2019: € 4,576 million) was attributable to the Healthcare business sector (see "Healthcare" section). Group-wide research and development (R&D) costs rose slightly year-on-year to € 2,288 million in fiscal 2020 (2019: € 2,268 million) and led to a research spending ratio (research and development costs as a percentage of net sales) of 13.0% (2019: 14.0%). Accounting for 74% (2019: 75%) of Group R&D spending, Healthcare remained the most research-intensive business sector of the Group.

Group

Research and development costs by business sector[1] – 2020
€ million/%



[1] Not presented: research and development costs of € 62 million allocated to Corporate and Other.

Detailed information about the development and composition of other operating expenses and income can be found in Note (13) "Other operating income" and Note (14) "Other operating expenses" in the Notes to the Consolidated Financial Statements.

An increase in provisions for obligations under long-term variable compensation programs (Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany) had an adverse effect on the operating result in the year under review, with the rise in the intrinsic value of the Share Units of Merck KGaA, Darmstadt, Germany, being reflected in the respective functional costs depending on the area of activity of the plan beneficiaries.

The financial result improved by 7.9% to € -354 million in fiscal 2020 (2019: € -385 million) which was particularly attributable to lower interest expenses. Details about the development of the finance income and finance expenses of the Group can be found in Note (40) "Financial income and expenses/Net profit and losses from financial instruments" in the Notes to the Consolidated Financial Statements.

Income tax expense amounted to € 637 million in 2020 (2019: € 440 million) and resulted in a tax rate of 24.2% (2019: 25.3%). Further information on income taxes can be found in Note (15) "Income taxes" in the Notes to the Consolidated Financial Statements.

The profit after tax from discontinued operations reported in the previous year in the amount of € 28 million was due to subsequent effects in connection with the sale of the Consumer Health business in December 2018.

The net income attributable to Merck KGaA, Darmstadt, Germany, shareholders increased by 50.5% to € 1,987 million (2019: € 1,320 million) and resulted in a corresponding improvement in earnings per share to € 4.57 in fiscal 2020 (2019: € 3.04).

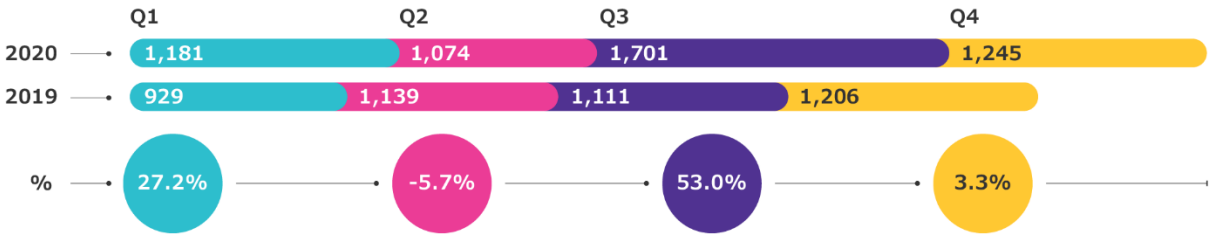
EBITDA pre, the key financial indicator used to steer operating business, rose by € 817 million, or 18.6%, to € 5,201 million (2019: € 4,385 million). Organic earnings growth, which also includes income from the release

of a provision for patent dispute in the amount of € 365 million (see Note (27) “Other provisions” in the Notes to the Consolidated Financial Statements), amounted to 16.8%. Portfolio effects – primarily resulting from the acquisition of Versum Materials – led to a 6.4% increase in EBITDA pre in fiscal 2020. This was offset by negative exchange rate effects of -4.6%. Relative to net sales, the Group recorded an EBITDA pre margin of 29.7% (2019: 27.1%). The reconciliation of the operating result (EBIT) to EBITDA pre is presented in the chapter entitled “Internal Management System”.

The development of EBITDA pre in the individual quarters in comparison with 2019 as well as the respective growth rates are presented in the following overview:

Group

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



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

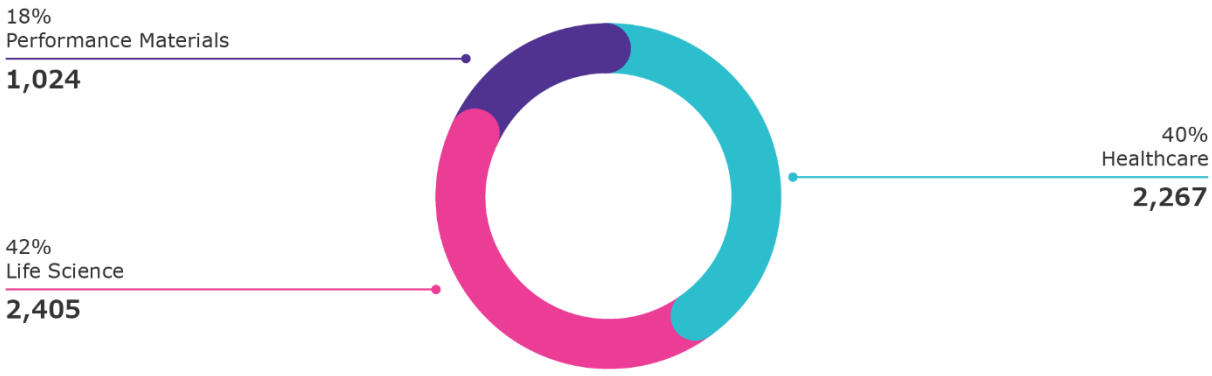
All business sectors contributed to the growth in Group EBITDA pre. Life Science generated EBITDA pre of € 2,405 million, up 13.0% on the previous year (2019: € 2,129 million). This meant the EBITDA pre margin in the Life Science business sector increased to 32.0% in fiscal 2020 (2019: 31.0%). The share of Group EBITDA pre attributable to the Life Science business sector (not taking into account the € -495 million reduction due to Corporate and Other) amounted to 42% in the year under review (2019: 44%).

EBITDA pre in the Healthcare business sector increased by 18.0% to € 2,267 million (2019: € 1,922 million). The resulting EBITDA pre margin improved substantially to 34.1% (2019: 28.6%). The share of Group EBITDA pre attributable to Healthcare remained unchanged year-on-year at 40%.

In fiscal 2020, the Performance Materials business sector benefited considerably from the acquisition of Versum Materials in October 2019, reporting a 27.5% increase in EBITDA pre to € 1,024 million (2019: € 803 million). Accordingly, the share of Group EBITDA pre attributable to Performance Materials rose by 2 percentage points to 18% (2019: 16%). The EBITDA pre margin declined slightly to 30.3% (2019: 31.2%).

Group

EBITDA pre[1] by business sector[2] – 2020
€ million/%



[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Not presented: Decline in Group EBITDA pre by €-495 million due to Corporate and Other.

Group

Balance sheet structure[1]

	Dec. 31, 2020		Dec. 31, 2019		Change	
	€ million	**%**	€ million	%	€ million	%
Non-current assets	**32,516**	**77.8%**	**34,805**	**79.4%**	**-2,289**	**-6.6%**
thereof:						
Goodwill	15,959		17,114		-1,155	
Other intangible assets	7,653		9,221		-1,567	
Property, plant and equipment	6,421		6,192		229	
Other non-current assets	2,483		2,278		205	
Current assets	**9,280**	**22.2%**	**9,003**	**20.6%**	**277**	**3.1%**
thereof:						
Inventories	3,294		3,342		-48	
Trade and other current receivables	3,221		3,488		-267	
Other current financial assets	125		57		68	
Other current assets	1,286		1,336		-51	
Cash and cash equivalents	1,355		781		575	
Total assets	**41,796**	**100.0%**	**43,808**	**100.0%**	**-2,012**	**-4.6%**
Equity	**17,017**	**40.7%**	**17,914**	**40.9%**	**-897**	**-5.0%**
Non-current liabilities	**15,548**	**37.2%**	**14,053**	**32.1%**	**1,496**	**10.6%**
thereof:						
Non-current provisions for employee benefits	3,880		3,194		686	
Other non-current provisions	281		254		27	
Non-current financial debt	9,785		8,644		1,141	
Other non-current liabilities	1,603		1,962		-359	
Current liabilities	**9,231**	**22.1%**	**11,842**	**27.0%**	**-2,610**	**-22.0%**
thereof:						
Current provisions	613		933		-320	
Current financial debt	2,357		4,550		-2,193	
Trade and other current payables/ refund liabilities	2,434		2,618		-185	
Other current liabilities	3,828		3,740		88	
Total equity and liabilities	**41,796**	**100.0%**	**43,808**	**100.0%**	**-2,012**	**-4.6%**

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

The total assets of the Group amounted to € 41,796 million as of December 31, 2020 (December 31, 2019: € 43,808 million), representing a decrease of -4.6% or € -2,012 million in fiscal 2020. The development of total assets was largely due to exchange rate changes, in particular the weaker US dollar at the reporting date. Working capital remained largely unchanged year-on-year at € 3,938 million (2019: € 3,944 million) despite the increase in the business volume in fiscal 2020.

Group

Working capital[1]

€ million	Dec. 31, 2020	Dec. 31, 2019	Change € million	Change %
Trade accounts receivable	3,052	3,174	-122	-3.8%
Receivables from royalties and licenses	24	45	-22	-47.8%
Inventories/right of return for goods already delivered	3,296	3,344	-47	-1.4%
Trade and other current payables/refund liabilities	-2,434	-2,618	185	-7.1%
Working capital[1]	**3,938**	**3,944**	**-6**	**-0.2%**

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

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

Group

Net financial debt[1]

€ million	Dec. 31, 2020	Dec. 31, 2019	Change € million	Change %
Bonds and commercial paper	9,642	10,059	-417	-4.1%
Bank loans	1,085	1,587	-501	-31.6%
Liabilities to related parties	817	809	8	1.0%
Loans from third parties and other financial debt	58	97	-39	-40.5%
Liabilities from derivatives (financial transactions)	102	76	26	34.2%
Lease liabilities	438	567	-129	-22.7%
Financial debt	**12,142**	**13,194**	**-1,052**	**-8.0%**
less:				
Cash and cash equivalents	1,355	781	575	73.6%
Other current financial assets[2]	28	50	-22	-43.4%
Net financial debt[1]	**10,758**	**12,363**	**-1,605**	**-13.0%**

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

[2] Excluding current derivatives (operational).

Group

Reconciliation of net financial debt[1]

€ million	2020	2019
Jan. 01	**12,363**	**6,701**
Currency translation difference	-189	79
Change in lease liabilities[2]	65	663
Dividend payments/profit withdrawals[3]	687	689
Acquisitions[3]	11	5,020
Payments for/proceeds from the disposal of assets held for sale[3]	-48	110
Transfer of financial debt due to acquisitions	–	966
Free cash flow[1]	-2,038	-1,889
Other	-93	24
Dec. 31	**10,758**	**12,363**

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

[2] In 2019 included € 465 million due to the first-time application of IFRS 16 as of January 1, 2019.

[3] According to the Consolidated Cash Flow Statement.

In fiscal 2020, the equity of the Group declined by -5.0% to € 17,017 million (December 31, 2019: € 17,914 million). This development was primarily due to negative currency translation effects as well as dividend payments and profit withdrawals. The profit after tax generated in fiscal 2020 was not sufficient to offset these effects (see "Consolidated Statement of Changes in Equity" in the Consolidated Financial Statements). The equity ratio declined only slightly to 40.7% (December 31, 2019: 40.9%). The composition of free cash flow as well as the development of the relevant items are presented in the following table:

Group

Free cash flow[1]

			Change	
€ million	**2020**	2019	€ million	%
Cash flow from operating activities according to the consolidated cash flow statement	3,477	2,856	621	21.7%
Payments for investments in intangible assets	-150	-208	58	-27.8%
Proceeds from the disposal of intangible assets	88	23	66	>100.0%
Payments for investments in property, plant and equipment	-1,413	-813	-600	73.8%
Proceeds from the disposal of property, plant and equipment	35	31	4	14.3%
Free cash flow[1]	**2,038**	**1,889**	**149**	**7.9%**

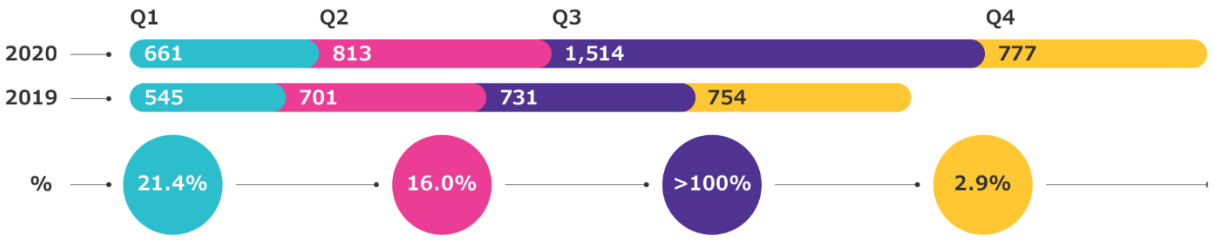
[1] Not defined by International Financial Reporting Standards (IFRS).

The business free cash flow of the Group rose by 37.8% to € 3,765 million in fiscal 2020 (2019: € 2,732 million). This was due in particular to the higher level of EBITDA pre and the development of inventories and receivables. The composition of business free cash flow is presented in the chapter entitled "Internal Management System".

The distribution of business free cash flow across the individual quarters and the percentage changes in comparison with 2019 were as follows:

Group

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



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

Group

Business free cash flow[1] by business sector[2] – 2020
€ million/%

[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Not presented: decline in Group business free cash flow by € -571 million due to Corporate and Other.

The contributions of the operating business sectors to Group business free cash flow developed as follows in fiscal 2020: The contribution of Healthcare increased by 51.4% to € 1,895 million (2019: € 1,252 million) and hence was the business sector with the highest cash flows, accounting for a 44% share (2019: 38%) of Group business free cash flow (not taking into account the € -571 million reduction due to Corporate and Other). In 2020, the Life Science business sector generated business free cash flow of € 1,595 million (2019: € 1,375 million), thus contributing a share of 37% to Group business free cash flow (2019: 42%). With business free cash flow of € 847 million (2019: € 641 million), Performance Materials contributed 19% (2019: 20%) to this Group key performance indicator.

Investments in property, plant, equipment, and software, as well as advance payments for intangible assets included in the calculation of business free cash flow, rose in 2020 by 40.2% to € 1,439 million (2019: € 1,026 million). The investments in property, plant, and equipment included therein amounted to € 1,344 million in 2020 (2019: € 1,104 million), of which € 858 million (2019: € 497 million) was attributable to strategic investment projects each with a project volume of more than € 2 million.

In 2020, strategic investments of € 168 million were made in Germany (2019: € 146 million), of which € 118 million related to the expansion of our site in Darmstadt. Among other things, the Performance Materials business sector invested € 15 million in a new research center and the Life Science business sector invested € 34 million in a new membrane production plant. The Life Science business sector also invested € 33 million in a new filling and logistics center in Schnelldorf.

Outside Germany, high levels of strategic investments were made in the United States (€ 366 million) and Switzerland (€ 162 million) in particular. The United States saw a Healthcare investment of € 27 million in the expansion of the research and development center in Billerica, Massachusetts, and a Life Science investment of € 36 million in a new manufacturing facility for gene therapy products in Carlsbad. In addition, the Life Science business sector acquired its previously leased company headquarters in Burlington, Massachusetts, for € 208 million. The same applies to the Performance Materials business sector, which purchased its previously leased facility in Tempe, Arizona, for € 18 million. In Switzerland, the Healthcare business sector invested € 85 million in a new development center to produce biotechnological products and € 41 million in a new production building for bottling these products.

Our credit ratings from the independent rating agencies did not change in 2020. Merck KGaA, Darmstadt, Germany, is currently rated by Standard & Poor's, Moody's, and Scope. Standard & Poor's has issued a long-term credit rating of A with a stable outlook, Moody's a rating of Baa1 with a stable outlook, and Scope a rating of A–, likewise with a stable outlook. An overview of the development of our rating in recent years is presented in the Report on Risks and Opportunities.

The development of key balance sheet figures was as follows:

Group

Key balance sheet figures

%		Dec. 31, 2020	Dec. 31, 2019	Dec. 31, 2018	Dec. 31, 2017	Dec. 31, 2016
Equity ratio[1]	Total equity / Total assets	40.7%	40.9%	46.7%	39.5%	36.7%
Asset ratio[1]	Non-current assets / Total assets	77.8%	79.4%	75.0%	79.1%	80.0%
Asset coverage[1]	Total equity / Non-current assets	52.3%	51.5%	62.3%	49.9%	45.9%
Finance structure[1]	Current liabilities / Liabilities (total)	37.3%	45.7%	43.3%	40.1%	37.5%

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

Overall assessment of business performance and economic situation

2020 was dominated by the global spread of Covid-19. The Group succeeded in mastering the unprecedented challenges this entailed, with the effectiveness of our business model and its three innovative business sectors proving its worth in the Covid-19 crisis.

Despite considerable obstacles in some business units as a result of the pandemic, the financial targets we had set for 2020 were reached or even exceeded. In particular, we recorded further profitable growth in fiscal 2020. Group net sales increased by 8.6% to € 17,534 (2019: € 16,152 million), while the key financial indicator used to steer our operating business, EBITDA pre, rose by as much as 18.6% to € 5,201 million (2019: € 4,385 million). All our business sectors contributed to this success.

Another milestone in our Healthcare business sector was the approval of our cancer immunotherapy Bavencio® by the U.S. Food and Drug Administration (FDA) for the treatment of patients with advanced urothelial carcinoma. We obtained additional approvals for Mavenclad® around the world, meaning that the product is now approved in more than 80 countries including in the European Union, the United States, Australia, Canada, and Switzerland. With the sale of our Allergopharma allergy business, we are now further heightening our focus on the development of innovative medicines for hard-to-treat diseases.

We also invested in research, development and production in the Life Science business sector in fiscal 2020. For example, we celebrated the topping-out ceremony for our new membrane facility in Darmstadt and announced the expansion of production sites in the United States.

In Performance Materials, we developed further into a leading player for materials-based solutions for the electronics market in 2020 as part of the “Bright Future” transformation program. Our current portfolio means we already occupy a strong position on the market for electronic materials, thanks in part to the acquisitions of Versum Materials and Intermolecular in 2019.

The solid financing policies of the Group are reflected in persistently good key balance sheet figures. The equity ratio was 40.7% on December 31, 2019 (December 31, 2019: 40.9%), and thus at a very good level. Having risen to € 12,363 million in the previous year due to the acquisition of Versum Materials, net financial debt was reduced by 13.0% in 2020 and amounted to € 10,758 million at the end of the fiscal year. So that we can continue to achieve a rapid reduction in financial liabilities, we are focusing on generating organic growth and on high inflows of financial resources from operating business activities.

Based on our solid net assets and financial position, and our profitable operations, we view the economic situation of the Group as positive overall. Our clear focus on science and technology means we are well positioned even in economically challenging times.

Healthcare

Healthcare

Key figures

€ million	2020	2019	Change € million	Change %
Net sales	6,639	6,714	-75	-1.1%
Operating result (EBIT)[1]	1,804	1,149	654	56.9%
Margin (% of net sales)[1]	27.2%	17.1%		
EBITDA[1]	2,184	1,896	288	15.2%
Margin (% of net sales)[1]	32.9%	28.2%		
EBITDA pre[1]	2,267	1,922	346	18.0%
Margin (% of net sales)[1]	34.1%	28.6%		
Business free cash flow[1]	1,895	1,252	643	51.4%

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

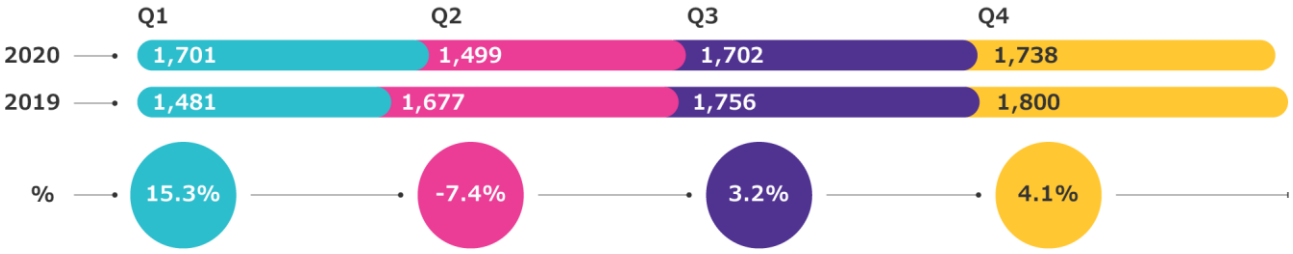
Development of sales and results of operations

In fiscal 2020, the Healthcare business sector recorded net sales of € 6,639 million (2019: € 6,714 million). Organic sales growth amounted to 3.4%. All in all, net sales decreased by -1.1% due to unfavorable exchange rate developments (-3.6%) and the disposal of the Allergopharma allergy business in the first quarter of 2020 (-0.9%). The exchange rate effect reflects the unfavorable development of various currencies against the euro, particularly the U.S. dollar, individual Latin American currencies, and the Russian ruble.

The net sales in the individual quarters as well as the respective organic growth rates in 2020 are presented in the following graph:

Healthcare

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



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

Net sales of the key product lines and products developed as follows in 2020:

Healthcare

Net sales by major product lines/products

€ million	2020	Share	Organic growth[1]	Exchange rate effects	Total change	2019	Share
Oncology	**1,116**	**17%**	**12.0%**	**-3.6%**	**8.4%**	**1,030**	**15%**
thereof: Erbitux®	891	13%	6.0%	-3.7%	2.3%	871	13%
thereof: Bavencio®	156	2%	57.4%	-4.9%	52.5%	103	2%
Neurology & Immunology	**1,662**	**25%**	**6.7%**	**-2.4%**	**4.3%**	**1,594**	**24%**
thereof: Rebif®	1,131	17%	-9.4%	-1.7%	-11.1%	1,273	19%
thereof: Mavenclad®	531	8%	70.5%	-5.2%	65.4%	321	5%
Fertility	**1,079**	**16%**	**-10.7%**	**-2.7%**	**-13.4%**	**1,247**	**19%**
thereof: Gonal-f®	630	9%	-12.7%	-2.5%	-15.2%	743	11%
General Medicine & Endocrinology	**2,585**	**39%**	**5.9%**	**-4.8%**	**1.1%**	**2,557**	**38%**
thereof: Glucophage®	903	14%	8.1%	-5.0%	3.1%	877	13%
thereof: Concor®	529	8%	4.4%	-4.7%	-0.2%	530	8%
thereof: Euthyrox®	455	7%	18.6%	-5.5%	13.1%	402	6%
thereof: Saizen®	234	4%	4.0%	-5.8%	-1.8%	238	4%
Other	**197**	**3%**				**287**	**4%**
Healthcare	**6,639**	**100%**	**3.4%**	**-3.6%**	**-1.1%**	**6,714**	**100%**

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

The oncology drug Erbitux® (cetuximab) posted organic sales growth of 6.0% in fiscal 2020. Taking into account negative exchange rate effects of -3.7%, global net sales of Erbitux® increased by 2.3% to € 891 million (2019: € 871 million). While China continued to see encouraging development following the addition of Erbitux® to the National Reimbursement Drug List (NRDL) in 2018, growth in the Asia-Pacific region as a whole stagnated as a result of the difficult competitive situation in Japan due to the launch of new drugs. The situation in the core European markets was also characterized by a difficult competitive environment, but positive effects from successful tenders resulted in moderate organic growth of 1.9%. All in all, Erbitux® sales in Europe amounted to € 404 million (2019: € 405 million). A partnership with Eli Lilly and Company, United States, also had a positive impact. Services performed for the production of cetuximab as part of this cooperation resulted in net sales in the United States in 2020.

In the area of immuno-oncology, sales of the oncology drug Bavencio® (avelumab) posted organic growth of 57.4%. Taking into account negative exchange rate effects of -4.9%, net sales of € 156 million were generated in 2020 (2019: € 103 million). This highly encouraging growth was due in particular to the approval granted for the first-line maintenance treatment of patients with locally advanced or metastatic urothelial carcinoma (UC) in the United States in June 2020. Bavencio® is the first immunotherapy to demonstrate an improvement in overall survival in a Phase III study compared with the standard treatment in the first-line setting for patients with locally advanced or metastatic urothelial carcinoma. Sales growth was also driven by the approval of Bavencio® in combination with axitinib for the treatment of patients with advanced renal cell carcinoma (RCC) in Europe and Japan in 2019.

Mavenclad®, for the oral short-course treatment of highly active relapsing multiple sclerosis, also made a substantial contribution to the encouraging organic growth in the Healthcare business sector. Mavenclad® posted net sales of € 531 million in fiscal 2020, almost double the figure recorded in the previous year (2019: € 321 million). In a market environment impacted by Covid-19, prescription rates for Mavenclad® declined temporarily. However, the second half of 2020 in particular saw strong signs of a recovery, supported by new safety data indicating that patients treated using Mavenclad® who acquire Covid-19 are not at an increased risk of severe outcomes. With the additional approvals obtained in 2020, Mavenclad® is now approved in more than 80 countries around the world.

Healthcare

Product sales and organic growth[1] of Rebif®, Glucophage® and Erbitux® by region – 2020

		Total	Europe	North America	Asia-Pacific (APAC)	Latin America	Middle East and Africa (MEA)
	€ million	1,131	331	705	11	34	50
Rebif®	Organic growth[1]	-9.4%	-2.3%	-11.2%	-3.2%	-2.4%	-28.1%
	Share	100%	29%	62%	1%	3%	5%
	€ million	903	123	–	543	128	110
Glucophage®	Organic growth[1]	8.1%	1.9%	–	8.4%	18.0%	2.1%
	Share	100%	14%	–	60%	14%	12%
	€ million	891	404	32.2	342	64	48
Erbitux®	Organic growth[1]	6.0%	1.9%	>100.0%	0.6%	15.9%	-2.0%
	Share	100%	45%	4%	39%	7%	5%

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

Sales of the drug Rebif®, which is used to treat relapsing forms of multiple sclerosis, saw an organic decline in net sales of -9.4% in fiscal 2020. This meant the long-term downward trend slowed temporarily in the year under review. Taking into account negative exchange rate effects of -1.7%, global net sales decreased to € 1,131 million (2019: € 1,273 million). The drop in sales was attributable to the persistently difficult competitive situation on the interferon market and the competition from alternative therapies, including oral dosage forms and high-efficacy therapies.

Fertility was the product line in the Healthcare business sector that was hardest hit by the Covid-19 pandemic. Gonal-f®, the leading recombinant hormone used in the treatment of infertility, saw an organic decline in net sales of -12.7% in 2020 that was exacerbated by negative exchange rate effects of -2.5%. As a result, global sales fell to € 630 million (2019: € 743 million). Despite signs of a recovery and isolated catch-up effects in the second half of 2020, only the North America region reported moderate organic growth of 2.7% in 2020, whereas full-year sales in the other regions were down compared to the previous year.

The General Medicine & Endocrinology franchise (including CardioMetabolic Care) recorded organic growth of 5.9% in fiscal 2020. The franchise includes medicines to treat cardiovascular diseases, thyroid disorders, diabetes, and growth disorders. Taking into account negative exchange rate effects of -4.8%, net sales in the General Medicine & Endocrinology franchise amounted to € 2,585 million (2019: € 2,557 million).

The diabetes drug Glucophage® from the General Medicine franchise became the second-strongest drug in the Healthcare product portfolio in terms of net sales, which increased to € 903 million (2019: € 877 million). This corresponds to organic growth of 8.1%, which was offset by negative exchange rate effects of -5.0%. The main driver of this development was positive performance in China and Latin America.

The beta-blocker Concor® also generated positive organic sales growth of 4.4%. However, negative exchange rate effects of -4.7% meant that total sales stagnated at € 529 million (2019: € 530 million).

Euthyrox®, a medicine to treat thyroid disorders, developed very favorably with organic sales growth of 18.6%. Taking into account negative exchange rate effects of -5.5%, net sales increased to € 455 million (2019: € 402 million).

Sales of the growth hormone Saizen® declined slightly to € 234 million in fiscal 2020 (2019: € 238 million). Organic growth of 4.0% was not enough to offset negative exchange rate effects of -5.8%.

Net sales of the Healthcare business sector by region in 2020 developed as follows:

Healthcare

Net sales by region

€ million	2020	Share	Organic growth[1]	Exchange rate effects	Acquisitions/ divestments	Total change	2019	Share
Europe	2,158	32%	1.1%	-2.0%	-2.8%	-3.7%	2,241	33%
North America	1,554	23%	7.8%	-2.3%	–	5.5%	1,474	22%
Asia-Pacific (APAC)	1,831	28%	2.4%	-1.5%	–	0.9%	1,816	27%
Latin America	641	10%	9.3%	-18.0%	–	-8.8%	702	11%
Middle East and Africa (MEA)	455	7%	-3.5%	-2.0%	–	-5.5%	482	7%
Healthcare	6,639	100%	3.4%	-3.6%	-0.9%	-1.1%	6,714	100%

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

The following table presents the composition of EBITDA pre in fiscal 2020 in comparison with 2019. The IFRS figures have been modified to reflect the elimination of adjustments included in the functional costs.

Healthcare

Reconciliation EBITDA pre[1]

	2020			2019			Change
€ million	IFRS	Elimination of adjustments	Pre[1]	IFRS	Elimination of adjustments	Pre[1]	Pre[1]
Net sales	**6,639**	**–**	**6,639**	**6,714**	**–**	**6,714**	**-1.1%**
Cost of sales	-1,613	7	-1,606	-1,605	–	-1,605	0.1%
Gross profit	**5,026**	**7**	**5,033**	**5,109**	**–**	**5,109**	**-1.5%**
Marketing and selling expenses	-1,664	47	-1,617	-2,305	3	-2,303	-29.8%
Administration expenses	-320	7	-313	-344	15	-329	-4.8%
Research and development costs	-1,640	24	-1,616	-1,666	2	-1,663	-2.9%
Impairment losses and reversals of impairment losses on financial assets (net)	-4	–	-4	-1	–	-1	>100.0%
Other operating income and expenses	406	-1	405	357	6	363	11.5%
Operating result (EBIT)[1]	**1,804**			**1,149**			
Depreciation/amortization/ impairment losses/reversals of impairment losses	381	-2	379	747	-1	746	-49.2%
EBITDA[1]	**2,184**			**1,896**			
Restructuring expenses	95	-95	–	17	-17	–	
Integration expenses/IT expenses	4	-4	–	13	-13	–	
Gains (-)/losses (+) on the divestment of businesses	-16	16	–	-5	5	–	
Acquisition-related adjustments	–	–	–	–	–	–	
Other adjustments	–	–	–	–	–	–	
EBITDA pre[1]	**2,267**	**–**	**2,267**	**1,922**	**–**	**1,922**	**18.0%**
of which: organic growth[1]							26.6%
of which: exchange rate effects							-8.5%
of which: acquisitions/ divestments							-0.1%

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

The gross profit of the Healthcare business sector after adjustments declined slightly to € 5,033 million (2019: € 5,109 million). This was largely due to the sales development. At 75.8%, the resulting gross margin was down slightly on the 2019 reporting period (76.1%).

Marketing and selling expenses after adjustments declined by -29.8% year-on-year to € 1,617 million (2019: € 2,303 million). The main reasons were lower costs due to the Covid-19 pandemic and the end of scheduled amortization in connection with purchase price allocation for the Serono acquisition in 2006. With investment requirements for our development portfolio being slightly lower at present, research and development costs declined by -2.9% to € 1,616 million in the year under review (2019: € 1,663 million). The change in other operating expenses and income was due to several factors. Earnings were positively affected in the amount of € 365 million as a result of the reversal of a provision for potential compensation payments for damages in connection with the patent dispute with Biogen Inc., United States (Biogen). This was offset by the end of the recognition of the upfront cash payment by Pfizer Inc., United States, from 2014. The 2019 reporting period was also positively influenced by the recognition of milestone payments of € 75 million from BioMarin Pharmaceutical Inc., United States, in connection with the sale of Palynziq™ rights in 2016 and € 90 million from the partnership with Pfizer following the extension of approval of Bavencio® for the treatment of advanced renal cell carcinoma in combination with axitinib.

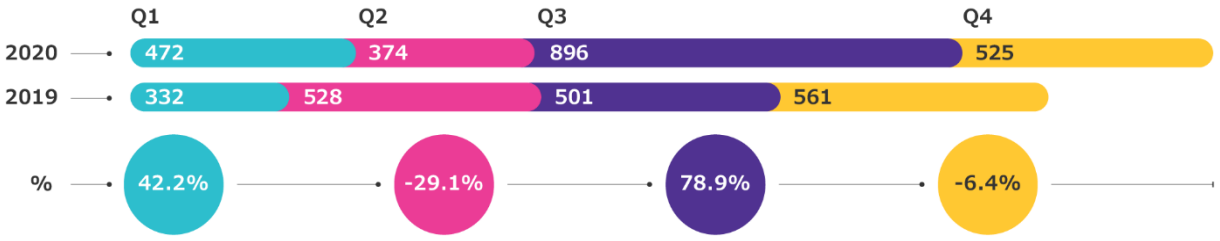
EBITDA pre developed very favorably in 2020, rising by 18.0% to € 2,267 million (2019: € 1,922 million). Organic earnings growth amounted to 26.6%. Overall, the EBITDA pre margin also saw growth of more than 5 percentage points to 34.1% (2019: 28.6%).

The restructuring expenses eliminated in calculating EBITDA pre are primarily attributable to transformation and growth programs initiated in fiscal 2020 (see Note (27) “Other provisions” in the Notes to the Consolidated Financial Statements).

The development of EBITDA pre in the individual quarters in comparison with 2019 is presented in the following overview:

Healthcare

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



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

Development of business free cash flow

In 2020, business free cash flow increased by 51.4% year-on-year to € 1,895 million (2019: € 1,252 million). This was primarily due to the higher EBITDA pre and the positive development of receivables compared with the previous year.

Healthcare

Business free cash flow[1]

€ million	**2020**	2019	Change € million	Change %
EBITDA pre[1]	2,267	1,922	346	18.0%
Investments in property, plant and equipment, software as well as advance payments for intangible assets	-448	-427	-22	5.1%
Changes in inventories	-20	-94	73	-78.2%
Changes in trade accounts receivable as well as receivables from royalties and licenses	170	-100	270	>100.0%
Lease payments[2]	-47	-50	3	-5.5%
Elimination Allergopharma divestment	-26			
Business free cash flow[1]	**1,895**	**1,252**	**643**	**51.4%**

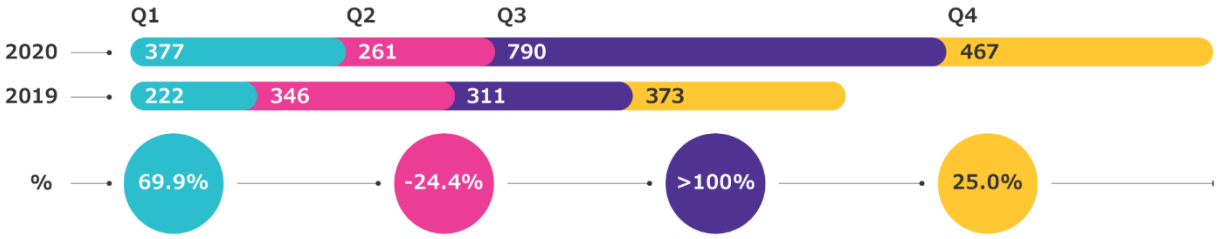
[1] Not defined by International Financial Reporting Standards (IFRS).

[2] Excluding payments for low-value leases and interest components included in lease payments.

The development of business free cash flow items in the individual quarters in comparison with 2019 is presented in the following overview:

Healthcare

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



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

Life Science

Life Science

Key figures

€ million	2020	2019	Change € million	Change %
Net sales	7,515	6,864	651	9.5%
Operating result (EBIT)[1]	1,599	1,280	318	24.9%
Margin (% of net sales)[1]	21.3%	18.7%		
EBITDA[1]	2,387	2,070	317	15.3%
Margin (% of net sales)[1]	31.8%	30.2%		
EBITDA pre[1]	2,405	2,129	276	13.0%
Margin (% of net sales)[1]	32.0%	31.0%		
Business free cash flow[1]	**1,595**	**1,375**	**220**	**16.0%**

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

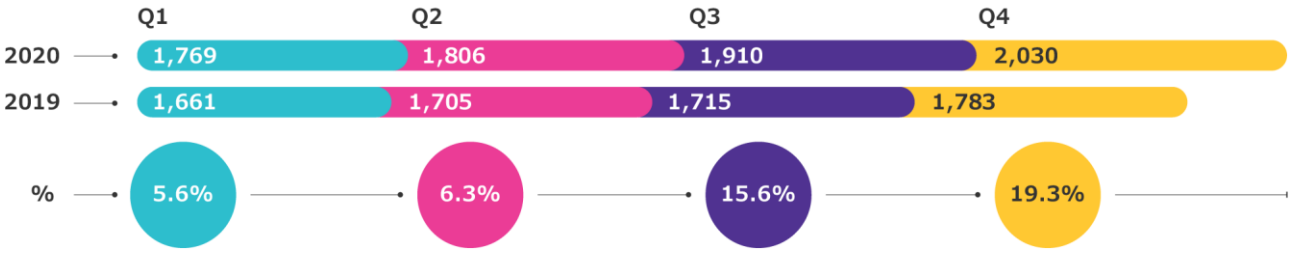
Development of sales and results of operations

In fiscal 2020, Life Science posted organic sales growth of 11.8% with unfavorable foreign exchange impact of -2.3%, resulting in a total net sales growth of 9.5% compared to the previous year. All three business units contributed to the organic growth, with the largest contribution coming from Process Solutions followed by Research Solutions. Overall, Life Science net sales increased to € 7,515 million (2019: € 6,864 million).

The development of sales in the individual quarters in comparison with 2019 as well as the respective organic growth rates are presented in the following graph:

Life Science

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



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

Life Science

Net sales by business unit[1]

€ million	2020	Share	Organic growth[2]	Exchange rate effects	Acquisitions/ divestments	Total change	2019	Share
Process Solutions	3,596	48%	21.8%	-2.1%	–	19.8%	3,002	44%
Research Solutions	2,215	29%	4.6%	-2.5%	–	2.1%	2,170	31%
Applied Solutions	1,704	23%	3.3%	-2.6%	–	0.8%	1,692	25%
Life Science	**7,515**	**100%**	**11.8%**	**-2.3%**	**–**	**9.5%**	**6,864**	**100%**

[1] Previous year's figures have been adjusted due to internal realignment.
[2] Not defined by International Financial Accounting Standards (IFRS).

The Process Solutions business unit, which markets products and services for the pharmaceutical production value chain, generated organic sales growth of 21.8%, which was the highest rate within the Life Science business sector. The business experienced strong demand in both Covid-19 and non Covid-19 related product and service offerings. With an unfavorable foreign exchange rate effect of -2.1%, net sales amounted to € 3,596 million in fiscal 2020 (2019: € 3,002 million). The percentage contribution of the Process Solutions business unit to Life Science total net sales rose by 4 percentage points to 48%. All regions experienced double-digit organic sales growth within Process Solutions.

The Research Solutions business unit, which provides products and services to support life science research for pharmaceutical, biotechnology, and academic research laboratories, recorded an organic sales growth of 4.6% in 2020. This was due to a recovery of the base business in the second half of 2020 combined with some tailwind in Covid-19 demand. Amid an unfavorable foreign exchange rate effect of -2.5%, net sales totaled € 2,215 million in 2020 (2019: € 2,170 million). Research Solutions thus accounted for 29% of Life Science total net sales. The organic sales growth was reported in Asia-Pacific, North America and Europe.

The Applied Solutions business unit with its broad range of products for researchers as well as scientific and industrial laboratories, accounted for a 23% share of Life Science sales. Applied Solutions recorded an organic sales growth of 3.3% in 2020. The Applied Solutions product portfolio faced some slowdown in customer demand due to Covid-19 related lockdowns, in particular in the first half of 2020. With an unfavorable foreign exchange rate effect of -2.6%, sales totaled € 1,704 million in 2020 (2019: € 1,692 million). Applied Solutions saw organic sales growth in all regions apart from Middle East and Africa.

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

Life Science

Net sales by region

€ million	2020	Share	Organic growth[1]	Exchange rate effects	Acquisitions/ divestments	Total change	2019	Share
Europe	2,583	35%	13.6%	-0.2%	–	13.4%	2,277	33%
North America	2,701	36%	11.6%	-2.4%	–	9.2%	2,474	36%
Asia-Pacific (APAC)	1,900	25%	11.5%	-2.5%	–	9.0%	1,743	26%
Latin America	241	3%	5.1%	-18.3%	–	-13.2%	278	4%
Middle East and Africa (MEA)	89	1%	–	-3.3%	–	-3.3%	92	1%
Life Science	**7,515**	**100%**	**11.8%**	**-2.3%**	**–**	**9.5%**	**6,864**	**100%**

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

The following table presents the composition of EBITDA pre for 2020 in comparison with 2019. The International Financial Reporting Standards (IFRS) figures have been modified to reflect the elimination of adjustments included in the respective functional costs.

Life Science

Reconciliation EBITDA pre[1]

	2020			2019			Change
€ million	IFRS	Elimination of adjustments	Pre[1]	IFRS	Elimination of adjustments	Pre[1]	Pre[1]
Net sales	**7,515**	**–**	**7,515**	**6,864**	**–**	**6,864**	**9.5%**
Cost of sales	-3,215	5	-3,210	-2,962	5	-2,957	8.6%
Gross profit	**4,300**	**5**	**4,305**	**3,903**	**5**	**3,908**	**10.2%**
Marketing and selling expenses	-1,995	4	-1,992	-1,924	2	-1,922	3.6%
Administration expenses	-354	32	-322	-341	34	-307	4.6%
Research and development costs	-313	1	-312	-276	–	-276	13.1%
Impairment losses and reversals of impairment losses on financial assets (net)	-1	–	-1	-7	–	-7	-79.9%
Other operating income and expenses	-38	-21	-59	-75	19	-56	5.4%
Operating result (EBIT)[1]	**1,599**			**1,280**			
Depreciation/amortization/ impairment losses/reversals of impairment losses	789	-3	786	789	–	789	-0.4%
EBITDA[1]	**2,387**			**2,070**			
Restructuring expenses	16	-16	–	13	-13	–	
Integration expenses/IT expenses	32	-32	–	36	-36	–	
Gains (-)/losses (+) on the divestment of businesses	–	–	–	9	-9	–	
Acquisition-related adjustments	-30	30	–	2	-2	–	
Other adjustments	–	–	–	–	–	–	
EBITDA pre[1]	**2,405**	**–**	**2,405**	**2,129**	**–**	**2,129**	**13.0%**
of which: organic growth[1]							17.2%
of which: exchange rate effects							-3.8%
of which: acquisitions/ divestments							-0.5%

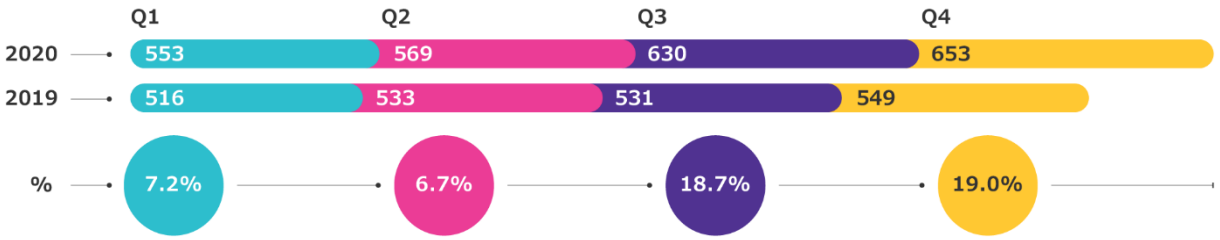
[1] Not defined by International Financial Reporting Standards (IFRS).

Adjusted gross profit increased by 10.2% to € 4,305 million (2019: € 3,908 million). The increase was mainly driven by the strong sales development. Marketing and selling expenses increased by 3.6% to € 1,992 million (2019: € 1,922 million), with higher logistics costs as the main driver. Administration expenses increased by 4.6% to € 322 million (2019: € 307 million) and research and development costs increased by 13.1% to € 312 million (2019: € 276 million). After eliminating adjustments, amortization, and depreciation, EBITDA pre rose by 13.0% to € 2,405 million (2019: € 2,129 million) reflecting the strong performance of the Life Science business. Organically, EBITDA pre increased by 17.2% in 2020. The result margin, i.e. EBITDA pre as a percentage of net sales, improved to 32.0% in 2020 (2019: 31.0%).

The development of EBITDA pre in the individual quarters in comparison with 2019 is presented in the following overview:

Life Science

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



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

Development of business free cash flow

In 2020, Life Science generated business free cash flow which amounted to € 1,595 million (2019: € 1,375 million). This positive development was mainly driven by higher EBITDA pre as well as a decrease in inventories partly offset by increased capital spending.

Life Science

Business free cash flow[1]

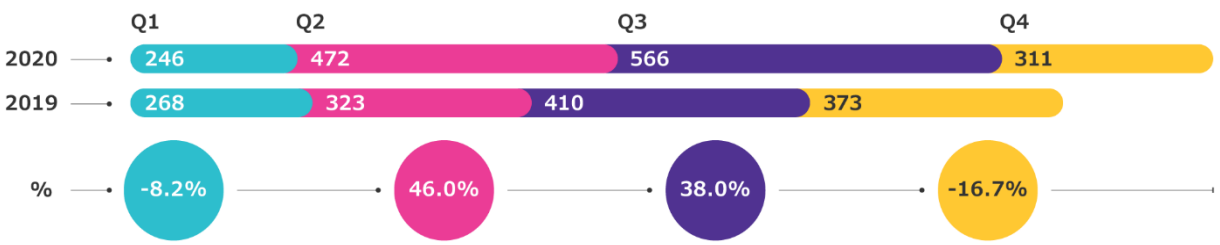
			Change	
€ million	**2020**	2019	€ million	%
EBITDA pre[1]	2,405	2,129	276	13.0%
Investments in property, plant and equipment, software as well as advance payments for intangible assets	-693	-384	-309	80.4%
Changes in inventories	13	-232	246	>100.0%
Changes in trade accounts receivable as well as receivables from royalties and licenses	-75	-81	6	-7.8%
Lease payments[2]	-56	-56	–	-0.4%
Elimination first-time consolidation	–	1	-1	-100.0%
Business free cash flow[1]	**1,595**	**1,375**	**220**	**16.0%**

[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Excluding payments for low-value leases and interest components included in lease payments.

The development of business free cash flow in the individual quarters in comparison with 2019 is presented in the following overview:

Life Science

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



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

Performance Materials

Performance Materials

Key figures

€ million	2020	2019	Change € million	Change %
Net sales	3,380	2,574	807	31.3%
Operating result (EBIT)[1]	240	307	-67	-21.7%
Margin (% of net sales)[1]	7.1%	11.9%		
EBITDA[1]	925	637	288	45.2%
Margin (% of net sales)[1]	27.4%	24.8%		
EBITDA pre[1]	1,024	803	221	27.5%
Margin (% of net sales)[1]	30.3%	31.2%		
Business free cash flow[1]	**847**	**641**	**206**	**32.1%**

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

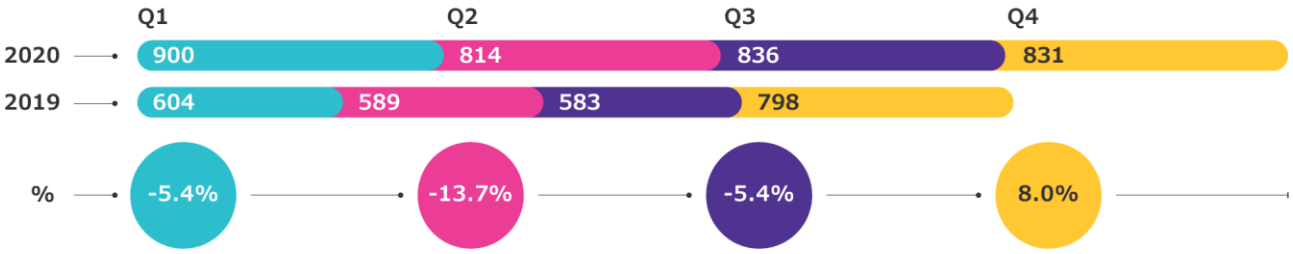
Development of net sales and results of operations

In 2020, net sales of the Performance Materials business sector increased 31.3% to € 3,380 million (2019: € 2,574 million). The acquisitions of Versum Materials and Intermolecular contributed 35.4% to the growth of Performance Materials, but an organic decline of -3.2% and a negative exchange rate impact of -0.9% partially offset the acquisition effects.

The net sales in the individual quarters as well as the respective organic growth rates in 2020 are presented in the following graph:

Performance Materials

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



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

The Covid-19 pandemic caused a significant demand decrease in both Surface Solutions and Display Solutions in the second quarter of fiscal year 2020 and was a major factor for the organic sales growth development for fiscal year 2020.

The Semiconductor Solutions business unit was transformed through the acquisitions of Versum Materials and Intermolecular in the fourth quarter of 2019. As a result, the share of Performance Materials sales attributable to Semiconductor Solutions increased from 34% to 56%. Semiconductor Solutions now comprises two businesses, Semiconductor Materials and Delivery Systems & Services. Semiconductor Materials will continue to focus on the development and commercialization of material-based solutions for the semiconductor industry. Delivery Systems & Services focuses on developing and operating delivery systems for semiconductor manufacturers. Additionally, the unit offers services to support the equipment install base and safe handling of the specialty materials that flow through it. In Semiconductor Solutions, strong improvement in the underlying

semiconductor markets helped drive organic growth of 14.3% for fiscal 2020. The organic growth was broad based across nearly all of the Semiconductor Materials businesses. Exchange rates negatively impacted net sales by -1.5%. Total growth in Semiconductor Solutions was mainly attributable to the acquisitions of Versum Materials and Intermolecular in the fourth quarter of 2019.

The Display Solutions business unit, consisting mainly of the businesses with liquid crystals, photoresists for display applications as well as OLED materials, recorded a sales decrease of -11.7% for fiscal year 2020, which was in total organically driven. The Covid-19 pandemic had a considerable impact on the development of net sales in 2020.

Net sales of the Surface Solutions business unit decreased by a total of -15.4% in fiscal year 2020. An organic decline of -13.5% was due to Covid-19 pandemic-driven demand decreases in the automotive, industrial and cosmetic markets. Foreign exchange effects contributed a further decrease of -1.9%.

Performance Materials

Net sales by business unit[1]

€ million	2020	Share	Organic growth[2]	Exchange rate effects	Acquisitions/ divestments	Total change	2019	Share
Semiconductor Solutions	1,901	56%	14.3%	-1.5%	>100.0%	>100.0%	878	34%
Display Solutions	1,108	33%	-11.7%	–	–	-11.7%	1,256	49%
Surface Solutions	370	11%	-13.5%	-1.9%	–	-15.4%	438	17%
Other	1	–	-56.2%	0.1%	–	-56.1%	2	–
Performance Materials	**3,380**	**100%**	**-3.2%**	**-0.9%**	**35.4%**	**31.3%**	**2,574**	**100%**

[1] Previous year's figures have been adjusted due to internal realignment.

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

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

Performance Materials

Net sales by region

€ million	2020	Share	Organic growth[1]	Exchange rate effects	Acquisitions/ divestments	Total change	2019	Share
Europe	250	8%	-5.9%	-0.4%	21.5%	15.2%	217	9%
North America	484	14%	2.2%	-3.1%	82.0%	81.2%	267	10%
Asia-Pacific (APAC)	2,582	76%	-3.6%	-0.4%	30.5%	26.5%	2,041	79%
Latin America	28	1%	0.2%	-15.3%	3.9%	-11.2%	32	1%
Middle East and Africa (MEA)	37	1%	-3.2%	-3.8%	>100.0%	>100.0%	17	1%
Performance Materials	**3,380**	**100%**	**-3.2%**	**-0.9%**	**35.4%**	**31.3%**	**2,574**	**100%**

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

The following table presents the composition of EBITDA pre for 2020 in comparison with 2019. The IFRS figures have been modified to reflect the elimination of adjustments included in the respective functional costs.

Performance Materials

Reconciliation EBITDA pre[1]

	2020			2019			Change
€ million	IFRS	Elimination of adjustments	Pre[1]	IFRS	Elimination of adjustments	Pre[1]	Pre[1]
Net sales	**3,380**	**–**	**3,380**	**2,574**	**–**	**2,574**	**31.3%**
Cost of sales	-2,007	40	-1,966	-1,437	51	-1,386	41.9%
Gross profit	**1,374**	**40**	**1,414**	**1,137**	**51**	**1,188**	**19.0%**
Marketing and selling expenses	-539	9	-530	-329	6	-323	64.0%
Administration expenses	-162	17	-144	-118	11	-107	34.7%
Research and development costs	-274	2	-272	-267	26	-241	12.9%
Impairment losses and reversals of impairment losses on financial assets (net)	–	–	–	–	–	–	–
Other operating income and expenses	-160	154	-5	-116	80	-37	-85.3%
Operating result (EBIT)[1]	**240**			**307**			
Depreciation/amortization/ impairment losses/reversals of impairment losses	684	-123	561	330	-7	323	74.0%
EBITDA[1]	**925**			**637**			
Restructuring expenses	31	-31	–	61	-61	–	
Integration expenses/IT expenses	47	-47	–	23	-23	–	
Gains (-)/losses (+) on the divestment of businesses	1	-1	–	–	–	–	
Acquisition-related adjustments	21	-21	–	82	-82	–	
Other adjustments	–	–	–	–	–	–	
EBITDA pre[1]	**1,024**	**–**	**1,024**	**803**	**–**	**803**	**27.5%**
of which: organic growth[1]							-7.5%
of which: exchange rate effects							-1.3%
of which: acquisitions/ divestments							36.3%

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

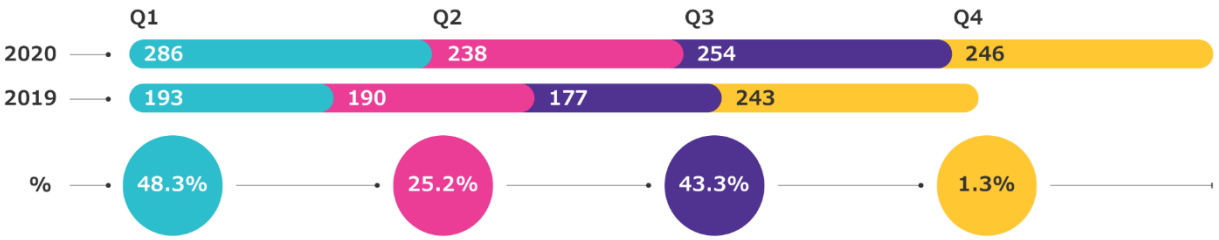
Adjusted gross profit of the Performance Materials business sector rose by 19.0% to € 1,414 million in fiscal 2020 (2019: € 1,188 million). The main driver for the increase was the acquisition of Versum Materials in the fourth quarter of 2019. The adjusted gross margin declined to 41.8% in 2020 (2019: 46.2%), primarily owing to the consolidation of the lower-margin Versum Materials business and the additional depreciation and amortization associated with acquisition accounting (purchase price allocation). Not including adjustments, the operating result (EBIT) decreased by € 67 million to € 240 million in 2020 (2019: € 307 million). The decrease was attributable to additional amortization and impairments partially offset by the additional EBIT provided by the Versum Materials acquisition.

The rise in marketing and selling expenses, administrative expenses and research and development costs was due to the additional costs of the Versum Materials and Intermolecular organizations. The successful implementation of the “Bright Future” transformation program reduced the underlying research and development costs of the legacy business – excluding the increase associated with the acquisitions of Versum Materials and Intermolecular. EBITDA pre of the business sector grew by 27.5% to € 1,024 million (2019: € 803 million) as the additional EBITDA pre from the acquisitions (36.3%) more than offset the decline in organic EBITDA pre (-7.5%) and negative foreign exchange effects (-1.3%). At 30.3%, the EBITDA pre margin in 2020 was down from the prior-year figure (2019: 31.2%).

The development of EBITDA pre in the individual quarters in comparison with 2019 is presented in the following overview:

Performance Materials

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



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

Development of business free cash flow

The business free cash flow of the Performance Materials business sector rose by € 206 million or 32.1% to € 847 million in 2020 (2019: € 641 million). Higher EBITDA pre from the acquisition of Versum Materials and lower inventories and receivables exceeded higher investments.

Performance Materials

Business free cash flow[1]

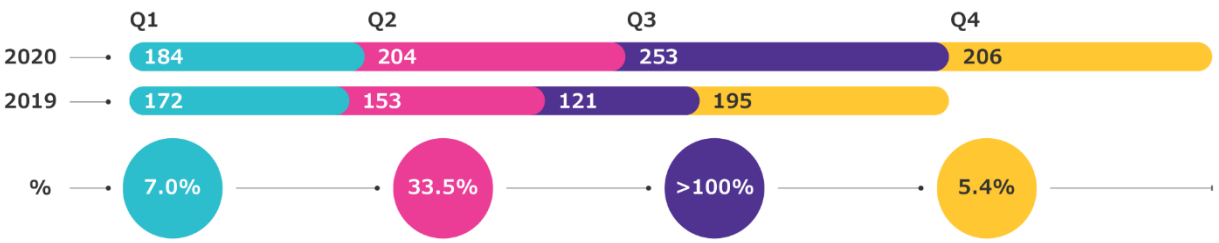
			Change	
€ million	**2020**	2019	€ million	%
EBITDA pre[1]	1,024	803	221	27.5%
Investments in property, plant and equipment, software as well as advance payments for intangible assets	-245	-158	-86	54.6%
Changes in inventories	55	-251	306	>100.0%
Changes in trade accounts receivable as well as receivables from royalties and licenses	49	-88	137	>100.0%
Lease payments[2]	-18	-11	-7	60.9%
Elimination first-time consolidations of Versum/Intermolecular	-19	346	-365	>100.0%
Business free cash flow[1]	**847**	**641**	**206**	**32.1%**

[1] Not defined by International Financial Reporting Standards (IFRS).
[2] Excluding payments for low-value leases and interest components included in lease payments.

The development of business free cash flow in the individual quarters in comparison with 2019 is presented in the following overview:

Performance Materials

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



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

Corporate and Other

Corporate and Other comprises administrative expenses for central Group functions that cannot be directly allocated to the business sectors, such as Finance, Procurement, Legal, Communications, and Human Resources. Corporate costs additionally encompass expenses for central, non-allocated IT functions, including expenses related to the expansion and harmonization of IT systems within the Group as well as research and development costs spanning business sectors.

Corporate and other

Key figures

			Change	
€ million	**2020**	2019	€ million	%
Operating result (EBIT)[1]	-658	-617	-41	6.6%
EBITDA[1]	-573	-537	-37	6.8%
EBITDA pre[1]	-495	-469	-26	5.5%
Business free cash flow[1]	-571	-536	-35	6.6%

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

After eliminating adjustments, administrative costs increased by 3.1% to € 311 million in fiscal 2020 (2019: € 302 million). Cross-business research and development costs amounting to € 62 million (2019: € 59 million), such as expenses for the Innovation Center, were allocated to Corporate. After eliminating adjustments, other operating expenses (net) increased to € -197 million (2019: € -167 million). After eliminating depreciation, amortization, and adjustments, EBITDA pre amounted to € -495 million in 2020 (2019: € -469 million). The increase in negative business free cash flow to € -571 million (2019: € -536 million) was largely due to the development of EBITDA pre.

Report on Risks and Opportunities

Risks and opportunities are inherent to entrepreneurial activity. We have put systems and processes in place to identify risks at an early stage and counteract them by taking appropriate action. Within the company, opportunity management is an integral component of our internal decision-making processes such as short- and medium-term planning and intra-year business plans.

Risk and opportunity management

We are part of a complex, global business world and is therefore exposed to a multitude of external and internal influences. Every business decision is therefore based on the associated risks and opportunities.

In our internal risk reporting, risks are defined as potential future events or developments that could lead to a negative deviation from our (financial) targets. In parallel, opportunities are defined as potential events or developments that imply a positive deviation from our planned (financial and non-financial) targets. Identified future events and expected developments are taken into account in internal planning, provided that it can be assumed that their occurrence is likely in the planning period. The risks and opportunities presented in the following risk and opportunities report are those potential future events or developments that could respectively lead to a negative or positive deviation from the targets covered by planning.

Risk management process

The objective of our risk management activities is to recognize, assess, and manage risks early on and to implement appropriate measures to minimize them. The responsibilities, objectives, and processes of risk management are described in our internal risk management guidelines. The business heads, managing directors of our subsidiaries, and the heads of Group functions are specified as employees with responsibility for risks. The group of consolidated companies for risk reporting purposes is the same as the group of consolidated companies for the Consolidated Financial Statements. Every six months, the risk owners assess their risk status and report their risk portfolio to Risk Management. We use special risk management software in the context of these activities.

Likewise, risk-mitigating measures are reported and assessed. The effectiveness of these measures and the planned implementation time frame are monitored by Group Risk Management.

The residual risk after the implementation of these measures is presented in the internal risk report as net risk.

Group Controlling & Risk Management forms the organizational framework for risk management and reports directly to the Group Chief Financial Officer. Group Risk Management uses the information reported to determine the current risk portfolio for the Group, presenting this in a report to the Executive Board, the Supervisory Board, and the Finance Committee with detailed explanations twice per year. This also encompasses a probability-weighted aggregation of risks at the Group level using a Monte Carlo simulation. Furthermore, significant changes in the assessment of the risks already known and new significant risks can be reported at any time and are communicated to the Executive Board on an ad hoc basis.

For reporting risks with a potential negative impact on our EBITDA pre, a minimum threshold is set at the level of € 5 million before mitigation measures in the standard process and € 25 million in the ad hoc process. Risks below these thresholds are steered independently within the business sectors. The relevant timeframe for internal risk reporting is five years. It can go beyond five years, e.g. for regulatory risks related to climate change. The effects of risks described in this report on risks and opportunities are presented as annual values. The assessment of the risks presented relates to December 31, 2020. There were no relevant changes after the balance sheet date that would have necessitated an amended presentation of the risk situation of the Group.

Within the scope of audits, Group Internal Auditing regularly reviews the performance of risk management processes within the units and, at the same time, the communication of relevant risks from the operating businesses to Group Risk Management.

Opportunity management process

The risk management system described concentrates on business risks, and not on opportunities at the same time. The opportunity management process is integrated into our internal controlling processes and carried out in the operating units on the basis of the Group strategy. The businesses analyze and assess potential market opportunities as part of strategy and planning processes. In this context, investment opportunities are examined and prioritized primarily in terms of their potential value proposition in order to ensure an effective allocation of resources. We specifically invest in growth markets to leverage the opportunities of dynamic development and customer proximity at a local level.

If the occurrence of the identified opportunities is rated as likely, they are incorporated into the business plans and the short-term forecasts. Trends going beyond this, or events that could lead to a positive development in the net assets, financial position, and results of operations, are presented in the following report as opportunities. These could have a positive effect on our medium-term prospects.

Risk and opportunity assessment

Risks

The significance of risks is calculated on the basis of their potential negative impact on the forecast financial targets in conjunction with the probability of occurrence of the respective risk. In line with these two factors, risks are classified as ”high”, “medium”, or “low”.

The underlying scales for measuring these factors are shown below:

Probability of success

Probability of success	Explanation
< 20%	Unlikely
20 – 50%	Possible
51 – 80%	Likely
> 80%	Very likely

Degree of Impact

Degree of impact	Explanation
> 50 million €	Critical negative impact on the net asset, financial position, and results of operations
20 – 50 million €	Substantial negative impact on the net asset, financial position, and results of operations
5 – < 20 million €	Moderate negative impact on the net asset, financial position, and results of operations
< 5 million €	Immaterial negative impact on the net asset, financial position, and results of operations

The combination of the two factors results in the risk matrix below, which shows the individual risks and their significance to the Group.

Risk matrix

> 50 million €	Medium	Medium	High	High
20 – 50 million €	Medium	Medium	Medium	High
5 – < 20 million €	Low	Medium	Medium	Medium
< 5 million €	Low	Low	Low	Low
Impact / Probability of occurence	< 20%	20 – 50%	51 – 80%	> 80%

Opportunities

Opportunities are assessed in their respective specific business environment. General measures of the business functions are quantified during operational planning, usually in relation to sales, EBITDA pre, and cash flow. Net present value, internal rate of return, the return on capital employed (ROCE), and the amortization period of the investment are primarily used to assess and prioritize investment opportunities. We use these indicators to assess the opportunities arising from the investment opportunities. Similarly, scenarios are frequently set up to simulate the influence of possible fluctuations and changes in the respective parameters on results. There is no overarching, systematic classification of the probability of occurrence and impact of opportunities.

Internal control system for the Group accounting process

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

Key tools

The internal control system aims to ensure the accuracy of the consolidated accounting process through functioning internal controls with reasonable assurance. The Group Accounting function centrally steers the preparation of the Consolidated Financial Statements of Merck KGaA, Darmstadt, Germany, as the parent company of the Group. This Group function defines the reporting requirements that all our subsidiaries must meet. At the same time, this function steers and monitors the scheduling and process-related requirements of the Consolidated Financial Statements. Group Accounting centrally manages all changes to the equity holding structure and correspondingly adapts the Group's scope of consolidation. The proper elimination of intragroup transactions within the scope of the consolidation process is ensured. Group-wide accounting guidelines form the basis for the preparation of the statutory financial statements of the parent company and of the subsidiaries, which are reported to Group Accounting; the guidelines are adapted in a timely manner to reflect changes in the financial regulatory environment and are updated in accordance with internal reporting requirements. For special issues, such as the accounting treatment of intangible assets within the scope of company acquisitions or pension obligations, external experts are additionally involved where necessary.

The individual companies have a local internal control system. Where financial processes are handled by a Shared Service Center, the internal control system of the Shared Service Center is additionally applied. Both ensure that accounting complies with IFRS (International Financial Reporting Standards) and with the Group accounting guidelines.

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

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

The effectiveness of our internal control system with regard to accounting and compliance with financial reporting on the part of the individual companies is confirmed by both the local managing director and the local chief financial officer by signing the single-entity reporting. For the accounting treatment of balance sheet items, Group Accounting closely cooperates with Group Risk Management in order to correctly present potential risks in the balance sheet. All the structures and processes described are subject to regular review by Group Internal Auditing based on an annual audit plan set out by the Executive Board. The results of these audits are dealt with by the Executive Board, the Supervisory Board, and the Finance Committee. The internal control system at Merck KGaA, Darmstadt, Germany, makes it possible to lower the risk of material misstatements in accounting to a minimum. However, no internal control system can entirely rule out a residual risk, whatever its design.

Business-related risks and opportunities

Political and regulatory risks and opportunities

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

Risk of more restrictive regulatory requirements regarding drug pricing and reimbursement

In the Healthcare business sector, the known trend toward increasingly restrictive requirements in terms of drug pricing, reimbursement, and the expansion of high-rebate groups is continuing. These requirements can negatively influence the profitability of our products, as can market referencing between countries, and the success of market launches. Foreseeable effects are taken into account as far as possible in the business sector's plans. Close communication with health and regulatory authorities serves as a preventive measure to avert risks.

Remaining risks beyond the current plans resulting from restrictive regulatory requirements are classified as a medium risk owing to the possible critical negative impact.

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

Likewise, in our Life Science and Performance Materials business sectors, we must adhere to a multitude of regulatory specifications regarding the manufacturing, testing, and marketing of many of our products. Specifically in the European Union, we are subject to the European chemicals regulation REACH. It demands comprehensive tests for chemical products. Moreover, the use of chemicals in production could be restricted, which would make it impossible to continue manufacturing certain products. We are constantly pursuing research and development in substance characterization and the possible substitution of critical substances so as to reduce the occurrence of this risk, and therefore view it as unlikely. Nevertheless, it is classified as a medium risk given its critical negative impact on the net assets, financial position, and results of operations.

Risk of negative political and macroeconomic developments

The destabilization of political systems, and the possible establishment of trade barriers, sanctions, and foreign exchange policy changes, can lead to declines in sales in certain countries and regions. These risks are taken into account as much as possible in the business plans of the affected countries and regions, and mitigated through product, industry, and regional diversification.

Potential negative macroeconomic developments can also impact our business. To minimize these impacts, corresponding measures pertaining to the sales strategy have been initiated in these countries.

The spread of the Corona virus since the beginning of 2020 is associated with risks in global macroeconomic developments, likewise with the potential for negative effects on our businesses. The opportunities in connection with combating the Covid-19 pandemic are described in the "Risks and opportunities of research and development" section.

The net risk of negative political and macroeconomic developments is seen as possible and has critical negative effects on the net assets, financial position, and results of operations. We thus rate this as a medium risk.

Market risks and opportunities

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

Opportunities due to new technologies in the manufacturing of displays

We see major opportunities in significant market growth of organic light-emitting diode (OLED) materials in high-quality display applications. According to industry estimates, the overall market volume for OLED materials will exceed that for liquid crystal materials as of 2022. We have been performing research and development in the area of organic light-emitting diode (OLED) technology for more than 15 years and have become one of the leading material suppliers for OLEDs. We focus on the production of ultrapure, extremely stable materials that are precisely tailored to customer requirements. To this end, we acquired the OLED patent portfolio for display applications from Konica Minolta. Comprising over 700 patent families, the portfolio will allow us to further expand our market position and advance our development pipeline.

Opportunities in liquid crystal distribution

We are pursuing a strategy of leveraging our expertise as the global market leader in liquid crystals in order to develop new fields of application for innovative liquid crystal technologies. For instance, we are pressing ahead to capture the future markets for liquid crystal windows (LCWs) and mobile antennas. LCWs are creating new architectural possibilities and solar shading that can be managed while maintaining transparency and color-neutrality. In 2020, we entered into a strategic partnership with Guardian Glass, a leading international manufacturer of float, coated, and other glass products. We intend for this partnership to boost commission sales of dynamic liquid crystal windows from our eyrise® brand, which uses our Licrivision® technology. Mobile antennas can receive signals transmitted in the high frequency range. As a result, mobile data exchange could improve significantly in a wide variety of fields of application. Since novel liquid crystal materials for antennas are currently being developed, we expect liquid crystal antennas to reach market maturity in the coming years.

Opportunities in the semiconductor industry

We see huge opportunities arising from our innovative Directed Self Assembly (DSA) technique for advanced lithography processing in Semiconductor Solutions. As semiconductor manufacturers continue to advance their device technologies, the image processing steps are becoming increasingly complex and the production of high-performance products is becoming more cost intensive. Our novel DSA platform and recent material advancements enable improved wafer performance and reduce the cost of ownership (COO) for the customer. This has helped us to secure its leading position as the "process of record" (POR) with several key semiconductor customers. Adoption of this disruptive lithography platform is expected to completely change how semiconductor manufacturing is conducted and could lead to a market leadership position for advanced lithography over the next few years. Furthermore, we are developing new dielectric platforms in cooperation with our key customers for 3D NAND applications. There has been a change in 3D NAND device architecture and some of our customers are moving from floating gate to replacement gate technology. Therefore, we are currently working with those customers on this new device architecture.

Opportunities from leveraging the e-commerce and distribution platform

With the acquisition of Sigma-Aldrich in 2015, we gained access to the leading e-commerce platform in life science, **www.sigmaaldrich.com**. With this distribution platform, our customers continue to benefit from a portfolio of more than 300,000 products, including highly respected brands. We are further expanding this platform to continuously increase the number of products available through e-commerce. Increasing speed and convenience during our customers' ordering processes as well as offering support through individualized product recommendations can lead to higher sales volumes and the winning of new customers. Consequently, this distribution channel can lead to an above-average development of sales in the medium term.

Risks and opportunities of research and development

For us, innovation is a major element of the Group strategy. Research and development projects can experience delays, expected budgets can be exceeded, or targets can remain unmet. Research and development activities are of special importance to the Healthcare business sector. In the course of portfolio management, we regularly evaluate and, if necessary, refocus research areas and all R&D pipeline projects. Alliances with external partners and the out-licensing of programs also form part of the catalog of measures for the efficient allocation of resources. The conclusion and continuation of these partnerships and externalizations plays an important role. A deviation from the strategic targets defined in this area could have a critical negative impact on net assets, financial position, and results of operations. The occurrence of a risk of this magnitude is considered unlikely, which means that this is a medium risk.

The global strategic alliance with GlaxoSmithKline plc., United Kingdom, (GSK) for the joint development and marketing of the bintrafusp alfa (M7824) immunotherapy developed by Merck KGaA, Darmstadt, Germany, is one example of an opportunity for research and development in the Healthcare business sector. This year, the Japanese Ministry of Health, Labor and Welfare granted fast-track status to bintrafusp alfa as a potential treatment for biliary tract cancer (BTC) as part of its SAKIGAKE strategy. In addition, we are currently exploring bintrafusp alfa in multiple non-correlated clinical studies. This innovative immunotherapy shows potential for new options for several hard-to-treat cancers. Despite the latest findings and the discontinuation of the INTR@PID Lung 037 study on the first-line treatment of patients with stage IV non-small cell lung cancer (NSCLC) that have high expression of PD-L1, we remain committed to investigating bintrafusp alfa in other indications. The findings from the INTR@PID Lung 037 study may be applied in other studies.

The strategic alliance concluded with Pfizer Inc. in 2014 enabled us to jointly develop Bavencio®. Following approvals for patients with metastatic Merkel cell carcinoma and those with locally advanced or metastatic urothelial carcinoma in 2017, the United States Food and Drug Administration (FDA) and the European Commission issued approvals for Bavencio® (avelumab) plus Inlyta® (axitinib) for the first-line treatment of patients with advanced renal cell carcinoma last year. This year, the FDA approved Bavencio® for the maintenance treatment of patients with locally advanced or metastatic urothelial carcinoma (UC) that has not progressed with first-line platinum-containing chemotherapy. After the Committee for Medicinal Products for Human Use (CHMP) of the European Medicines Agency (EMA) adopted a positive opinion, Bavencio® has been approved recently as monotherapy for the first-line maintenance treatment of adult patients with locally advanced or metastatic urothelial carcinoma (UC) who are progression-free following platinum-based chemotherapy. Additional applications for Bavencio® have been submitted to regulatory authorities worldwide.

Mavenclad® was approved by the European Commission in 2017. It is the first short-course oral treatment approved in Europe for the treatment of relapsing multiple sclerosis in patients with high disease activity. With the approvals in a number of additional countries in 2018 and 2019, including the United States and Switzerland, Mavenclad® is now approved in around 80 countries.

In March, the Japanese Ministry of Health, Labor and Welfare approved the oncology drug tepotinib for the treatment of patients with inoperable, advanced or recurrent non-small cell lung cancer (NSCLC) with METex14 skipping alterations. In addition, the FDA has accepted the filing of the application for tepotinib for the treatment of adult patients with metastatic NSCLC and granted priority review.

This year, Erbitux was approved by the National Medical Products Administration (NMPA) of China for the first-line treatment of patients with recurrent and/or metastatic squamous cell carcinoma of the head and neck in combination with platinum-based treatment with fluorouracil. This represents another step in our focus on acting as a global innovator for specialty products, including bringing innovative medicines to markets with high unmet medical needs.

In addition to marketing already approved medicines, we are pushing ahead with research projects in other important therapeutic areas. The portfolio of projects is evaluated on a regular basis. This may also lead to in-licensing or out-licensing, or further strategic alliances.

Investments made in 2020, e.g. to expand biotech development in Switzerland, are intended to accelerate scientific progress and the further development of our innovative clinical pipeline worldwide. The expenses currently being incurred, especially in our Healthcare research and development, are already reflected in the current plans. The same applies to sales of products for approved indications in the respective markets (e.g. Bavencio® and Mavenclad®). Further approvals may result in an increased sales potential.

Risks due to increased competition and customer technology changes

In the Healthcare business sector, both our biopharmaceutical products and classic pharmaceutical business are exposed to increased competition from rival products (in the form of biosimilars and generics). In the Life Science and Performance Materials business sectors, risks are posed by not only cyclical business fluctuations but also changes in the technologies used or customer sourcing strategies, particularly with respect to liquid crystals. We use close customer relationships and in-house further developments as well as market proximity, including precise market analyses, as mitigating measures. Overall, owing to its possible occurrence with a critical negative impact, the market risk is classified as a medium risk.

Opportunities presented by activities to boost innovative strength

With the M Lab™ Collaboration Center in Shanghai, we opened the doors to the largest of our nine centers worldwide to date. Encompassing non-GMP (Good Manufacturing Practice) laboratory space for pilot projects and process developments, it offers customizable solutions that are tailored to the Chinese life science community to advance drug development. Pharmaceutical and biopharmaceutical manufacturers can explore ideas, learn innovative techniques and work side-by-side with our scientists and engineers. The Collaboration Center is located in Pudong, at the heart of the biomedical sciences and research community in Shanghai, meaning we have our pulse right on the finger of Asia’s rapidly growing pharmaceutical market. Other M Lab™ Collaboration Centers are located in the United States, Singapore, Japan, Korea, India, France, and Brazil.

Digital technologies are becoming increasingly important for our markets and our world of work. In 2015, we launched several strategic digital initiatives geared toward improving the efficiency of our internal processes and toward evaluating the opportunities of digitalization for our products and customers. In this context, we set up a collaborative partnership with Siemens in 2020 in order to advance our modular production and to meet customer and market requirements quicker, more efficiently and more flexibly. Developing and adhering to rigorous ethical standards is of utmost importance for all our activities. Therefore, we created our Digital Ethics Advisory Panel to provide external guidance and expertise on complex ethical matters around data usage, algorithms and new digital innovations, ensuring that the company develops new digital technologies responsibly. We are also working on establishing new business outside our three business sectors, with a focus on digitalization and our innovation fields of Clean Meat, Liquid Biopsy, and Biosensing and Interfaces. In addition to collaborations with external partners such as the European Space Agency, the Accelerator program, which is being driven by our Innovation Center, is one component of our innovation strategy.

Cooperating with start-ups gives us extensive opportunities to drive innovative approaches and ideas. In 2020, we helped to advance numerous projects through various support models like our Innovation Labs and Centers and different investment programs, such as the China Seeds Fund. Among other things, we invested in SynSense, a neuromorphic computing start-up based in China and Switzerland whose AI (artificial intelligence) processors and sensors provide an unprecedented combination of ultra-low power consumption and low latency for a broad range of edge applications for smart home, smart security, autonomous driving, drones and robots.

The Industry 4.0 start-up Feelit also launched its first commercial product on the market. RetroFeel™ combines a wireless edge computing device with a printed nanotechnology sticker sensor that detects structural changes in mechanical parts and systems and is able to predict upcoming failures (predictive maintenance). This sensor solution can be used in process industries such as pharmaceuticals, food and beverage, oil and gas, as well as in semiconductor manufacturing. We take an active role in our portfolio companies and focus our investments on the early stage and the foundation of companies or spin-offs with a view to utilizing their science and technology base.

In the Life Science business sector, we strengthened our viral vector manufacturing capabilities with the launch of the VirusExpress™ lentiviral production platform. We are committed to accelerating the manufacture of cell and gene therapies with the goal of getting these lifesaving treatments to patients faster. This proven, scalable platform increases dose yields and reduces process development times.

In Life Science, we also expanded our HPAPI and ADC manufacturing capabilities in the United States with the creation of one of the largest single-digit nanogram containment production facilities for high-potent pharmaceutical ingredients (HPAPI). This will allow the continuous manufacturing at an industrial scale of increasingly potent agents for therapies with the potential to treat cancer. Antibody drug conjugates (ADCs) are an emerging class of medicines designed for the high-specificity targeting and destruction of cancer cells while preserving healthy cells. Only nine ADCs are currently approved worldwide. The ADC industry is experiencing strong growth and is expected to reach € 13 billion by 2030.

We also opened a new research center for electronic applications on the campus at its headquarters in Darmstadt, Germany. The building offers space for additional research and development activities, especially for next-generation materials including display materials – such as innovative liquid crystals and quantum dot pixel color converters (QDPCC) – as well as semiconductor materials such as photoresist materials, dielectrics, and directional self-alignment materials (DSA).

Opportunities provided by the CRISPR technology

As a pioneer of genome-editing innovation for 15 years, we are leveraging CRISPR technology as a core competency of our business. Around the world, our Life Science business sector holds 28 CRISPR-related patents in methods and composition, including the fundamental technology of CRISPR Cas9 for gene editing and integration in mammalian cells and paired Cas9 nickases. Two of the CRISPR-Cas9-assisted genome-editing patents were approved in the United States in 2020. This gives us the opportunity to support US scientists and researchers in their work to advance and protect gene therapy development programs. In the reporting year, we also signed agreements licensing our CRISPR technology to two companies: panCELLa, a cell therapy company based in Toronto, Canada, and Takara Bio USA, Inc., a biotechnology company based in Mountain View, California, United States. The licenses are aimed at accelerating drug discovery leading to the development of new treatments.

CRISPR technologies open up promising new avenues for medical research and potential solutions to treat some of the most difficult diseases, including cancer as well as hereditary and rare diseases. The Group recognizes that the growing potential of genome-editing technologies is accompanied by scientific, legal and societal concerns. It supports research using genome editing under careful consideration of ethical and legal standards. Among other things, it has established an independent, external Bioethics Advisory Panel to provide guidance for its research.

Opportunities in connection with combating the Covid-19 pandemic

As a science and technology company, we have helped to combat the global challenges resulting from Covid-19 in various ways. In Life Science, we are working with more than 50 vaccine developers around the world and supporting more than 35 testing solutions and more than 20 projects involving monoclonal antibodies, plasma products, and antiviral drugs. We are collaborating with numerous researchers and institutions to assist them with process development of and the production process for potential Covid-19 vaccine candidates, as well as development and preparations for the mass production of SARS-CoV-2 diagnostic tests. To meet the unprecedented demand in our Life Science business sector, we expand our production capability with

investments in the US, Singapore and Germany. These investments will strengthen our manufacturing footprint to meet demand for key-life saving products. Additionally, we acquired AmpTec, a leading Hamburg, Germany-based, mRNA contract development and manufacturing organization (CDMO) to strengthen our capabilities across the mRNA manufacturing chain. Combining our expertise in lipids manufacturing with AmpTec's PCR-based technology will allow us to offer customers innovative technologies, products and services to help advance life-enhancing therapeutics and vaccines for Covid-19.

In the Healthcare business sector, the FDA cleared the investigational new drug application (IND) for M5049 for the treatment of patients with Covid-19 pneumonia. M5049 is a potentially first-in-class small molecule that blocks the activation of the toll-like receptors TLR7 and TLR8. A Phase II randomized, controlled clinical study evaluating the safety and efficacy of M5049 in this patient population began in late July. The results of the study are expected by the second quarter of 2021.

Opportunities arising from the further integration of Sustainability in the Corporate Strategy

In 2020, we integrated sustainability more strongly in the corporate strategy, setting three goals in the areas of science & technology, value chain and climate & environment. By considering the goals of the sustainability strategy when making business decisions, our company contributes to achieving the United Nations Sustainable Development Goals. Additionally, the company is planning to also link the long-term variable compensation of the Executive Board from 2022 onward with the progress made toward achieving the company's sustainability goals.

Risks of discontinuing development projects and regulatory approval of developed medicines

Sometimes development projects are discontinued after high levels of investment at a late phase of clinical development. Decisions – such as those relating to the transition to the next clinical phase – are taken with a view to minimizing risk. We are currently not aware of any risks beyond general development risks that could significantly affect the net assets, financial position, and results of operations.

Furthermore, there is the risk that regulatory authorities either do not grant or delay approval or grant only restricted approval. Additionally, there is the risk that undesirable side effects of a pharmaceutical product could remain undetected until after approval or registration, which could result in a restriction of approval or withdrawal from the market. Well-advanced programs in our pipeline and those of our partners result in potential new approvals; on the other hand, missing targets in this area may have critical negative effects on our financial position and operating result, for example due to lower net sales or the non-occurrence of milestone payments from collaboration agreements. These risks are considered to be medium overall, with probabilities ranging from unlikely to possible.

Risks and opportunities related to the quality and availability of products

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

We are required to comply with the highest standards of quality in the manufacturing of pharmaceutical products (Good Manufacturing Practice or official pharmacopoeia). In this regard, we are subject to the supervision of the regulatory authorities. Conditions imposed by national regulatory authorities could result in a temporary ban on products/production facilities, and possibly affect new registrations with the respective authority. We make the utmost effort to ensure compliance with regulations, regularly perform our own internal inspections, and carry out external audits. Thanks to these quality assurance processes, the occurrence of a risk with a critical negative impact is unlikely; however, it cannot be entirely ruled out. Depending on the product concerned and the severity of the objection, such a risk can have a moderate negative impact on the net assets, financial position, and results of operations. Therefore, we rate this as a medium risk.

Risks of production availability

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

Although the occurrence of these risks is considered unlikely, an individual event could have a critical negative effect on the net assets, financial position, and results of operations, and they are therefore classified as a medium risk.

Risks of dependency on suppliers

Quality controls along the entire value chain reduce the risks related to product quality and availability. This starts with the qualification of our suppliers. Quality controls also include comprehensive quality requirements for raw materials, purchased semi-finished products, and plants. We are dependent on individual suppliers for a number of precursor products, packaging materials, and finished goods. In the event that one of these suppliers curtails or discontinues production, or supply is disrupted, this could potentially have a critical impact on the business concerned. With long-term strategic alliances for precursor products critical to supply and price as well as alternative sourcing strategies, we reduce the probability of occurrence of these risks and rate them as unlikely. Overall, these are classified as medium risks.

Product liability risks

Companies in the chemical and pharmaceutical industries are particularly exposed to product liability risks. Product liability risks can lead to considerable claims for damages, loss of reputation, and costs to avert damages. We have taken out the liability insurance that is standard in the industry for such risks. However, it could be that the insurance coverage available is insufficient for individual cases. Although the occurrence of product liability claims in excess of the existing insurance coverage is considered unlikely, individual cases could still have a critical negative effect on the net assets, financial position, and results of operations. We therefore rate a potential product liability risk as a medium risk.

Risks due to product-related crime and espionage

Owing to our portfolio, we are exposed to a number of sector-specific crime risks. This relates primarily to products, including among other things, counterfeiting, illegal channeling, and misuse, as well as all types of property crime, including attempts at these crimes. Crime phenomena such as cybercrime and espionage could equally affect our innovations or innovation abilities as such.

To combat product-related crime, an internal coordination network covering all functions and businesses (“Anti-Counterfeiting Operational Network”) was set up several years ago. In addition, security measures are in use to protect products against counterfeiting. Innovative technical security solutions and defined preventive approaches are used to ward off dangers relating to cybercrime and espionage. Measures to prevent risks and to prosecute identified offenses are conducted in all the relevant crime areas in close and trustworthy cooperation with the responsible authorities. The impact of these risks on business operations depends on the respective individual case, product-specific factors, the value chain, and regional aspects in particular. Our Corporate Security department is responsible for the overall coordination of all measures in this area. Overall, the threat resulting from crime in general is seen as being possible and is classified as a medium risk.

Risks and opportunities from the use of social media

Our company and its employees are active on numerous social media channels. The consistent and legally compliant use of the channels and their content is important in terms of increasing awareness of our brand, among other things. Our company takes precautions and implements processes to ensure awareness of the proper handling of social media, controlling publication, and actively managing communication.

Nevertheless, reputational risks could result, for instance through public dialogues in social media.

Overall, we rate this as a low risk.

Financial risks and opportunities

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

Risk and opportunity management in relation to the use of financial instruments

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

Liquidity risks

In order to ensure its continued existence, a company must be able to fulfill its commitments from operating and financial activities at all times. Therefore, to reduce potential liquidity risks, we have a central Group-wide liquidity management system in place, and a balanced maturity profile. The maturities of our financial liabilities are aligned with our planned free cash flow. Furthermore, we have a multi-currency revolving credit facility of € 2 billion with a term until 2025, which ensures continuing solvency if any liquidity bottlenecks occur. As our loan agreements do not contain any financial covenants, these agreed lines of credit can be accessed even if our credit rating should deteriorate. Additionally, we have a commercial paper program with a maximum volume of € 2 billion.

Overall, the liquidity risk is unlikely and rated as low.

Counterparty risks

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

As for counterparty risks from financial transactions, we review all positions relating to trading partners and their credit ratings on a daily basis. We manage financial risks of default by diversifying our financial positions and through the related active management of our trading partners. Significant financial transactions involving credit risk are entered into with banks and industrial companies that have a good credit rating. Moreover, our large banking syndicate – the multi-currency revolving credit facility of € 2 billion was syndicated by 20 banks – reduces possible losses in the event of default.

The solvency and operational development of trading partners are regularly reviewed as part of the management of operational counterparty risks. Sovereign risks are also analyzed. The volume of receivables of each customer is capped in line with their credit ratings. Risk-mitigating measures, such as credit insurance, are utilized as appropriate. Nevertheless, defaults by isolated trading partners, even those with outstanding credit ratings, cannot be entirely ruled out, although rated as unlikely (further information can be found in "Credit risks" in the note "Management of financial risks" in the Notes to the Consolidated Financial Statements).

Counterparty risk is classified as a medium risk overall owing to the unlikely probability of occurrence with a potential critical negative effect.

Financial market risks and opportunities

As a result of our international business activities and global corporate structure, we are exposed to risks and opportunities from fluctuations in exchange rates. These result from financial transactions, operating receivables and liabilities, as well as forecast future cash flows from sales and costs in foreign currency. We use derivatives to manage and reduce the aforementioned risks and opportunities (further information can be found in the note "Derivative financial instruments" in the Notes to the Consolidated Financial Statements). Due to their possible occurrence with a potentially critical negative effect on the net assets, financial position, and results of operations, foreign exchange rate risks are rated as medium risk.

Variable interest and current financial liabilities are exposed to the risks and opportunities of interest rate fluctuations. These are also managed and reduced using derivatives. Interest rate risks have a potentially moderate negative impact, are considered unlikely, and pose low risks overall.

Risks of impairment of balance sheet items

The carrying amounts of individual balance sheet items are subject to the risk of changing market and business conditions and thus to changes in fair values as well. Necessary impairments could have a significant negative non-cash impact on earnings and affect the accounting ratios. This applies in particular to the high level of intangible assets including goodwill, which mainly derive from the purchase price allocations made in connection with past acquisitions (further information can be found in the note "Intangible assets" in the Notes to the Consolidated Financial Statements). All relevant risks were assessed during the preparation of the Consolidated Financial Statements and taken into account accordingly. We rate risks beyond this as unlikely with a critical negative impact. Therefore, this is seen as a medium risk.

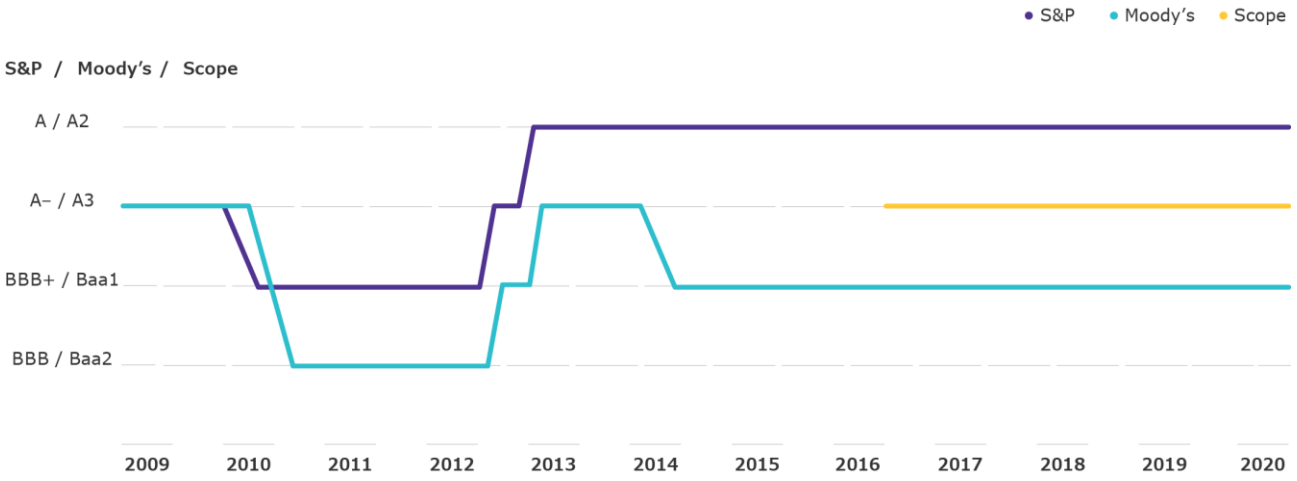
Risks and opportunities from pension obligations

We have commitments in connection with pension obligations. The present value of defined benefit obligations can be significantly increased or reduced by changes in the relevant valuation parameters, for example the interest rate or future salary increases. Pension obligations are regularly assessed as part of annual actuarial reports. The obligations are covered by the pension provisions reported in the balance sheet based on the assumptions as of the balance sheet date. Some of these obligations are funded by plan assets (further information can be found in the note "Provisions for pensions and other post-employment benefits" in the Notes to the Consolidated Financial Statements). To the extent that pension obligations are covered by plan assets consisting of interest-bearing securities, shares, real estate, and other financial assets, decreasing or negative returns on these assets can adversely affect the fair value of plan assets and thus result in further additions to pension provisions. By contrast, rising returns increase the value of plan assets, thereby resulting in excess cover of plan liabilities. We increase the opportunities of fluctuations in the market value of plan assets on the one hand and reduce the risks on the other by using a diversified investment strategy. The unlikely risk due to pension obligations could have moderate negative effects on the net assets, financial position, and results of operations, and is classified as low.

Assessment by independent rating agencies

The capital market uses the assessments published by rating agencies to help lenders assess the risks of a financial instrument used by our company. We are currently rated by Standard & Poor's, Moody's, and Scope. Standard & Poor's has issued a long-term credit rating of A with a stable outlook, Moody's a rating of Baa1 with a stable outlook, and Scope a rating of A-, likewise with a stable outlook. In line with market procedures, our financing conditions are closely tied to our rating. The better the rating, the more favorably we can generally raise funds on the capital market or from banks.

Overview of Rating Development



Legal risks

Generally, we strive to minimize and control our legal risks. To this end, we have taken the necessary precautions to identify threats and defend our rights where necessary.

Nevertheless, we are still exposed to risks from litigation or legal proceedings. In particular, these include risks in the areas of product liability, competition and antitrust law, pharmaceutical law, patent law, trademark law, data protection law, tax law, and environmental protection. As a research-based company, we have a valuable portfolio of industrial property rights, patents, and brands that could become the target of attacks and infringements. The outcome of future proceedings or those currently pending is difficult to foresee.

For instance, we are currently involved in litigation with Merck & Co. Inc., Kenilworth, NJ, United States (outside the United States and Canada: MSD), against whom we have filed lawsuits in various countries. This company has also sued us in the United States for trademark infringement, among other things.

Due to long statutes of limitations or in some cases the absence thereof, it is not possible to rule out that we will face third-party claims arising from the same issue despite the conclusion of legal proceedings. Court or official rulings or settlements can lead to expenses with a significant impact on our business and earnings.

Despite extensive precautionary measures, non-compliance with laws and regulations leading to related consequences can never be completely excluded.

Tax risks are reviewed regularly and systematically by Group Tax. Corresponding standards and guidelines are used in order to identify tax risks at an early stage as well as to review, evaluate, and correspondingly minimize them. Risk reduction measures are coordinated by Group Tax together with the subsidiaries abroad.

In our opinion, the lawsuits described below constitute the most significant legal risks. This should not be seen as an exhaustive list of all legal disputes currently ongoing.

Risks from product-related and patent law disputes

We are involved in a patent dispute with Biogen Inc., Massachusetts, United States ("Biogen"), in the United States. Biogen claims that the sale of Rebif® in the United States infringes on a Biogen patent. The disputed patent was granted to Biogen in the United States in 2009. Subsequently, Biogen sued us and other pharmaceutical companies for infringement of this patent. Our company defended itself against all allegations and brought a countersuit claiming that the patent is invalid and not infringed by our actions. In the first instance, a jury recognized the invalidity of the patent. This jury verdict was overturned by a judge in the same instance in September 2018. For the time being, the patent is thus deemed to be legally valid and to have been infringed. We already filed a complaint with the United States Court of Appeals for the Federal Circuit (second instance) against the first-instance ruling in October 2018. On September 28, 2020, this court overturned the verdict of the judge in the first instance, declared Biogen's patent to be invalid, and instructed the District Court to reinstate the original jury verdict. A cash outflow is considered to be unlikely based on this decision. Accordingly, the provision of € 365 million that was recognized at that point in time for potential compensation payments for damages was reversed.

In the Performance Materials business sector, we are involved in a legal dispute with JNC Corporation, Japan (JNC). JNC claims that by manufacturing and marketing certain liquid crystal mixtures, our company has infringed JNC patents in China, Taiwan and Korea. We maintain that the above mentioned patents are invalid owing to relevant prior art. At the end of the second quarter of fiscal 2020, the actions in China and Taiwan were concluded with legally binding effect in favor of our company. In view of these developments, the provision was reduced accordingly. In Korea however, a patent infringement action, a patent nullity action and a "correction trial" are still pending ex parte JNC. In addition, new statutory rules were implemented in Korea that could have an adverse effect on any potential amount of damage. We have taken appropriate accounting measures according to the remaining litigation risk in Korea. A potentially considerable impact of the legal dispute on the financial position cannot be ruled out. A cash outflow within the next 12 months is considered possible at present.

Risks due to antitrust and other government proceedings

Raptiva®: In December 2011, the federal state of São Paulo, Brazil, sued us for damages because of alleged collusion between various pharmaceutical companies and an association of patients suffering from psoriasis and vitiligo. This collusion is alleged to have been intended to increase sales of the medicines from the companies involved to the detriment of patients and state coffers. Moreover, patients are also suing for damages in connection with the product Raptiva®. We have taken appropriate accounting measures for these issues, which relate to various legal cases. Risks in excess of this with a substantial negative effect on the net assets, financial position, and results of operations cannot be ruled out, but are considered unlikely. This is rated as a medium risk.

On July 6, 2017, we received notice from the European Commission (EU Commission) in connection with the antitrust review proceedings for the acquisition of Sigma-Aldrich, in which the EU Commission informed us of its preliminary conclusion that our company and Sigma-Aldrich allegedly transmitted incorrect and/or misleading information within the scope of the acquisition of Sigma-Aldrich. The EU Commission received registration of the merger on April 21, 2015, and granted clearance on June 15, 2015, subject to the condition that our company and Sigma-Aldrich divest parts of the European solvents and inorganic chemicals businesses of Sigma-Aldrich in order to resolve antitrust concerns. According to the preliminary viewpoint of the EU Commission communicated in a letter dated July 6, 2017, our company and Sigma-Aldrich withheld related important information about an innovation project. According to the EU Commission, the innovation project should have been included in the remedies package. This resulted in an administrative procedure with the EU Commission. On July 1, 2020, the EU Commission informed us that the parts of the procedure relating to our company were no longer under investigation and that the procedure now related solely to the allegations against Sigma-Aldrich. Our company again countered these remaining accusations at a hearing on November 13, 2020. The administrative procedure could result in the issuance of a fine that would be open to appeal. In the second quarter of 2020, the existing provision in a mid double-digit euro amount was reduced to a low double-digit euro amount. A potential outflow of resources is considered possible for 2021.

This is currently classified as a medium risk with a probable substantial negative impact on the financial position.

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

Paroxetine: In connection with the divested generics business, Merck KGaA, Darmstadt, Germany, is subject to antitrust investigations by the British Competition and Market Authority (CMA) in the United Kingdom. In March 2013, the authorities informed us of the assumption that a settlement agreement entered into in 2002 between Generics (UK) Ltd. and several subsidiaries of GlaxoSmithKline plc, United Kingdom, in connection with the antidepressant drug paroxetine, violated British and European competition law. Our company, the then-owner of Generics (UK) Ltd., was allegedly involved in the negotiations for the settlement agreement and is therefore liable. The investigations into Generics (UK) Ltd. started in 2011, without this being known to our company. On February 11, 2016, the CMA imposed a fine in this matter. We have taken legal action against this fine. The Appeals Tribunal has since submitted the relevant legal questions to the European Court of Justice (CJEU) for a preliminary ruling. The CJEU confirmed in January 2020 that such settlement agreements in general may breach European competition law. The proceeding will now be continued at the UK Competition Appeal Tribunal (CAT). A decision is pending. Appropriate accounting measures have been taken. A decision and an outflow of resources within the next 12 months are considered possible. A provision in a low double-digit million euro amount was recognized for these proceedings. This is currently classified as a medium risk with a moderate negative impact on the financial position.

Citalopram: In connection with the divested generics business in 2007, Merck KGaA, Darmstadt, Germany, is accused of breaching EU antitrust law through agreements concluded by its former subsidiary Generics (UK) Ltd., Denmark, relating to the antidepressant Citalopram patented by Lundbeck A/S. In 2013, the EU Commission imposed a corresponding fine in a double-digit euro amount. Our company filed a lawsuit against the Commission’s decision with the European Court in August 2013. The lawsuit was rejected in 2016. Our company subsequently filed an appeal with the European Court of Justice (CJEU). In the course of these proceedings, the Advocate General of the CJEU recommended that the European Court’s verdict be confirmed. The Court announced that it will issue a ruling in March 25, 2021. In light of the disadvantageous development in this matter, additional accounting measures were taken for potential additional claims and the corresponding provision has increased by a double-digit million euro amount as a result. This is currently classified as a medium risk with a probable substantial negative impact on the financial position.

Human resources risks

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

Recruiting and retaining specialists and talent are therefore key priorities for the company and are managed through the targeted use of, for instance, employer branding initiatives, global talent and succession management processes, as well as competitive compensation packages. Nevertheless, employee-related risks that affect business activities are possible, even though their impact is difficult to assess. We rate this as a medium risk.

Information technology risks

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

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

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

The Group operates an information protection management system based on ISO 27001 comprising security guidelines as well as organizational and technical measures to prevent and address IT security incidents. Globally used IT applications form the basis for the contractual delivery of products and solutions. The failure of business-critical IT applications could therefore have a direct influence on our ability to deliver and on the quality of our products. This also applies to the failure of a data center. To achieve the required service quality, we use a quality management system certified to ISO 9001 that also applies to the provision of IT. In addition, to reduce the risk of failure, we operate several redundantly designed data centers. Furthermore, insurance solutions for cybercrime offenses are in place at Group level.

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

Despite the mitigating measures taken and functional continuity plans, the effects of cybercrime or the failure of business-critical IT applications and their influence on the net assets, financial position, and results of operations are considered high risks owing to likely and potentially critical negative impacts.

Environmental, climate related and safety risks

As a company with global production operations, we are exposed to risks of possible damage to people, goods, and our reputation. Those include physical risks stemming from exposure to droughts, storms and floods. Audits, consulting, and training on environmental protection, and occupational health and safety minimize these risks to people and the environment. In order to ensure the continuity of plant and equipment, we monitor these risks both at our own sites as well as at suppliers and contract manufacturers. By adhering to high technical standards, our rules of conduct, and all legal requirements in environmental protection and occupational health and safety, we ensure the preservation of goods and assets. We have taken sufficient appropriate accounting measures for the environmental risks known to us. We monitor regulatory risks in connection with the transition to a low-carbon economy, which could materialize in the mid- and long-term through rising carbon prices through emissions trading systems, taxes or energy legislation. We mitigate those risks with our energy and carbon management measures. We classify these as a high risk since a critical negative impact on the financial position cannot be ruled out.

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

Irrespective of the fact that acquisitions made in the past have been successfully completed, the risk of conducting acquisitions and subsequent integration exists for future transactions. This includes, among other things, the inability to meet sales volume targets, and higher integration costs than expected, as well as the failure to meet synergy goals. The divestment of companies and businesses can lead to liability vis-à-vis the buyer or additional expenses, for instance through indemnity clauses and guarantee commitments or long-term supply contracts. Through strong due diligence processes and closely managed integration processes, we seek to reduce the probability of occurrence of this risk. Therefore, we classify this as a low risk with an unlikely probability of occurrence and potentially moderate negative effects on the net assets, financial position, and results of operations.

Overall view of the risk and opportunity situation and management assessment

The most significant individual risks in the businesses have been named in the report above, with business-related risks being the most significant alongside IT and legal risks. These risks include already the risks stemming from the recent developments regarding the Covid-19 pandemic. Most notably, the pandemic increases existing risks related to more restrictive regulatory requirements regarding drug pricing and reimbursement, the demand for our products, business interruptions at our production facilities, lack of availability of good quality materials or services, risks related to research and development, and negative macroeconomic developments.

With respect to high and medium risks, certain changes have occurred, as the assessment of the individual risks has of course shifted over the fiscal year due to changing external and internal conditions while the overall risk profile remained stable. Thanks to the risk reduction measures taken – such as the consistent implementation of management action (organizational responsibility and process improvements), existing insurance coverage, and accounting precautions – we were able to take counteraction, in particular against significant individual risks.

The overall risk of the Group, which is derived from the probability-weighted aggregation of the identified risks, leads to the assessment that we are not exposed to risks of a nature to threaten the existence of the Group as a going concern, or for which coverage and financing of the losses are questionable. We are confident that we will continue to successfully master the challenges arising from the above risks in the future as well. Our company also benefits from diversification through our different products and markets.

In our view, business-related opportunities offer the greatest potential. An important element here is the continuous expansion of our businesses. With the successful focusing and continued intensification of our research and development activities, we want to be able to continue to offer our customers innovative products and help shape markets. Moreover, we also consolidate our expertise in numerous alliances with industrial partners as well as various universities and international organizations. We are making targeted investments in future-oriented companies and start-ups via our Ventures Investment Fund and our Accelerator programs. The topic of innovation is at the forefront of all our activities. Externally, this is becoming particularly apparent through our Innovation Center at Group headquarters in Darmstadt, Germany, which is to develop into a nucleus of creativity at our company. The activities listed hold significant opportunities for us in the medium to long term, beyond the underlying forecast period.

We pursue the opportunities that arise and specify their expected effects in the forecast development of net sales, EBITDA pre, and cash flow. Furthermore, we will actively seek new opportunities, examine their implementation, and drive them forward where appropriate. If opportunities arise in addition to the forecast developments, or these occur more quickly than anticipated, this could have correspondingly positive effects on our net assets, financial position, and results of operations.

Report on Expected Developments

The following report provides a forecast for fiscal 2021 of the development of the Group and its three business sectors: Healthcare, Life Science and Performance Materials (to be renamed Electronics).

The divestment of Allergopharma to Dermapharm Beteiligungs GmbH ("Dermapharm") closed on March 31, 2020. Our allergy business in Europe was transferred to Dermapharm on March 31, 2020. The transfer of the Allergopharma business in China closed on August 31, 2020. Accordingly, in 2021 we report a portfolio effect from this transaction. As expected, however, this will not be material.

Moreover, on December 22, 2020, we fully acquired AmpTec GmbH, Hamburg, a leading contract development and manufacturing organization for mRNA, which is used in vaccines, treatments and diagnostics in connection with Covid-19 and numerous other diseases. We do not expect this acquisition to have a material portfolio effect either.

In the United States, our company was involved in patent litigation with Biogen Inc., USA. Biogen sued us for having allegedly infringed a patent in connection with Rebif®. On September 28, 2020, the U.S. Court of Appeals for the Federal Circuit set aside the first-instance decision and declared Biogen's patent invalid. Therefore, a provision amounting to € 365 million for this patent litigation was released. The income from the release of the provision led to a corresponding increase in EBITDA pre in fiscal 2020. This forecast and in particular, organic growth rates, relate to a year-earlier figure adjusted for the income from the release of the provision.

As regards the Covid-19 pandemic and the negative effects thereof, we assume that the business recovery that started in the second half of 2020 will continue in fiscal 2021. At present, we do not assume that further disease waves will have a negative effect comparable to that seen in the first half, especially on the Healthcare and Performance Materials business sectors. For Life Science, we expect significantly positive contributions owing to the Covid-19 pandemic, particularly in the Process Solutions business unit. The increasing availability of Covid-19 vaccines and the associated immunization of the population will contribute to a further stabilization of the societal and economic situation. Nevertheless, this forecast is subject to a higher degree of estimation uncertainty than was the case in previous years.

Forecast for the Group

Forecast for the Group

€ million	Actual results 2020	Forecast for 2021	Key assumptions
Net sales	17,534	• Strong organic growth • Negative foreign exchange effect of -2% to -5%	• Organic growth driven by all three business sectors • Negative foreign exchange effects from the U.S. dollar in particular and individual growth markets
EBITDA pre[1]	5,201	• Organic growth in the high single-digit to low teens percentage range • Negative foreign exchange effect of -2% to -5%	• Life Science with growth in the low teens range • Strong growth in Healthcare • Solid to strong growth in Performance Materials • Realization of synergies totaling approximately € 83 million as planned from the integration of Versum Materials into Performance Materials • Negative foreign exchange effects from the U.S. dollar in particular and individual growth markets
Operating Cash Flow	3,477	• Slight increase over the previous year	• Rise in EBITDA pre • Increase in net working capital and adverse impact from negative foreign exchange effects • Payments in connection with the transformation and growth program THRIVE commenced by Healthcare in 2020 • Higher fluctuation corridors than for net sales and EBITDA pre are to be expected

[1] EBITDA pre of fiscal 2020 included income from the release of a provision for patent litigation amounting to € 365 million. Including this amount in the previous year, we expect slight to moderate organic growth.

Net sales

For the Group in fiscal 2021, we expect strong organic net sales growth, driven mainly by our Healthcare and Life Science business sectors. For Performance Materials we forecast a solid organic increase. The divestment of Allergopharma will be reported in the first three quarters of 2021 as a portfolio effect, which will not be material for the Group. With regard to foreign exchange developments, we continue to expect a volatile environment due to political and macroeconomic developments. We expect a negative foreign exchange effect between -2% and -5%, These effects will result in particular from the development of the U.S. dollar as well as individual growth market currencies. This forecast for 2021 is based on a euro-U.S. dollar exchange rate in a corridor of 1.17 to 1.22.

EBITDA pre

EBITDA pre is our key financial indicator to steer operating business. For fiscal 2021, we expect organic growth of EBITDA pre in a high single digit to low teens percentage range. All three business sectors will contribute to this development with organic growth. Excluding the release of the provision for the patent litigation with Biogen amounting to € 365 million, we expect that in fiscal 2021, the EBITDA pre margin will be higher than in fiscal 2021. Including the income from the release of the provision in the previous year, we are forecasting moderate organic growth and a margin below that of the previous year.

The expected foreign exchange development is forecast to adversely affect Group EBITDA pre by between -2% and -5% compared with fiscal 2020; it is likely to be seen mainly in the Healthcare and Performance Materials businesses. In this context, we assume that in particular, the euro-U.S. dollar exchange rate will impact foreign exchange developments. These foreign exchange effects will be partly mitigated by currency hedging, although we do not hedge all growth market currencies.

Operating cash flow

Apart from EBITDA pre, operating cash flow as of fiscal 2021 will represent one of our key performance indicators at Group level and replace business free cash flow (BFCF) as a steering parameter. Operating cash flow takes the cash-relevant variables before investments and financing into account and serves to manage internal financing power and liquidity. In general, the forecast for operating cash flow is subject to a higher fluctuation corridor than the forecast for net sales, EBITDA pre and the previous steering parameter BFCF.

The expected strong development of operating business in fiscal 2021 will be a main driver of operating cash flow. However, in fiscal 2020 operating cash flow reflected the increasing receipt of payments from customers in the fourth quarter of 2020. Since we do not expect a comparable effect in fiscal 2021, this will have a negative impact on the steering parameter. We continue to expect payouts in the context of ongoing restructuring programs on a larger scale in 2021. Among other things, this relates to the transformation and growth program THRIVE that was launched in Healthcare in 2020. Negative foreign exchange effects will also weigh on operating cash flow. Against this backdrop, overall we expect a slight increase in 2021.

Forecast for the Healthcare business sector

Forecast for the Healthcare Business Sector

€ million	Actual results 2020	Forecast for 2021	Key assumptions
Net Sales	6,639	• Strong organic growth • Slight to moderately negative foreign exchange effect	• Roughly stable organic development of the core business • Substantial contribution to growth by Mavenclad® and Bavencio® • Negative foreign exchange effects, in particular the U.S. dollar and individual growth market currencies
EBITDA pre[1]	2,267	• Strong organic growth • Strongly negative foreign exchange effect	• Expected substantial earnings contribution especially from Mavenclad® can more than offset the effect from the expected decline in sales of Rebif® • Marketing and selling expenses as well as research and development costs with decrease in percentage of sales due to systematic cost management and strict pipeline prioritization • Negative foreign exchange effects, in particular the U.S. dollar and individual growth market currencies

[1] EBITDA pre of fiscal 2020 included income from the release of a provision for patent litigation amounting to € 365 million. Including this amount in the previous year, we expect a strong organic decline.

Net sales

Following the significantly negative effects from the Covid-19 pandemic that impacted the Healthcare business sector in fiscal 2020, we now expect to see strong organic growth of net sales in 2021. This will be driven mainly by Mavenclad® and Bavencio®. We thus believe that both products will generate a further significant increase in sales. For the core business, we forecast a roughly stable development. This reflects the continued competitive pressure and the associated decline in sales of Rebif®. Although the negative impacts of the volume-based procurement regulations that took effect in China in 2020 will now be seen in full in 2021, we forecast a roughly stable organic development for our products in the General Medicine & Endocrinology franchise. We assume that General Medicine & Endocrinology will resume its growth course as of 2022. The performance of the Fertility franchise will have a mitigating effect. At present we do not assume that the Covid-19 pandemic will have considerable negative effects on Healthcare sales. We forecast a slight to moderately negative foreign exchange effect.

EBITDA pre

For 2021, we expect EBITDA pre of the Healthcare business sector to see strong organic growth. The negative earnings effects resulting from the expected decline in Rebif® sales should be more than offset by substantial earnings contributions from Mavenclad®. In addition, we will continue our rigorous cost management and strict pipeline prioritization. We therefore expect marketing and selling expenses as well as research and development costs to decline as a percentage of sales. Research and development costs will remain heavily dependent on the development of clinical data and further expected study results. We forecast the upfront cash payment in the context of the global strategic alliance with GlaxoSmithKline for the joint development and marketing of bintrafusp alfa to have a positive earnings effect in the higher double-digit euro millions, which will be recognized in other operating income. The amount generally depends on the cost evolution. Development milestones will no longer occur subsequent to the recently communicated discontinuation of the INTR@PID Lung 037 trial. For fiscal 2021, we expect income from active portfolio management in a low to mid double-digit million range as well as income from the realization of milestone payments within the scope of our strategic alliance with Pfizer to develop and commercialize Bavencio®. By contrast, we expect foreign exchange effects to weigh heavily on EBITDA pre.

Forecast for the Life Science business sector

Forecast for the Life Science Business Sector

€ million	Actual results 2020	Forecast for 2021	Key assumptions
Net Sales	7,515	• Organic growth in the low teens percentage range • Slight to moderately negative foreign exchange effect	• All businesses contribute to growth • Process Solutions remains the main driver of growth, followed by Applied Solutions • Negative foreign exchange effects from the U.S. dollar in particular
EBITDA pre	2,405	• Organic earnings growth in the low teens percentage range • Slightly negative foreign exchange effects	• Organic earnings growth owing to the expected sales growth and positive Covid-19 effects amid a slight margin improvement • Negative foreign exchange effects primarily owing to the development of individual growth market currencies

Net sales

For the Life Science business sector in fiscal 2021, we forecast growth in the low teens percentage range. The Process Solutions business unit will clearly remain the strongest driver of growth and will be further propelled by significantly positive Covid-19 effects. Solid organic growth in Applied and Research Solutions will also contribute positively to the overall performance of Life Science. We expect no material portfolio effects from the acquisitions of AmpTec and Resolution Spectra Systems S.A.S., France. We forecast a slight to moderately negative foreign exchange effect.

EBITDA pre

In 2021, the Life Science business sector is expected to show organic growth of EBITDA pre in the low teens percentage range compared with the previous year. The persistently dynamic demand trend and clearly positive Covid-19 effects will contribute to organic earnings growth. Based on our estimates, the foreign exchange impact on earnings in fiscal 2021 should be only slightly negative.

Forecast for the Performance Materials business sector

Forecast for the Performance Materials Business Sector

€ million	**Actual results 2020**	Forecast for 2021	Key assumptions
Net sales	3,380	• Solid organic growth • Slight to moderately negative foreign exchange effect	• Strong growth momentum in Semiconductor Solutions • Positive organic growth in Surface Solutions • High organic growth in OLED materials • Negative foreign exchange effects from key Asian currencies and the U.S. dollar
EBITDA pre	1,024	• Solid to strong organic growth • Significant to strongly negative foreign exchange effect	• Growth in Semiconductor Solutions can more than offset price decline in Liquid Crystals supported by active cost management • Planned realization of synergies totaling around € 83 million from the integration of Versum Materials • Negative foreign exchange effects from key Asian currencies and the U.S. dollar

Net sales

Following the successful realignment of our portfolio, we expect solid organic growth of net sales in our Performance Materials business sector in fiscal 2021. Particularly for the Semiconductor Solutions business unit we forecast strong growth dynamics, which will exceed market growth in the medium term. In addition to sales by Semiconductor Materials, the project business of Delivery Systems & Services is expected to contribute significantly to organic growth. We expect our Surface Solutions business to see a positive organic development in 2021. Our Liquid Crystals business will still face continued price erosion owing price pressure common in this industry. We forecast a slight to moderately negative foreign exchange effect.

EBITDA pre

For our Performance Materials business sector, we expect a solid to strong organic increase in EBITDA pre in 2021. The price decline in liquid crystals will be more than offset by anticipated growth in Semiconductor Solutions and by active cost management. This forecast includes the planned realization of synergies amounting to totaling around € 83 million from the integration of Versum Materials. We assume that the expected foreign exchange development will have a significant to strongly adverse impact on EBITDA pre.

Corporate and Other

We expect that in fiscal 2021, Corporate and Other will be below the previous year’s level. This is mainly due to the positive effects expected from foreign currency hedging, which will partly offset negative foreign exchange effects in the business sectors.

Report in accordance with section 315a of the German Commercial Code (HGB)

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

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

Pursuant to the information on voting rights submitted to us in accordance with the German Securities Trading Act (WpHG), on December 31, 2020, no shareholders owned direct or indirect investments exceeding 10% of the voting rights.

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

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

The Executive Board is authorized to increase the company's share capital with the approval of the Supervisory Board and of E. Merck KG, Darmstadt, Germany, once or repeatedly, up to and including April 27, 2022, by up to a total of € 56,521,124.19 by issuing new no-par value bearer shares against cash and/or non-cash contributions (Authorized Capital 2017). Limited liability shareholders shall be generally granted the statutory right to subscribe to the new shares. However, the Executive Board is authorized, with the approval of the Supervisory Board, to exclude the limited liability shareholders' subscription right, in full or in part, in case of a capital increase against cash contributions pursuant to or by analogous application of section 186 (3) sentence 4 AktG, if the issue price of the new shares is not substantially lower than the stock exchange price of the company's shares already listed and if the new shares, which are issued under exclusion of the subscription right, do not exceed a proportional amount of 10% of the share capital either at the time of the Authorized Capital 2017 taking effect or at the time of the Authorized Capital 2017 being utilized. This restriction to 10% of the share capital shall include the proportional amount of the share capital that is attributable to shares that are issued under exclusion of the subscription right or sold during the term of the Authorized Capital 2017, based on an authorization to issue new shares or sell own shares by direct or analogous application of section 186 (3) sentence 4 AktG. Further, this restriction shall also include the proportional amount of the share capital that is attributable to shares which may or must be issued in order to service bonds carrying a conversion or option

right or a conversion or option obligation, if the bonds are issued during the term of the Authorized Capital 2017 under exclusion of the limited liability shareholders' subscription right by analogous application of section 186 (3) sentence 4 AktG.

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

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

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

Lastly, with the approval of the Supervisory Board, the subscription right of the limited liability shareholders can be excluded in order to exclude fractional amounts from the subscription right.

The sum of shares issued on the basis of the Authorized Capital 2017 under exclusion of the limited liability shareholders' subscription right must not exceed a proportional amount of 20% of the share capital, by taking into account other shares of the company which, during the term of the Authorized Capital 2017, are sold or issued under exclusion of the subscription right or are to be issued under bonds issued after April 28, 2017, under exclusion of the subscription right; this limitation shall apply both at the time of this authorization taking effect and at the time of this authorization being exercised.

To the extent that the subscription right is not excluded under the above provisions, it may also be granted to the limited liability shareholders by way of an indirect subscription right pursuant to section 186 (5) AktG or, in part, by way of a direct subscription right, and otherwise by way of an indirect subscription right pursuant to section 186 (5) AktG.

Furthermore, the Executive Board is authorized, with the approval of the Supervisory Board, to determine the additional details of the capital increase and its implementation, including the content of rights attached to the shares as well as the terms and conditions of the share issue.

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

Moreover, the share capital is contingently increased by up to € 16,801,491.20 composed of up to 12,924,224 no par value bearer shares (Contingent Capital II). This increase in contingent capital is only to be implemented insofar as the bearers or creditors of option or conversion rights, or with an obligation to convert or exercise options on warrant bonds, option participation certificates, option participation bonds, convertible bonds, convertible participation certificates, or convertible participation bonds issued against contributions that are issued or guaranteed by the company or a subordinate Group company on the basis of the authorization resolution of the Annual General Meeting of April 27, 2018, to April 26, 2023, utilize their option or conversion rights, or to fulfill their conversion obligation or obligation to exercise options insofar as they are obliged to fulfill their conversion or option exercise obligation, or insofar as the company exercises an option, wholly or in part, of granting shares in the company instead of paying the sum of money due, and to the extent that in each case a cash settlement is not granted, or own shares or other forms of fulfillment are used. Each issue of new shares shall take place at the determined option or conversion price, pursuant to the aforementioned authorization resolution. The new shares participate in the profit from the beginning of the fiscal year in which they are created; insofar as this is legally permissible, the Executive Board may, with the approval of the Supervisory Board, and in deviation from section 60 (2) AktG, stipulate that the new shares also participate in the profit for a past fiscal year. The Executive Board is authorized, with the approval of the Supervisory Board and of E. Merck KG, Darmstadt, Germany, to stipulate the further details of the implementation of the increase in contingent capital.

The company is not authorized to acquire its own shares.

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

Additional Information in accordance with the German Commercial Code (HGB)

The management report of Merck KGaA, Darmstadt, Germany, has been combined with the Group management report. The Annual Financial Statements and the Combined Management Report of the Group and Merck KGaA, Darmstadt, Germany, for 2020 are being filed with the electronic German Federal Gazette (elektronischer Bundesanzeiger) and are available on the website of the German company register.

Merck KGaA, Darmstadt, Germany, headquartered in Darmstadt, Germany, is the parent company of the Group. In addition to its function as a holding company, Merck KGaA, Darmstadt, Germany, generates sales in the Healthcare, Life Science, and Performance Materials business sectors. The Healthcare business sector has been run as a separate company, Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, since April 1, 2019 (see Effects of material company agreements on the net assets, financial position, and results of operations). Merck KGaA, Darmstadt, Germany, employs the majority of the 11,000-plus workforce in Darmstadt.

The financial statements of Merck KGaA, Darmstadt, Germany, have been prepared in accordance with the provisions of the German Commercial Code (HGB), as amended by the German Accounting Directive Implementation Act (BilRUG), and the German Stock Corporation Act (AktG). The full version of the Annual Financial Statements of Merck KGaA, Darmstadt, Germany, together with the unqualified auditor's opinion has been submitted to the operator of the electronic Federal Gazette (elektronischer Bundesanzeiger), where they are published and forwarded to the company register.

Statement on Corporate Governance

For the fiscal year 2020, our company exercise the option to publish the corporate governance statement on the Group website in accordance with section 315d HGB in conjunction with section 289f (1) sentence 2 of the HGB. The corporate governance declaration is available on the website **https://www.emdgroup.com/en/investors/corporate-governance/reports**.

Effects of material company agreements on the net assets, financial position, and results of operations

End of the temporary business lease of the Healthcare and Performance Materials business sectors

As part of the strategic development of Merck KGaA, Darmstadt, Germany, the existing operating activities of the Healthcare, Life Science, and Performance Materials business sectors within Merck KGaA, Darmstadt, Germany, together with the relevant assets and liabilities (hereinafter: "operating sectors"), were spun off at their carrying amounts into three separate companies (hereinafter: "OpCo" or plural "OpCos") with the legal form of a GmbH or German limited liability corporation (operating spin-off). This operating spin-off is based on the spin-off and takeover agreement concluded between Merck KGaA, Darmstadt, Germany, and the OpCos in notarized form on March 2, 2018. Following approval by the 2018 Annual General Meeting, the operating spin-off took place with economic effect as of 0:00 on January 1, 2018.

Immediately after the spin-off took effect, all shares held by Merck KGaA, Darmstadt, Germany, in the respective OpCos were transferred to holding companies via a further spin-off (holding company spin-off), as a result of which the OpCos are each indirectly held by Merck KGaA, Darmstadt, Germany, via an intermediate holding company. The acquiring legal entities within the scope of the holding company spin-off were Merck Healthcare Holding GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, for the business shares of Healthcare OpCo, Merck Life Science Holding GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, for the business shares of Life Science OpCo, and Merck Performance Materials Holding GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, for the business shares of Performance Materials OpCo (referred to individually as "HoldCo", independently of the sector, and jointly as "HoldCos"). To this end, Merck KGaA, Darmstadt, Germany, and the HoldCos signed a notarized spin-off and takeover agreement on March 2, 2018. The holding company spin-off took place with economic effect as of 0:00 on January 1, 2018.

Since the technical system requirements for the introduction of the sector-specific enterprise resource planning (ERP) systems as regards the OpCos were not in place at the time of the spin-off, the business activities spun off to the OpCos have been temporarily leased back by the relevant OpCos to Merck KGaA, Darmstadt, Germany, until sector-specific ERP systems have been introduced. For this purpose, also on March 2, 2018, Merck KGaA, Darmstadt, Germany, entered into a business leasing contract with each respective OpCo with economic effect as of 0:00 on January 1, 2018, to lease back all the operating business previously spun off to the OpCo. Under the terms of the respective business leasing contract, Merck KGaA, Darmstadt, Germany, leases the entire operation from the respective OpCo, as well as all fixed assets in this context; it acquires the current assets as well as certain liabilities and provisions at their carrying amounts under German commercial law. The business lease allowed the spin-off measures to be implemented for all OpCos with economic effect at a uniform time, 0:00 on January 1, 2018, while retaining the flexibility of transitioning the management of the relevant operating business in accordance with the sector-specific ERP introduction at an individual time to the OpCo in question in a targeted manner. On the basis of the business leasing contract, Merck KGaA, Darmstadt, Germany, will temporarily continue to operate the spun-off business as a leaseholder in its own name and for its own account. Once the relevant ERP systems have been introduced for the respective OpCo, the business lease with this OpCo will be terminated and the business previously leased out will pass to the OpCo.

The aforementioned spin-off and business leasing contracts form part of an overall entrepreneurial concept. They were submitted to the General Meeting of Merck KGaA, Darmstadt, Germany, for approval on April 27, 2018, at the 2018 Annual General Meeting, as a coherent restructuring measure and were approved. In 2018, the Healthcare OpCo changed its legal form to that of a German corporation with general partners (Kommanditgesellschaft auf Aktien) and has since been trading under the name of Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, Darmstadt.

The business leasing contract under which the Healthcare business sector was leased back to Merck KGaA, Darmstadt, Germany, was terminated on January 11, 2019, with economic effect as of 24:00 on March 31, 2019. The sector-specific ERP system for the Healthcare business sector was introduced as planned on April 1, 2019. As a result of the end of the business leasing contract, the leased objects allocated to the Healthcare business sector at the end of the lease – comprising current assets as well as certain liabilities and provisions, including the leased objects acquired or created by means of maintenance, replacement, and expansion investments – were transferred to Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, at their carrying amounts under German commercial law and in a condition commensurate with their continued and proper operational use up to the date the business leasing contract ended. As the carrying amounts of the liabilities exceeded the carrying amounts of the assets, Merck KGaA, Darmstadt, Germany, made a settlement payment to Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany. In addition, the licenses for the intangible assets and know-how leased to Merck KGaA, Darmstadt, Germany, came to an end.

As planned, the business leasing contract between Merck Performance Materials Germany GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, and Merck KGaA, Darmstadt, Germany, for the distribution and sales function of the Performance Materials business sector was terminated on November 18, 2019, with economic effect as of 24:00 on December 31, 2019. By way of an agreement dated November 18, 2019, the business leasing contract for the other functions of the Performance Materials business sector remains in place. Accordingly, the distribution and sales function of the Performance Materials business sector moved to Merck Performance Materials Germany GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, with economic effect as of 0:00 on January 1, 2020. The sector-specific ERP system for the distribution and sales function of the Performance Materials business sector was introduced at Merck Performance Materials Germany GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, as planned on January 1, 2020. As a result of the partial termination of the business leasing contract, the leased objects allocated to the distribution and sales function of the Performance Materials business sector at the end of the lease – comprising current assets as well as certain liabilities and provisions – were transferred to Merck Performance Materials Germany GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, at their carrying amounts under German commercial law. The contractual, process, procedural, and working relationships allocated to the function were also transferred to Merck Performance Materials Germany GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany.

As the carrying amounts of the assets exceeded the carrying amounts of the liabilities, Merck Performance Materials Germany GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, made a settlement payment to Merck KGaA, Darmstadt, Germany. In addition, the licenses for the intangible assets and know-how of the distribution and sales function leased to Merck KGaA, Darmstadt, Germany, came to an end.

The table below shows the assets and debt of Merck KGaA, Darmstadt, Germany, immediately before and after the partial termination of the business lease and the transfer of the assets and debt to Merck Performance Materials Germany GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany.

€ million	Merck KGaA, Darmstadt, Germany Dec. 31, 2019	**Merck KGaA, Darmstadt, Germany Jan. 1, 2020**
Assets		
A. Fixed assets		
Intangible assets	232.3	232.3
Tangible assets	859.9	859.9
Financial assets	22,457.6	22,457.6
	23,549.8	**23,549.8**
B. Current assets		
Inventories	567.0	504.9
Trade accounts receivable	186.2	178.6
Other receivables and other assets	972.9	1,037.8
Cash and cash equivalents	0.5	0.5
	1,726.6	**1,721.8**
C. Prepaid expenses	46.6	46.6
Total assets	**25,323.0**	**25,318.2**
Equity and liabilities		
A. Net equity		
Subscribed capital	168.0	168.0
General partner's equity	397.2	397.2
Capital reserves	3,813.7	3,813.7
Retained earnings	701.6	701.6
Profit carried forward E. Merck KG, Darmstadt, Germany	62.6	62.6
Net retained profit: shareholders	194.5	194.5
	5,337.7	**5,337.7**
B. Provisions		
Provisions for pensions and other post-employment benefits	378.6	378.6
Other provisions	604.7	600.9
	983.3	**979.5**
C. Liabilities		
Financial liabilities	3,000.0	3,000.0
Trade accounts payable	383.6	382.7
Other liabilities	15,604.8	15,604.7
	18,988.4	**18,987.4**
D. Deferred income	13.7	13.7
Total equity and liabilities	**25,323.0**	**25,318.2**

Merger of AB Pensions GmbH & Co. KG

With the agreement dated July 24, 2020, AB Pensionsverwaltung GmbH retired as complementary of AB Allgemeine Pensions GmbH & Co. KG (hereinafter "AB Pensions GmbH & Co. KG") with effect from August 31, 2020. At the same time, the AB Pensions GmbH & Co. KG merged to its sole limited partner Merck KGaA, Darmstadt, Germany. The assets and liabilities were transferred to Merck KGaA, Darmstadt, Germany, at their carrying amounts. For a better comparability, the main assets and liabilities are listed in the notes to the financial statements in the relevant financial statement caption. The main captions affected by the merger were pension provisions, cash pool and financial assets as well as other operating income in the income statement.

Business development

Net sales of Merck KGaA, Darmstadt, Germany, decreased in 2020. The decline of € -469 million resulted primarily from the Healthcare and Performance Materials business sectors. The Healthcare business sector has been held in a separate company, Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, since April 1, 2019. Accordingly, the prior-year figures included net sales from the operational Healthcare business in the first quarter. In addition, the Group services oncharged to the Healthcare business sector are allocated to Healthcare. On the other hand, net sales of the Life Science business sector rose, in particular.

			Change	
€ million	2020	2019	€ million	%
Healthcare	508	1,102	-594	-53.9
Life Science	1,169	987	182	18.4
Performance Materials	1,176	1,263	-87	-6.9
Other sales	323	293	30	10.2
Total	**3,176**	**3,645**	**-469**	**-12.9**

Other sales mainly included the intragroup oncharging of IT services, rent, and the umbrella brand, as well as other administrative services.

The share of sales with other Group companies (Group sales) amounted to 92.5% in the year under review (2019: 92.0%).

			Change	
€ million	**2020**	**2019**	€ million	%
Group sales	2,938	3,355	-417	-12.4
Sales to third parties	238	290	-52	-17.9
Total	**3,176**	**3,645**	**-469**	**-12.9**

At 66.2% (2019: 81.7%), the share of exports in 2019 was below the previous year's level.

			Change	
€ million	**2020**	**2019**	€ million	%
Outside Germany	2,103	2,978	-875	-29.4
Germany	1,073	667	406	60.9
Total	**3,176**	**3,645**	**-469**	**-12.9**

The decline in net sales of the Healthcare business sector is attributable to the fact that its business has been continued in a separate company, Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, since April 1, 2019. Accordingly, the prior-year figures included net sales from the operational Healthcare business in the first quarter.

In the Performance Materials business sector, sales in the Display Solutions business unit including OLED sales declined by -16.7% year-on-year. A sharp increase in sales in the Surface Solutions business unit (+27.0%), including Cosmetics sales, was not enough to offset this decline. This increase was largely due to the sale of inventories to Merck Performance Materials Germany GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, at their net carrying amount as of January 1, 2020. From a regional perspective, sales declined in North America and Latin America in particular.

Net sales in the Life Science business sector increased by a double-digit rate compared with the previous year, mainly due to the Process Solutions business unit (+35.7%). The Applied Solutions (+3.0%) and Research Solutions (+2.9%) business units also contributed to this development. Sales increased in the Europe, Asia-Pacific and North America regions in particular. By contrast, a decline was recorded in Latin America.

Results of operations

			Change	
€ million	**2020**	2019	€ million	%
Net sales	3,176	3,645	-469	-12.9
Other income	355	215	140	65.2
Cost of materials	-1,265	-1,459	195	-13.3
Personnel expenses	-1,070	-1,128	58	-5.1
Depreciation, amortization, and write-downs	-131	-122	-9	7.4
Other operating expenses	-1,047	-1,382	335	-24.2
Investment income/write-downs of financial assets	1,092	1,099	-7	-0.7
Financial result	-345	-228	-117	51.4
Profit before profit transfers and taxes	**765**	**641**	**124**	**19.3**
Profit transfers	-520	-456	-64	13.9
Taxes	-64	-16	-48	299.4
Profit after profit transfers and taxes	**181**	**169**	**12**	**7.2**

The increase in **other income** mainly resulted from the merger of AB Pensions GmbH & Co. KG. This was offset by a negative effect from changes in inventories.

The **cost of materials** fell overall due to fact that the Healthcare business has been continued in a separate company, Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, since April 1, 2019. Accordingly, the prior-year figures included the cost of materials of the operational Healthcare business in the first quarter. The cost of materials in relation to sales remained stable at 39.9% (2019: 40.0%).

The decline in **personnel expenses** was mainly attributable to the business transfer of almost 3,000 employees from the Healthcare business sector to Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany. Accordingly, the prior-year figures included the personnel expenses of the operational Healthcare business in the first quarter.

Depreciation, amortization, and write-downs rose as a result of the investments made in 2019 and 2020.

The continuation of the Healthcare business sector in a separate company since April 1, 2019, led to a fall in **other operating expenses**, mainly in marketing, research and other external services and remuneration. The prior-year figures included the other operating expenses of the operational Healthcare business in the first quarter.

Investment income was at the same level as the previous year. An overall increase in profit transfers from subsidiaries is offset by lower dividends from subsidiaries.

The year-on-year downturn in the **financial result** was primarily due to higher interest expenses for the financing of the Versum Materials acquisition and increased interest expenses resulting from the provisions for pensions assumed in connection with the accretion of AB Pensions GmbH & Co. KG.

Net assets and financial position

Assets

			Change	
€ million	**Dec. 31, 2020**	Dec. 31, 2019	€ million	%
Fixed assets	**23,883**	**23,550**	**333**	**1.4**
Intangible assets	229	232	-4	-1.5
Tangible assets	862	860	2	0.2
Financial assets	22,793	22,458	335	1.5
Current assets	**1,447**	**1,726**	**-280**	**-16.2**
Inventories	470	567	-97	-17.1
Trade accounts receivable	133	186	-53	-28.4
Other receivables and other assets	843	973	-130	-13.3
Cash and cash equivalents	1	1	0	20.0
Prepaid expenses	**52**	**47**	**5**	**10.9**
	25,382	**25,323**	**59**	**0.2**

Equity and liabilities

			Change	
€ million	**Dec. 31, 2020**	Dec. 31, 2019	€ million	%
Net equity	**5,351**	**5,338**	**13**	**0.2**
Provisions	**1,735**	**983**	**752**	**76.5**
Provisions for pensions and other post-employment benefits	1,104	379	726	191.6
Other provisions	631	605	27	4.4
Liabilities	**18,283**	**18,988**	**-706**	**-3.7**
Financial liabilities	3,517	3,000	517	17.2
Trade accounts payable	263	384	-120	-31.4
Other liabilities	14,503	15,605	-1,102	-7.1
Deferred income	**13**	**14**	-1	-4.5
	25,382	**25,323**	**59**	**0.2**

The change in the net assets and financial position of Merck KGaA, Darmstadt, Germany, was mainly due to the accretion of AB Pensions GmbH & Co. KG in August 2020 and the performance of additional financing measures for the Group. With total assets increasing by 0.2%, the equity ratio remained stable at 21.1% (2019: 21.1%).

The partial termination of the business lease for the distribution and sales function of the Performance Materials business sector resulted in a decline in the assets and liabilities attributable to this function (see ”Effects of material company agreements on the net assets, financial position, and results of operations”).

Financial assets increased due to the equity investment in Merck Capital Holding Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany, acquired as part of the accretion of AB Pensions GmbH & Co. KG.

Current assets (€ -280 million) decreased primarily as a result of the assets transferred to Merck Performance Materials Germany GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany (see "Effects of material company agreements on the net assets, financial position, and results of operations"). In addition, other receivables and other assets declined in respect to affiliated companies in particular.

The provisions for pensions assumed in connection with the accretion of AB Pensions GmbH & Co. KG accounted for the majority of the increase in provisions for pensions at Merck KGaA, Darmstadt, Germany (€ +726 million).

The increase in financial liabilities was due to the issue of bonds as well as additional borrowings to finance the Group.

The decrease in other liabilities primarily resulted from the reduction in cash pool liabilities due to the cash pool deposits acquired in connection with the accretion of AB Pensions GmbH & Co. KG as well as the issue of bonds and additional borrowings.

Research and development

In 2019, research and development expenditure totaled € 229 million (2019: € 434 million). A large portion was also incurred by companies outside the Group. The decline of € 206 million (47.3%) was mainly attributable to the fact that the Healthcare business sector has been continued in a separate company, Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, since April 1, 2019. Accordingly, the prior-year figures included the research and development expenses of the operational Healthcare business in the first quarter. Further information can be found in the "Research and Development" section in the Combined Management Report.

Research and development expenses

			Change	
€ million	**2020**	**2019**	€ million	%
Healthcare	0	132	-132	-100.0
Life Science	57	57	1	1.4
Performance Materials	159	244	-85	-34.9
Other R&D spending that cannot be allocated to individual business sectors	13	2	11	599.5
Total	**229**	**434**	**-206**	**-47.3**

The ratio of research and development spending to sales was 7.2% (2019: 11.9%). Overall, the average number of employees working in research and development was 1,076. The decline is mainly attributable to the fact that the R&D activities of the research-intensive Healthcare business sector have been continued at Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, since April 1, 2019.

Dividend

For 2020, we are proposing to the General Meeting the payment of a dividend of € 1.40 per share.

Personnel

As of December 31, 2020, Merck KGaA, Darmstadt, Germany, had 8,578 employees, representing an increase as against the previous year (2019: 8,474).

The average number of employees by functional area is as follows:

Personnel

Average number of employees during the year	**2020**	2019
Production	3,222	3,164
Administration	3,119	3,143
Research	1,076	1,678
Logistics	633	620
Marketing and sales	470	510
Other	16	23
Total	**8,536**	**9,138**

Risks and opportunities

Merck KGaA, Darmstadt, Germany, is largely subject to the same opportunities and risks as the Group. More information can be found in the Report on Risks and Opportunities.

Forecast for Merck KGaA, Darmstadt, Germany

Deviations of actual business development in 2020 from the previously reported guidance

The Combined Management Report for 2019 initially forecast a substantial decline in net sales in 2020. This was due to the planned termination of the business leasing contracts with Merck Life Science Germany GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, and Merck Performance Materials Germany GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, as well as the resulting transfer of the operating business of the Life Science and Performance Materials business sectors. In the updated forecast on May 12, 2020, net sales in the Life Science and Performance Materials business sectors were expected to be at the same level as in 2019 based on the revised project planning and the development of the Covid-19 pandemic at the time of the update. Net income was also expected to be the same as in the previous year.

In the Performance Materials business sector, sales in the Display Solutions business unit including OLED sales declined by -16.7% year-on-year. A sharp increase in sales in the Surface Solutions business unit (+27.0%) including Cosmetics sales, was not enough to offset this decline. This increase largely resulted from the sale of inventories to Merck Performance Materials Germany GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, at their net carrying amount as of January 1, 2020.

Net sales in the Life Science business sector increased by a double-digit rate compared with the previous year, mainly due to the Process Solutions business unit (+35.7%). The Applied Solutions (+3.0%) and Research Solutions (+2.9%) business units also contributed to this development.

The continuation of the Healthcare business sector in Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, led to a fall in the associated net sales and cost of materials and personnel, and other operating expenses at Merck KGaA, Darmstadt, Germany, as expected. Overall, the net income for the year was at a comparable level to the previous year.

Forecast 2021

In fiscal 2021, net sales are expected to be at a similar level to 2020.

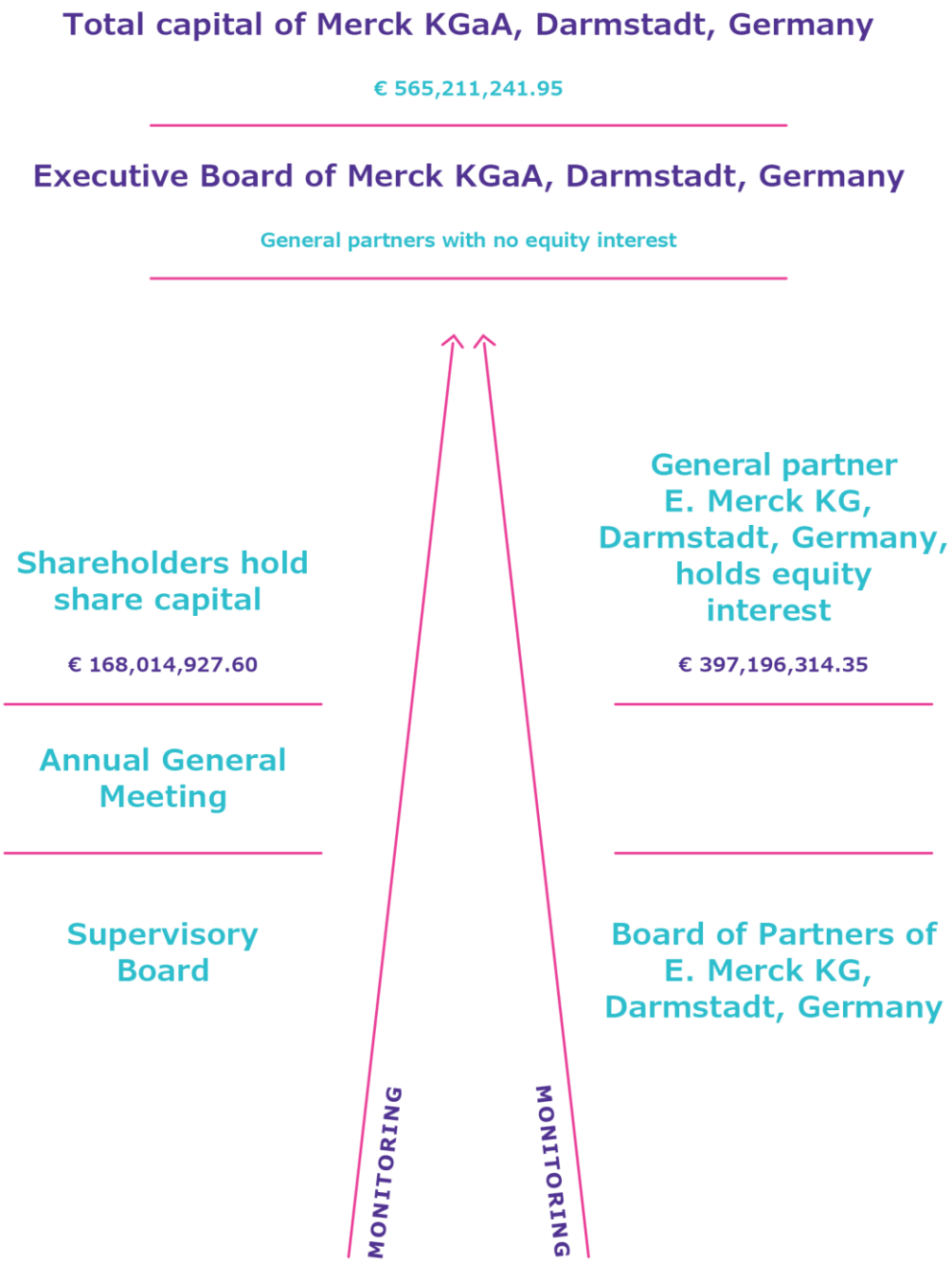
As in the previous year, the financing costs of the Sigma-Aldrich acquisition and the Versum Materials acquisition will continue to adversely affect net income. Nevertheless, net income for 2021 is expected to be at a comparable level to 2020 due to the positive investment income and dividends from the subsidiaries.

Merck Financial Services GmbH, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany, Darmstadt, will provide the company with sufficient financial resources and thus ensure liquidity.

No risks that could jeopardize the continued existence of the company have been identified.

CORPORATE GOVERNANCE

Capital Structure and Corporate Bodies of Merck KGaA, Darmstadt, Germany



Further information can be found under “Merck KGaA, Darmstadt, Germany” in the “Statement on Corporate Governance”

Statement on Corporate Governance including Compensation Report

The Statement on Corporate Governance contains the Declaration of Conformity, relevant information on practices within the company, and a description of the procedures of the corporate bodies, as well as targets for the percentage of positions held by women and the diversity policy.

Joint report of the Executive Board and the Supervisory Board including Declaration of Conformity

The German Corporate Governance Code is geared toward the conditions found in a German stock corporation ("Aktiengesellschaft" or "AG") and does not take into consideration the special characteristics of a corporation with general partners ("Kommanditgesellschaft auf Aktien" or "KGaA") such as Merck KGaA, Darmstadt, Germany. Given the structural differences between an AG and a KGaA, several recommendations of the German Corporate Governance Code are to be applied to a KGaA only in a modified form. Major differences between the two legal forms exist in terms of liability and management. While, in the case of an AG, only the AG is liable as a legal entity, the general partners of a KGaA also have unlimited personal liability for the company's obligations (section 278 [1] of the German Stock Corporation Act [AktG]). At Merck KGaA, Darmstadt, Germany, this pertains to both E. Merck KG, Darmstadt, Germany – which pursuant to article 8 (5) of the Articles of Association is excluded from management and representation – as well as to the managing general partners, who together make up the Executive Board of Merck KGaA, Darmstadt, Germany. The members of the Executive Board of Merck KGaA, Darmstadt, Germany, are therefore subject to unlimited personal liability. Unlike an AG, their executive authority is not conferred by the Supervisory Board, but rather by their status as general partners. Consequently, in addition to other responsibilities typical of the supervisory board of an AG (see description of the procedures of the Supervisory Board), the supervisory board of a KGaA does not have the authority to appoint the management board, draw up management board contracts, or specify compensation of the management board. This legal form also involves special features with regard to the General Meeting. For example, in a KGaA, many of the resolutions made require the consent of the general partners (section 285 [2] AktG), including in particular the adoption of the annual financial statements (section 286 [1] AktG).

Merck KGaA, Darmstadt, Germany, applies the German Corporate Governance Code analogously where these regulations are compatible with the legal form of a KGaA. In order to enable shareholders to compare the situation at other companies more easily, to a broad extent we base corporate governance on the conduct recommendations made by the Government Commission of the German Corporate Governance Code and forgo having our own, equally permissible, code. The recommendations of the Code in the version dated February 7, 2017, the intent and meaning of which are applied, have been complied with since the last Declaration of Conformity issued on February 3, 2020, in the version updated on February 27, 2020, with one exception. In future, we aim to comply with the recommendations of the Code in the version dated December 16, 2019.

For a clearer understanding, the following gives a general explanation of the application of German company law at Merck KGaA, Darmstadt, Germany, with additional references to the General Meeting and shareholder rights.

Merck KGaA, Darmstadt, Germany

The general partner E. Merck KG, Darmstadt, Germany, holds around 70% of the total capital of Merck KGaA, Darmstadt, Germany (equity interest); the shareholders hold the remainder, which is divided into shares (share capital). E. Merck KG, Darmstadt, Germany, is excluded from the management of business activities. The general partners with no equity interest (Executive Board) manage the business activities. Nevertheless, due to its substantial capital investment and unlimited personal liability, E. Merck KG, Darmstadt, Germany, has a strong interest in the businesses of Merck KGaA, Darmstadt, Germany, operating efficiently in compliance with procedures. The participation of Merck KGaA, Darmstadt, Germany, in the profit/loss of E. Merck KG, Darmstadt, Germany, in accordance with articles 26 et seq. of the Articles of Association further harmonizes the interests of the shareholders and of E. Merck KG, Darmstadt, Germany. E. Merck KG, Darmstadt, Germany, appoints and dismisses the Executive Board. In addition, E. Merck KG, Darmstadt, Germany, has created bodies – complementing the expertise and activities of the Supervisory Board – to monitor and advise the Executive Board. This task applies primarily to the Board of Partners of E. Merck KG, Darmstadt, Germany.

Based on the provisions of the German Stock Corporation Act, the Articles of Association of Merck KGaA, Darmstadt, Germany, and the rules of procedure of the various committees, Merck KGaA, Darmstadt, Germany, has a set of rules for the Executive Board and its supervision that meet the requirements of the German Corporate Governance Code. The investors, who bear the entrepreneurial risk, are protected as provided for by the German Corporate Governance Code. We take suggestions from the capital market on corporate governance seriously and hold discussions with investors and shareholder representatives.

The General Meeting of Merck KGaA, Darmstadt, Germany

The 25th Annual General Meeting of Merck KGaA, Darmstadt, Germany, was held on May 28, 2020, in Darmstadt, Germany. In response to the coronavirus pandemic, the Executive Board decided, with the approval of the Supervisory Board, to hold the 2020 Annual General Meeting in virtual form, i.e. without the shareholders and their proxies attending in person. In doing so, it took the option provided by the legislation introduced by the act on mitigating the consequences of the Covid-19 pandemic in civil, insolvency, and criminal procedure law (Gesetz zur Abmilderung der Folgen der Covid-19-Pandemie im Zivil-, Insolvenz- und Strafverfahrensrecht). Shareholders and shareholder representatives participated in the General Meeting virtually. The meeting was broadcast audiovisually on the Internet in full. At 69.44%, the proportion of share capital represented at the meeting (including postal votes) was slightly higher than in the previous year. In 2019, the proportion of share capital represented was 66.96%. The Annual General Meeting service provider does not forward voting instructions to our company in advance of the Annual General Meeting, but keeps them in the system until the count takes place.

In particular, the Annual General Meeting passes resolutions concerning the approval of the annual financial statements, the appropriation of net retained profit, the approval of the actions of the Executive Board members and the Supervisory Board members, as well as the election of the auditor. Changes to the Articles of Association likewise require the adoption of a resolution by the General Meeting. The shareholders of Merck KGaA, Darmstadt, Germany, exercised their rights at the virtual Annual General Meeting using the Internet-based General Meeting system and via a prior question and answer process. They were able to exercise their voting rights personally, through an authorized representative, or through a proxy appointed by the company. The proxies were in attendance throughout the duration of the General Meeting. All the documents and information concerning upcoming General Meetings (including a summary explanation of shareholder rights) are also posted on our website. The introductory speech by the Chairman of the Executive Board was published in advance on the Internet on May 25, 2020, in order to make it available to interested shareholders and members of the public and thus satisfy the high transparency requirements of the Group.

Declaration of Conformity

In accordance with section 161 AktG, applying the provisions of the German Corporate Governance Code correspondingly, the Executive Board and the Supervisory Board issued the following Declaration of Conformity with the recommendations of the Government Commission of the German Corporate Governance Code:

"Declaration of the Executive Board and the Supervisory Board of Merck KGaA, Darmstadt, Germany, on the recommendations of the Government Commission of the German Corporate Governance Code pursuant to section 161 of the German Stock Corporation Act (AktG). Since the last Declaration of Conformity on February 3, 2020, in the version updated on February 27, 2020, we have complied with the recommendations of the Government Commission of the German Corporate Governance Code in the version dated February 7, 2017, as published in the official section of the German Federal Gazette, with the following exception: Contrary to section 5.3.2 of the German Corporate Governance Code, the Supervisory Board has not established an audit committee. However, an audit committee does exist in the form of the Finance Committee of the Board of Partners of E. Merck KG, Darmstadt, Germany, which to a large extent exercises the duties described in section 5.3.2 of the Code. Due to the relatively limited authority of the supervisory board of a KGaA in comparison with that of an AG, this therefore satisfies the requirements of the German Corporate Governance Code. In addition, as of March 20, 2020, Merck KGaA, Darmstadt, Germany, has not maintained a D&O liability insurance policy for the members of the Supervisory Board with a corresponding deductible, as the relevant recommendation was dropped in the current version of the Code dated December 16, 2019.

In view of future compliance with the current recommendations of the Government Commission of the German Corporate Governance Code, the Executive Board and the Supervisory Board declare the following: The company will comply with the recommendations of the Code in the version dated December 16, 2019."

Darmstadt, February 26, 2021

For the Executive Board

signed Stefan Oschmann

For the Supervisory Board

signed Wolfgang Büchele

Compensation Report

(This section is part of the Combined Management Report.)

Compensation philosophy

As the world's oldest pharmaceutical and chemical company, we attach great importance to responsible governance and entrepreneurship. This is also reflected by the compensation of the members of the Executive Board of Merck KGaA, Darmstadt, Germany. Unlike management board members of stock corporations, they are not merely employed members of a corporate board. Rather, they are personally liable general partners of both Merck KGaA, Darmstadt, Germany, and the general partner E. Merck KG, Darmstadt, Germany, and in this capacity they receive profit sharing from E. Merck KG, Darmstadt, Germany. Owing to the legal form as a KGaA (corporation with general partners), the stipulations of the German Corporate Governance Code concerning the compensation of management board members of publicly listed German stock corporations as well as the individual disclosure thereof do not apply to the Executive Board members of Merck KGaA, Darmstadt, Germany. Nevertheless, we have decided to comply with the recommendations of the German Corporate Governance Code in the version dated February 7, 2017. The Compensation Report for the coming fiscal year and on the revised compensation system for the Executive Board will be based on the recommendations of the German Corporate Governance Code in the version dated December 16, 2019.

The compensation paid to the members of the Executive Board takes into account the responsibilities and duties of the individual Executive Board members, their status as personally liable partners, their individual performance, and the economic situation, as well as the performance and future prospects of the company. At the same time, the compensation should create a high long-term ambition for the members of the Executive Board while also protecting against disproportionality.

Furthermore, Executive Board compensation is oriented toward the external peer environment of Merck KGaA, Darmstadt, Germany, meaning in comparison with other German blue-chip (DAX®) companies as well as international competitors. The relationship between Executive Board compensation and the compensation of top management and the workforce as a whole continues to be taken into account, also in a multi-year assessment. The Personnel Committee regularly commissions an independent compensation consultant to review the appropriateness of the compensation.

The following principles are followed or taken into account when it comes to the specific structure of the compensation, the setting of individual compensation, the selection of the key performance indicators, and the structure of payout and allocation terms:

Regulatory requirements and principles of good corporate governance

The structure of the compensation system and the assessment of individual compensation are guided by the German Stock Corporation Act (AktG) and, with regard to compensation for 2020, by the German Corporate Governance Code in the version dated February 7, 2017, for the last time. The revised compensation system for the Executive Board of Merck KGaA, Darmstadt, Germany, will take into account the recommendations of the German Corporate Governance Code in the version dated December 16, 2019. Within the regulatory framework conditions, the objective is to offer the Executive Board members a competitive compensation package in line with market practice.

Long-term Group strategy

The execution of the long-term Group strategy is promoted through the selection of appropriate, ambitious key performance indicators for performance-related compensation. Against this background, our performance-related compensation components (profit sharing and Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany) are oriented toward the key performance indicators of the Group.

Long-term interests of our shareholders

The long-term interests of our shareholders are taken into account through a significantly high amount of variable, performance-related compensation as a proportion of total compensation as well as the compensation system's strong focus on the share price. The performance of the Executive Board members should be properly recognized, with the failure to meet targets leading to a noticeable reduction in performance-related compensation (malus) or a potential reclaim (clawback).

In our company, unlike publicly listed German stock corporations, it is not the Supervisory Board, but the Board of Partners of E. Merck KG, Darmstadt, Germany, that decides on the amount and composition of compensation received by our Executive Board members. The Board of Partners has assigned this task to its Personnel Committee. The Personnel Committee is thus primarily responsible for the followings topics as they relate to our Executive Board and the compensation of its members:

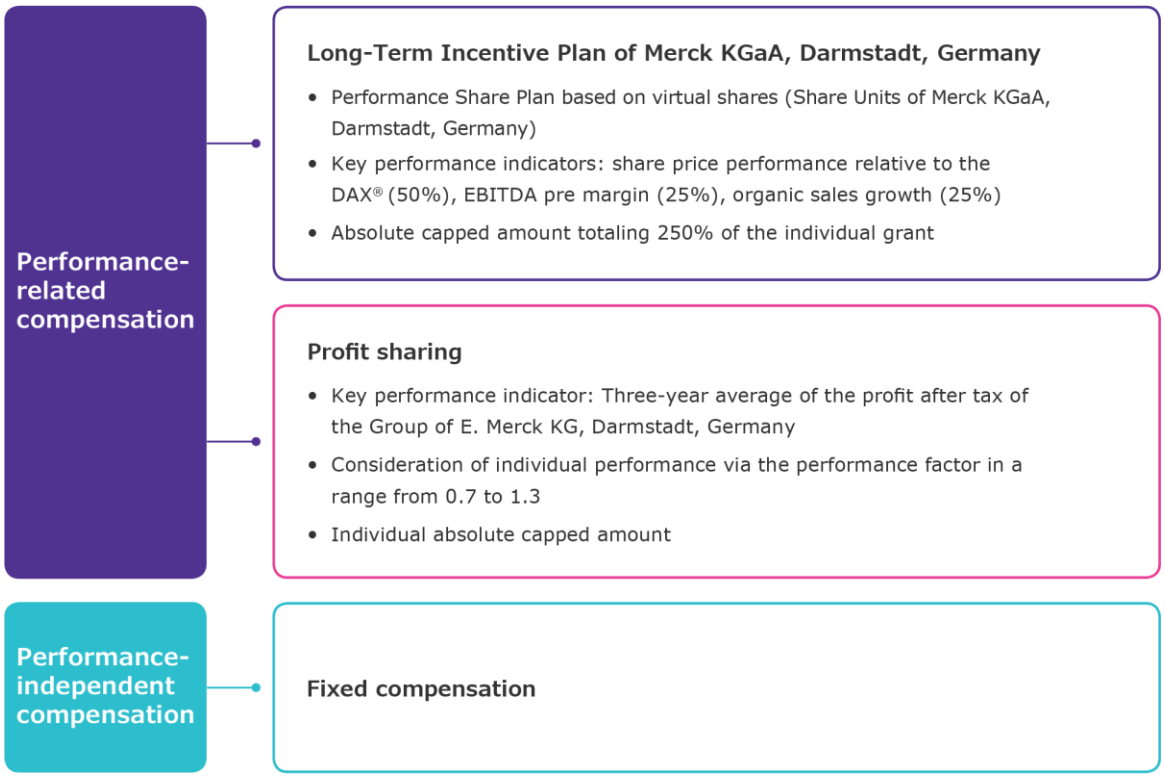
- Development and regular review of the compensation system
- Structure and examination of the performance-independent and performance-related compensation elements
- Contract terms of members of the Executive Board
- Assumption of honorary offices, board positions, or other sideline activities
- Distribution of responsibilities among Executive Board members
- Granting of loans and salary advances

Our compensation system for the Executive Board was revised again in 2020 in view of another round of regulatory changes resulting from the entry into force of the German Act Implementing the Second Shareholder Rights Directive (ARUG II) and the German Corporate Governance Code reform. The revised compensation system is expected to be submitted to the Annual General Meeting for approval in 2021. All mentions of the German Corporate Governance Code in this Compensation Report refer to the version dated February 7, 2017.

Overview of the structure and the components of the compensation system

The compensation system for the Executive Board in the reporting year essentially comprises the three main components of fixed compensation, profit sharing, and the Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany. It is complemented by contributions to the company pension plan as well as additional benefits. The components of the compensation system are as follows:

Compensation elements and compensation structure[1]



[1] Excluding additional benefits and company pension

Performance-independent compensation and additional benefits

Fixed compensation

The fixed compensation received by the members of the Executive Board comprises fixed and non-performance-related amounts that are paid in the form of 12 equivalent monthly installments.

Additional benefits

In addition, the members of the Executive Board receive non-performance-related additional benefits. These consist mainly of contributions to insurance policies, personal security expenses, and a company car, which they may use privately.

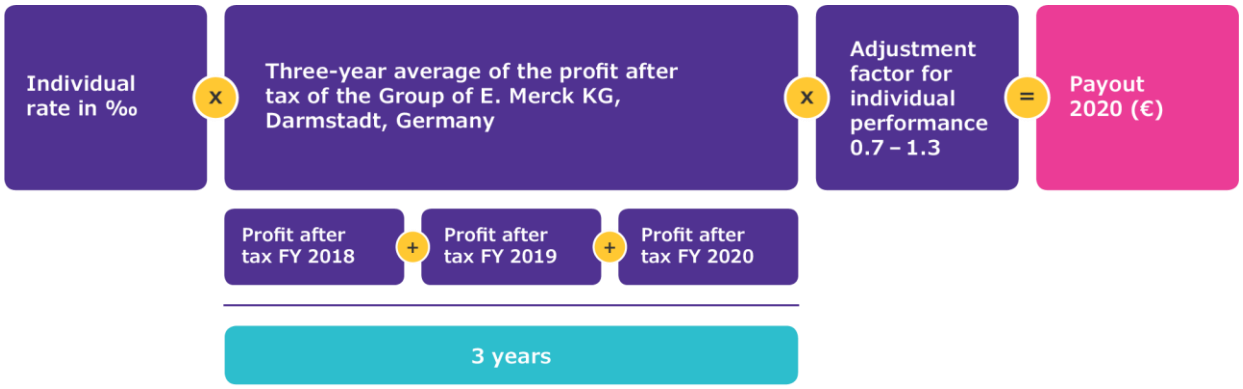
Performance-related compensation

Performance-related compensation comprises profit sharing as well as the Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany. Both performance-related compensation components are based on multi-year steering parameters. The regulatory requirements of the German Stock Corporation Act and the German Corporate Governance Code are taken into account, and particular recognition is given for sustainable corporate development.

Profit Sharing

Key performance indicator	Threeyear average of the profit after tax of the Group of E. Merck KG, Darmstadt, Germany
Cycle	Three years
Limit	Individual absolute capped amount

As part of profit sharing, at the end of a fiscal year the members of the Executive Board receive an individual per mille rate of the three-year average of profit after tax of the Group of E. Merck KG, Darmstadt, Germany. The current and the two preceding fiscal years are included in the calculation. The use of profit after tax as the key performance indicator, which also serves as the basis for dividend payments, ensures very close alignment with the shareholder interests. The amount of the individual per mille profit-sharing rates is staggered at intervals. Staggering means that achieving an average profit after tax of more than € 1 billion is more strongly incentivized than amounts below € 1 billion. Insofar as the average profit after tax is more than € 1.5 billion, however, the amount greater than € 1.5 billion is not taken into account when determining the profit-sharing payment. To appropriately take into account the individual performance of the Executive Board members, since fiscal year 2017 the Personnel Committee has been able to adjust the payment by applying a factor ranging from 0.7 to 1.3. The performance factor makes it possible to recognize superb performance of a member of the Executive Board by multiplying profit sharing by a value greater than 1.0 up to 1.3. Similarly, multiplying by a value less than 1.0 down to 0.7 can lower profit sharing if the case calls for it. The maximum profit-sharing payment is capped individually.



Since fiscal year 2018, the Personnel Committee has resolved to define criteria applicable to the adjustment of profit sharing, for applying the factor in a range of between 0.7 and 1.3. Insofar as the adjustment increases or decreases the profit sharing of a member of the Executive Board, this is to be published in the Compensation Report.

Adjustment criteria for increasing profit sharing could include the following:

- Extraordinary success in connection with M&A activities of the Group
- Extraordinary success in the sustainable strategic, technical, product-related, or structural further development or reorganization of the Group
- Extraordinary performance in the execution of especially important projects or the achievement of other exceptionally important objectives in the area of responsibility
- Extraordinary performance leading to a clear over-achievement of targets for relevant key performance indicators in the area of responsibility
- Extraordinary contributions to the aspirations and targets of the Group's stakeholders (for example, employee satisfaction, customer satisfaction, Corporate Social Responsibility, implementation of diversity requirements)

Adjustment criteria for lowering profit sharing could include the following:

- Violations of internal rules and guidelines (for example, our Code of Conduct), legislation, or other binding external requirements in the area of responsibility
- Significant breaches of duty of care within the meaning of section 93 AktG, or other grossly non-compliant or unethical behavior
- Behaviors or actions that are contradictory to our company values
- Failure to implement particularly important projects or to reach other exceptionally important targets in the area of responsibility
- Clear failure to achieve targets for relevant key performance indicators in the area of responsibility

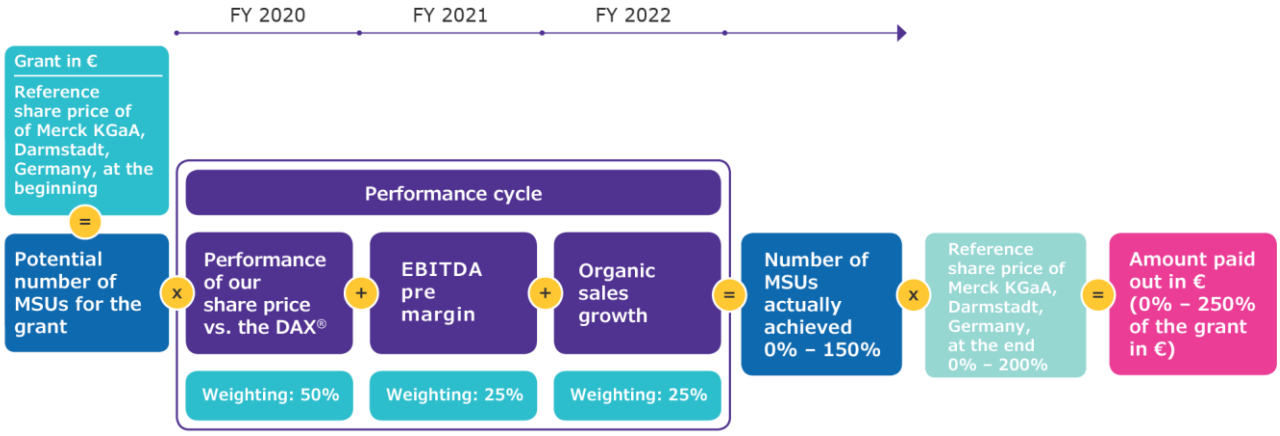
Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany (LTIP)

Key Performance Indicators	• Share price performance relative to the DAX® (50% weighting) • EBITDA pre margin (25% weighting) • Organic sales growth (25% weighting)
Cycle	Three years
Limit	Absolute capped amount totaling 250% of the individual grant
Reference price (share price for conversion into numbers or for payment)	Average closing price of shares of Merck KGaA, Darmstadt, Germany, in Xetra® trading during the last 60 trading days prior to the beginning or the end of the performance cycle

The Long-Term Incentive Plan is based on a three-year future-oriented performance cycle. As part of the Long-Term Incentive Plan, the members of the Executive Board are eligible to receive a certain number of virtual shares – Share Units of Merck KGaA, Darmstadt, Germany (MSUs). The number of MSUs is calculated as follows:

At the beginning of the performance cycle, the Personnel Committee defines an individual grant in euros for each Executive Board member. This grant is then divided by the definitive reference share price at the beginning of the performance cycle, resulting in the number of MSUs they could be eligible to receive. The final number of MSUs that are actually allocated to the Executive Board members after the performance cycle has expired depends on the development of three weighted key performance indicators over the three-year performance cycle:

- a) the performance of the share price of Merck KGaA, Darmstadt, Germany, compared with the performance of the DAX® with a weighting of 50%
- b) the EBITDA pre margin, as a proportion of a defined target value with a weighting of 25%
- c) the organic sales growth of the Group as a proportion of a defined target value with a weighting of 25%



The Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany, thus links two key performance indicators derived from the strategy with an external, relative key performance indicator. In light of our diversified business, the comparison of the share price performance of of Merck KGaA, Darmstadt, Germany, with the DAX® as an external, relative key performance indicator is more suitable than a comparison with an individual industry-specific index, as well as being more independent than a comparison with a defined peer group of companies. On the one hand, the performance indicators create an incentive to achieve strategic objectives. On the other hand, the strong share price orientation takes into account the company's long-term development prospects and the expectations of our shareholders. To prevent distortions as a result of exceptional factors as well as to directly reflect the performance of the Executive Board members, the EBITDA pre margin is used.

Depending on the performance of the key performance indicators, after the three-year performance cycle, between 0% and 150% of the provisionally promised MSUs are finally allocated. The value of these MSUs is paid out to the Executive Board in the year after the three-year performance cycle has ended. For this, the final allocated number of MSUs is multiplied by the definitive reference share price at the end of the performance cycle. The maximum increase in the share price is limited to 200% of the reference price at the beginning of the performance cycle, thus limiting participation in external effects that contribute to share price increases. Apart from setting a limit on the final number of allocated MSUs and on the applicable share price increase, the overall Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany, payment is limited to 250% of the individual grant. If targets are clearly missed, it is also possible that absolutely no payment is made from the Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany (0%).

Clawback provision

Through their status as personally liable general partners of Merck KGaA, Darmstadt, Germany, and E. Merck KG, Darmstadt, Germany, the Executive Board members bear a unique entrepreneurial responsibility. This is also reflected by the penalty criteria set forth in profit sharing and by the German statutory regulations on liability for damages stipulated in section 93 AktG.

In order to take even greater account of the prominent position of entrepreneurial responsibility in compensation, a clawback provision was included in the Long-Term Incentive Plan, effective January 1, 2018, allowing amounts allocated from the Long-Term Incentive Plan but not yet paid out to be retained. Cases in which the clawback provision may be applied include violations of internal rules and regulations (our Code of Conduct), legislation, other binding external requirements in the area of responsibility, significant breaches of duty of care within the meaning of section 93 AktG, and other grossly non-compliant or unethical behavior or actions that are contradictory to our company values.

To further increase the transparency of the Executive Board compensation system, the performance corridor for the key performance indicators used in the Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany, will subsequently be disclosed. However, the company will continue to refrain from publishing this performance corridor in advance as this could permit market-related and competitively relevant conclusions to be drawn about strategic objectives.

Share Ownership Guideline

A Share Ownership Guideline was introduced in 2017. This obligates the Executive Board members, for the duration of their employment relationship, to permanently hold shares of Merck KGaA, Darmstadt, Germany, in an amount equal to 100% of their annual gross fixed compensation. Owing to his position as Chairman of the Executive Board, Stefan Oschmann is obligated to hold a higher amount, that is at least 200% of his annual gross fixed compensation, in shares of Merck KGaA, Darmstadt, Germany. The duty to provide evidence of the complete number of shares must be met no later than on expiration of four years after having joined the Executive Board or after the introduction of the rule. The Share Ownership Guideline promotes even stronger alignment between the interests of the Executive Board members and those of our shareholders, and it additionally raises the entrepreneurial responsibility of the Executive Board members. Moreover, the introduction of the Share Ownership Guideline takes into account the widespread practice of share ownership among management and executive board members in international peer comparisons.

Outlook at the compensation system from 2021

The compensation system of the Executive Board has been revised effective January 1, 2021, and at the same time been integrated into the Agreements with the Executive Board members. The revised compensation system aims to create a high long-term ambition for the members of the Executive Board and at the same time to protecting against disproportionality. It will be presented to the Annual General Meeting on April 23, 2021 and will be subject to a "Say on Pay" on the Annual General Meeting 2021. The adjustments of the compensation system of the Executive Board include the following compensation components:

Profit sharing

- Reduction of modifier range: In the future, the range of the modifier will be reduced to 0.8-1.2 (up to and including 2020, the range was 0.7-1.3).
- Introduction of a threshold value and recalibration of the individual profit-sharing rates:
  A threshold value will be implemented for participating in the three-year average of the profit after tax of the Group of E. Merck KG, Darmstadt, Germany. If the three-year average of the profit after tax of the Group of E. Merck KG, Darmstadt, Germany, is below this threshold, no payment will be made.
- Introduction of a mandatory personal investment as part of the new Share Ownership Guideline:
  In the future, the members of the Executive Board of Merck KGaA, Darmstadt, Germany, will be obliged to invest one-third of the profit-sharing payment (net) in shares of Merck KGaA, Darmstadt, Germany, and to hold these shares for at least four years. Consequently, the revised compensation system will comply with the German Corporate Governance Code on share-based variable compensation (G. 10) in the revised version dated December 16, 2019. The previous Share Ownership Guideline will be replaced by this new regulation.

Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany (LTIP)

- Extension to a period of four years by introducing an additional one-year holding period:
  As before, target achievement will be determined after a three-year target achievement cycle. In addition, a one-year holding period will be added at the end of this target achievement cycle. This means that the LTIP is linked to the absolute share price performance of our shares for a performance cycle of four years in total. This ensures compliance with G. 10 of the German Corporate Governance Code in the revised version dated December 16, 2019, while also maintaining a uniform target achievement cycle for the LTIP for the members of the Executive Board and the other executives eligible to participate in the LTIP. Furthermore, the additional one-year holding period establishes an emphasized incentive regarding a sustainable increase of the share price of Merck KGaA, Darmstadt, Germany, in the long term.

Link to sustainability strategy

From 2021 onward, our sustainability strategy will also be integrated into the compensation system for the Executive Board. The following steps are planned:

Fiscal year 2021

The sustainability strategy of Merck KGaA, Darmstadt, Germany, will be integrated into the compensation system for the Executive Board via the modifier. The modifier, which will have a range of 0.8-1.2 in the future, also takes particular account of the ambitious sustainability targets developed for the Group in fiscal year 2020, which are geared toward non-financial performance criteria:

- Human Progress
- Sustainable value chains
- Reduction of our ecological Footprint

Fiscal year 2022

It is intended to integrate the sustainability strategy into the Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany, from 2022 onward. The necessary concepts and performance indicators will be successively developed in fiscal year 2021. The integration of the sustainability strategy into the Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany, will be based on the Group-wide sustainability targets and is intended to generate a corresponding incentive to achieve these goals.

Overall compensation limit

Compensation is capped with respect to its performance-related compensation elements of profit sharing and the Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany, as well as having an overall cap. The maximum limits are presented in the following table.

Overall compensation limit

€ thousand	Fixed compensation	Maximum profit-sharing limit	Maximum limit for Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany	Maximum limit for overall compensation[1]
Member of the Executive Board				
Stefan Oschmann	1,400	4,810	5,638	9,800
Udit Batra (left on: July 13, 2020)	1,100	3,640	4,263	8,000
Kai Beckmann	1,100	3,120	3,825	8,000
Belén Garijo	1,200	3,900	4,925	8,000
Marcus Kuhnert	1,000	3,120	3,300	8,000

[1] Excluding additional benefits and company pension.

Pension entitlements

Effective January 1, 2017, for the Executive Board members Kai Beckmann, Belén Garijo and Marcus Kuhnert, the individual contractual pension agreements were changed from defined benefit to defined contribution pension obligations, maintaining the direct commitment modality[1]. A defined contribution pension agreement was also in place with Udit Batra. Within the scope of these defined contribution pension obligations, every year an amount of € 400,000 respectively € 450,000 is paid into a benefit account and interest is paid on this at standard market interest rates. Once the respective Executive Board members reach the contractually agreed age limit and are no longer employed by E. Merck KG, Darmstadt, Germany, the amount in the benefit account is paid out either in ten annual installments or as a one-time payment. The balance in the benefit account is

disbursed as a one-time payment, possibly topped up by additional contributions (maximally ten contributions, up to the age of 60) in the event of permanent disability, or in the event of death to surviving dependents. The vested amount from the former defined benefit pension agreement was credited to the benefit account when the changeover took place.

There is a defined benefit pension obligation for Stefan Oschmann. The old-age pension is determined in accordance with a certain percentage of pensionable compensation. The percentages can be found in the table below. The individual contractual pension obligation grants Stefan Oschmann an entitlement to a lifelong old-age pension or surviving dependents' pension in the event of reaching the individual contractually agreed age limit, permanent disability, or death. As an alternative to an old-age pension, the promised pension may be paid out as a one-time amount calculated on the basis of actuarial principles once the age limit stipulated in the relevant contract has been reached.

[1] For accounting purposes, this corresponds to a defined-benefit obligation within the meaning of IAS 19.8.

Moreover, surviving dependents receive a surviving dependents' pension. For his spouse, this amounts to 60% of the pension entitlement. Dependent children are entitled to either a half-orphan's or an orphan's pension maximally until the age of 25.

The contribution amounts or pensionable compensation and the percentage obligation as well as the pension provisions and service costs, are listed in the following tables:

Defined contribution obligations

		IFRS			
	Contribution level	Service cost of pension obligations earned in the current year		Present value of the defined contribution pension obligation as of Dec.	
€ thousand		2019	**2020**	2019	**2020**
Member of the Executive Board					
Udit Batra (left on: July 13, 2020)	400	393	147	1,406	1,532
Kai Beckmann	400	392	392	4,867	5,325
Belén Garijo	450	391	440	5,119	5,649
Marcus Kuhnert	400	414	409	3,419	3,860
Total	**1,650**	**1,590**	**1,388**	**14,811**	**16,366**

Defined benefit obligation

			IFRS			
€ thousand	Pensionable compensation	Percentage entitlement	Service cost of pension obligations earned in the current year		Present value of the defined contribution pension obligation as of Dec.	
Member of the Executive Board			2019	**2020**	2019	**2020**
Stefan Oschmann[1]	800	68	1,372	1,611	14,524	17,344

[1] The percentage entitlement increases until retirement by two percentage points per year of service up to 70%.

Benefits in the event of termination of duties as an Executive Board member

In the event of the early termination of the employment relationship, without notice for good cause, the employment contracts of the Executive Board members stipulate a cap on severance pay in accordance with the recommendations of the German Corporate Governance Code in the version dated February 17, 2017. Pursuant to this, payments in connection with the termination of an Executive Board member's duties shall not exceed twice the annual total compensation, or constitute compensation for more than the remaining term of the employment contract (severance cap). If an Executive Board member's duties prematurely end due to the termination of the employment contract either by the company or the Executive Board member before the performance cycle of an open tranche in the Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany, expires, the obligations resulting from the plan no longer apply as a matter of principle.

The employment contracts of Stefan Oschmann and Kai Beckmann contain a post-contractual non-competition clause, as did the employment contract with Udit Batra. During a two-year period, an amount totaling 50% of the contractual average benefits received by the Executive Board member in question within the last twelve months prior to their departure is provided as compensation for each year of the period of the non competition clause. During the period of the non competition clause, other employment income and pension payments will be credited against this compensation. Within certain time limits, E. Merck KG, Darmstadt, Germany, has the possibility to dispense with adherence to the non competition clause with the consequence that the obligation to make the compensation payments shall no longer exist. There was no payment of such compensation in the case of Udit Batra. The contracts of the Executive Board members also provide for the continued payment of fixed compensation to surviving dependents for a limited period of time in the event of death. Above and beyond existing pension obligations, no further obligations exist in the event of the termination of the contractual relationships of the Executive Board members.

Loans and advances

The members of the Executive Board did not receive any advances or loans in fiscal 2020.

Payments to former Executive Board members and their surviving dependents

Payments to former members of the Executive Board or their surviving dependents are made for a limited period of time and represent continued payment of fixed compensation in the event of death, as well as pension payments. In fiscal 2020, these amounted to € 13,849 thousand (previous year: € 13,448 thousand). Pension provisions amounted to € 177,037 thousand in 2020 (previous year: € 163,617 thousand).

Other

The total compensation of the Executive Board of Merck KGaA, Darmstadt, Germany, includes both the compensation received from E. Merck KG, Darmstadt, Germany, as well as possibly also from subsidiaries consolidated in the Group financial statements. Should members of the Executive Board be held liable for financial losses while executing their duties, this liability risk is covered by a D&O insurance policy from Merck KGaA, Darmstadt, Germany, under certain circumstances. The D&O insurance policy has a deductible in accordance with the legal requirements and the recommendations of the German Corporate Governance Code.

Performance-related compensation in 2020

The compensation system for our Executive Board is geared to suitably rewarding the performance of Executive Board members in terms of sustainable corporate development and the creation of shareholder value, whereas the failure to meet targets leads to a noticeable decrease in performance-related compensation. In response to the suggestions from our shareholders and to further increase the transparency of the Executive Board compensation system, the following tables present the average individual profitsharing rates and the performance corridors for the key performance indicators used in the Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany.

Profit sharing

As part of profit sharing, the members of the Executive Board receive an individual per mille rate of the three-year average of profit after tax of the Group of E. Merck KG, Darmstadt, Germany, at the end of the fiscal year. The three-year average is based on the current year and the two preceding years.

Key performance indicator (€ million)	2017	2018	2019	**2020**
Profit after tax of the Group of E. Merck KG, Darmstadt, Germany	2,549	3,324	1,255	1,915
Three-year average profit after tax of the Group of E. Merck KG, Darmstadt, Germany (2017 – 2019)		2,376		
Three-year average profit after tax of the Group of E. Merck KG, Darmstadt, Germany (2018 – 2020)			2,165	

The amount of the individual per mille profit-sharing rates is staggered at intervals. This staggering incentivizes the achievement of an average profit after tax of more than € 1 billion more strongly than amounts below € 1 billion. However, insofar as the average profit after tax is more than € 1.5 billion, the amount greater than € 1.5 billion is not taken into account when determining the profit-sharing payment. The average profit-sharing rates in per mille for the members of the Executive Board in 2020 were as follows:

Member of the Executive Board	**Average profit-sharing rate in per mill in 2020**	**Performance factor for individual performance 2020**
Stefan Oschmann	1.88	1.2
Udit Batra (left on: July 13, 2020)	0.63	1
Kai Beckmann	1.22	1.2
Belén Garijo	1.52	1.2
Marcus Kuhnert	1.22	1.2

The adjustment factor for the profit-sharing amount for Stefan Oschmann, Belén Garijo, Kai Beckmann and Marcus Kuhnert has been set to 1.2. This is to recognize the extraordinary contributions by these members of the Executive Board to the aspirations and targets of the Group's stakeholders during the Covid-19 pandemic. The extraordinary handling of the pandemic situation has led to a remarkable success in terms of employee well-being, strong financial results, steady business operations as well as a very positive share price development in the fiscal year 2020. Specifically, the aforementioned members of the Executive Board distinguished themselves through the following achievements under the difficult conditions of the crisis.

In his role as CEO, Stefan Oschmann made the following objectives his top priority from the very beginning of the pandemic: the health and safety of all employees, business continuity in all three sectors, and a contribution to society via the provision of materials, e.g. for vaccine production. By establishing both a well-organized global task force and local crisis teams and connecting them very efficiently, it was always ensured that high safety standards were applied at all sites in all countries. Well thought-out hygiene measures were introduced quickly and efficiently, applied and communicated transparently. As a result, both the health situation at our sites and the economic success of the Group were always ensured. Additionally, Stefan Oschmann took over the responsibility for the Life Science sector ad interim. In addition to his regular duties, he successfully managed the business and ensured that the disproportionate increase in demand for life science products for diagnostics and vaccination could be responded to in a timely and demand-oriented manner.

Belén Garijo ensured that business operations could continue uninterrupted by setting clear priorities, communicating transparently, planning flexibly, and networking the crisis teams on critical issues. As member of the Executive Board being responsible for EQ (Environment, Health, Safety, Security and Quality), she held a leading role in the global management of the crisis. In addition, the Healthcare sector, under her leadership, ensured the supply of vital medicines to patients. The identification and development of drugs for the treatment of Covid-19 was given special priority.

The pandemic decisively changed living and working conditions around the world – a crisis situation in which the Performance Materials sector, with its materials for the electronics industry, was particularly important. In order to meet this rapidly and significantly increased demand, Kai Beckmann set the decisive course in the

Performance Materials sector to be able to drive forward digitization in a new dimension worldwide. As the Executive Board member responsible for Germany, Kai Beckmann played a key role in talks with government representatives to initiate suitable measures in companies. In addition, within his area of responsibility for Site Management worldwide, Kai Beckmann ensured that both the health and safety of employees and business operations were always safeguarded.

In his role as Chief Financial Officer for the Group, Marcus Kuhnert made the necessary decisions to maintain the economic performance and liquidity of the Group. Through his efforts, business operations were able to continue steadily without the need for government financial support. Beyond his contributions as CFO, Marcus Kuhnert, with his additional responsibilities for IT and the global Shared Services organization, has secured seamlessly the delivery of accounting, procurement and HR administrative and transactional services throughout the pandemic on a global scale. Challenges in the procurement process as securing critical materials to keep employees healthy and safe were handled efficiently and resolved quickly. In the IT function measures were taken on quickly and efficiently in adjusting the infrastructure to ensure remote working for a vast number of employees while keeping business processes running without disruptions. This has allowed the businesses of Healthcare, Life Science and Performance Materials to continue to operate without disruption and secured business continuity for customers and patients worldwide.

Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany

Until the beginning of fiscal 2017, payment from the Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany, was based on the achievement of specific targets with respect to the development of the share price of Merck KGaA, Darmstadt, Germany, compared with the DAX® as well as the development of the EBITDA pre margin during the three-year performance cycle. Since fiscal year 2017, organic sales growth of the Group has been included as an additional key performance indicator. The tables below show the target values that lead to 100% target achievement relative to the respective key performance indicator. Below the lower target corridor limit, target achievement for the respective key performance indicator is 0%. Above the upper target corridor limit, target achievement no longer increases. The performance corridor for the key performance indicators will be published retrospectively, as publication in advance would allow market- and competition-relevant conclusions about strategic targets.

Key performance indicator[1]	Lower target corridor limit	Target	Upper target corridor limit	Actually achieved value of LTIP of Merck KGaA, Darmstadt, Germany, tranche 2016	Target achievement of LTIP of Merck KGaA, Darmstadt, Germany, tranche 2016
Share price performance relative to the DAX® (external key performance indicator)	-20.0%	0.0%	50.0%	0.7%	100.7%
EBITDA pre margin (internal key performance indicator)	24.0%	27.0%	30.0%	28.1%	118.4%

[1]The key performance indicator organic sales growth became a component of the Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany, in 2017 and is therefore not relevant for target achievement of the tranche in fiscal 2016.

Key performance indicator	Lower target corridor limit	Target	Upper target corridor limit	Actually achieved value of LTIP of Merck KGaA, Darmstadt, Germany, tranche 2017	Target achievement of LTIP of Merck KGaA, Darmstadt, Germany, tranche 2017
Share price performancerelative to the DAX® (external key performance indicator)	-20.0%	0.0%	50.0%	-9.5%	52.5%
EBITDA pre margin (internal key performance indicator)	24.7%	27.7%	30.7%	27.1%	80.0%
Organic sales growth	2.5%	5.5%	8.5%	5.0%	83.4%

Total compensation

According to the German Commercial Code (HGB), the total compensation of the members of the Executive Board of Merck KGaA, Darmstadt, Germany, broken down by performance-related and performance-independent compensation components, is as follows:

		Performance-independent components		Performance-related components				Total	Expense recorded for the period for share-based compensation[4]
		Fixed compensation	Additional benefits	Profit sharing (without long-term incentive effect)[1]	Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany (with long-term incentive effect)				
		(€ thousand)	(€ thousand)	(€ thousand)	Grant value (€ thousand)	Number of MSUs[2]	Fair value[3] (€ thousand)	(€ thousand)	(€ thousand)
Member of the Executive Board									
Stefan Oschmann	2020	1,400	269	4,069	2,255	21,371	1,969	7,707	4,848
	2019	1,400	721	4,810	2,255	24,054	1,520	8,451	1,859
Udit Batra (left on: July 13, 2020)	2020	636	4	1,364	1,705	16,159	1,489	3,493	2,575
	2019	1,100	7	2,800	1,705	18,187	1,149	5,056	1,368
Kai Beckmann	2020	1,100	21	2,640	1,530	14,500	1,336	5,097	3,187
	2019	1,100	30	2,400	1,530	16,320	1,031	4,561	1,202
Belén Garijo	2020	1,200	66	3,299	1,970	18,670	1,720	6,285	4,065
	2019	1,100	49	3,000	1,870	19,947	1,260	5,409	1,541
Marcus Kuhnert	2020	1,000	25	2,640	1,320	12,510	1,153	4,818	2,838
	2019	942	26	2,284	1,320	14,080	890	4,142	1,088
Total	**2020**	**5,336**	**385**	**14,012**	**8,780**	**83,210**	**7,667**	**27,400**	**17,513**
	2019	**5,642**	**833**	**15,294**	**8,680**	**92,588**	**5,850**	**27,619**	**7,058**

[1] Date of granting (date of legally binding commitment).

[2] Number of potential MSUs subject to target achievement. The actual number of MSUs to be granted after the expiration of the three year performance cycle may deviate from this.

[3] Fair value on the grant date (date of the legally binding entitlement). This does not determine the amount of any payment. Payment is subject to target achievement and is made on a specified date after the expiration of the three-year performance cycle. The fair value of the obligations was calculated using a Monte Carlo simulation based on the previously described KPIs. The expected volatilities are based on the implicit volatility of shares of Merck KGaA, Darmstadt, Germany, and the DAX® in accordance with the remaining term of the LTIP tranche. The dividend payments incorporated into the valuation model are based on medium-term dividend expectations.

[4] In accordance with IFRS, the expense recorded for 2020 includes the amounts for the 2018, 2019, and 2020 LTIP tranches. In accordance with IFRS, the expense recorded for 2019 includes the amounts for the 2017, 2018, and 2019 LTIP tranches.

Information in accordance with the requirements of the German Corporate Governance Code

In accordance with the requirements of the German Corporate Governance Code, the following tables present the compensation granted for 2020, including additional benefits, contributions to the company pension plan, and the achievable minimum and maximum values of the variable compensation components, as well as the allocation of the respective compensation components for the fiscal year. The maximum amounts shown are purely arithmetical values. When compensation is allocated to the members of the Executive Board, the applicable overall compensation limit applies.

Benefits granted for the fiscal year

	Stefan Oschmann				Udit Batra			
	Chairman of the Executive Board				Member of the Executive Board (left on: July 13, 2020)			
Benefits granted (€ thousand)	2019	**2020**	**2020 (min.)**	**2020 (max.)**	2019	**2020**	**2020 (min.)**	**2020 (max.)**
Fixed compensation	1,400	1,400	1,400	1,400	1,100	636	636	636
Additional benefits	721	269	269	269	7	4	4	4
Total	**2,121**	**1,669**	**1,669**	**1,669**	**1,107**	**640**	**640**	**640**
Profit sharing	4,810	4,069	0	4,810	2,800	1,364	0	3,640
Multi-year variable compensation								
LTI 2019 (2019 to 2021)	1,520				1149			
LTI 2020 (2020 to 2022)		1,969	0	5,638		1,489	0	4,263
Total	8,451	7,707	1,669	12,117	5,056	3,493	640	8,543
Service cost	1,372	1,611	1,611	1,611	393	147	147	147
Total compensation	**9,823**	**9,318**	**3,280**	**13,728**	**5,449**	**3,640**	**787**	**8,690**

	Kai Beckmann				Belén Garijo			
	Member of the Executive Board				Member of the Executive Board			
Benefits granted (€ thousand)	2019	**2020**	**2020 (min.)**	**2020 (max.)**	2019	**2020**	**2020 (min.)**	**2020 (max.)**
Fixed compensation	1,100	1,100	1,100	1,100	1,100	1,200	1,200	1,200
Additional benefits	30	21	21	21	49	66	66	66
Total	**1,130**	**1,121**	**1,121**	**1,121**	**1,149**	**1,266**	**1,266**	**1,266**
Profit sharing	2,400	2,640	0	3,120	3,000	3,299	0	3,900
Multi-year variable compensation								
LTI 2019 (2019 to 2021)	1031				1,260			
LTI 2020 (2020 to 2022)		1,336	0	3,825		1,720	0	4,925
Total	**4,561**	**5,097**	**1,121**	**8,066**	**5,409**	**6,285**	**1,266**	**10,091**
Service cost	392	392	392	392	391	440	440	440
Total compensation	**4,953**	**5,489**	**1,513**	**8,458**	**5,800**	**6,725**	**1,706**	**10,531**

	Marcus Kuhnert			
	Member of the Executive Board			
Benefits granted (€ thousand)	2019	**2020**	**2020 (min.)**	**2020 (max.)**
Fixed compensation	942	1,000	1,000	1,000
Additional benefits	26	25	25	25
Total	**968**	**1,025**	**1,025**	**1,025**
Profit sharing	2,284	2,640	0	3,120
Multi-year variable compensation				
LTI 2019 (2019 to 2021)	890			
LTI 2020 (2020 to 2022)		1,153	0	3,300
Total	**4,142**	**4,818**	**1,025**	**7,445**
Service cost	414	409	409	409
Total compensation	**4,556**	**5,227**	**1,434**	**7,854**

Allocation for the fiscal year

	Stefan Oschmann		**Udit Batra**		**Kai Beckmann**	
	Chairman of the Executive Board		Member of the Executive Board (left on: July 13, 2020)		Member of the Executive Board	
Allocation (€ thousand)	2019	**2020**	2019	**2020**	2019	**2020**
Fixed compensation	1,400	1,400	1,100	636	1,100	1,100
Additional benefits	721	269	7	4	30	21
Total	**2,121**	**1,669**	**1,107**	**640**	**1,130**	**1,121**
Profit sharing	4,810	4,069	2,800	1,364	2,400	2,640
Multi-year variable compensation						
LTI 2016 (2016 to 2018)	2,261		1,708		1,617	
LTI 2017 (2017 to 2019)		1,670		1,262		1,059
Total	**9,192**	**7,408**	**5,615**	**3,266**	**5,147**	**4,820**
Service cost	1,372	1,611	393	147	392	392
Total compensation	**10,564**	**9,019**	**6,008**	**3,413**	**5,539**	**5,212**

	Belén Garijo		**Marcus Kuhnert**	
	Member of the Executive Board		Member of the Executive Board	
Allocation (€ thousand)	2019	**2020**	2019	**2020**
Fixed compensation	1,100	1,200	942	1,000
Additional benefits	49	66	26	25
Total	**1,149**	**1,266**	**968**	**1,025**
Profit sharing	3,000	3,299	2,284	2,640
Multi-year variable compensation				
LTI 2016 (2016 to 2018)	1,922		1,492	
LTI 2017 (2017 to 2019)		1,385		977
Total	**6,071**	**5,950**	**4,744**	**4,642**
Service cost	391	440	414	409
Total compensation	**6,462**	**6,390**	**5,158**	**5,051**

Compensation for the Supervisory Board members of Merck KGaA, Darmstadt, Germany

The compensation of the Supervisory Board members is defined by article 20 of the Articles of Association of Merck KGaA, Darmstadt, Germany. The members of the Supervisory Board receive fixed compensation of € 47,000 per year. The Chairman receives double and the Vice Chairman receives one and a half times this amount. Moreover, the members receive additional compensation of € 750 per meeting. The individual values are presented in the following table:

	Fixed compensation		Compensation for meeting attendance		Total compensation	
€	**2020**	2019	**2020**	2019	**2020**	2019
Wolfgang Büchele (Chairman)	94,000.00	94,000.00	3,000.00	3,750.00	97,000.00	97,750.00
Michael Fletterich (Vice Chairman) (until April 26, 2020)	19,057.53	70,500.00	1,500.00	3,750.00	20,557.53	74,250.00
Sascha Held (Vice Chairman) (since April 26, 2019)	70,500.00	32,191.78	3,000.00	3,000.00	73,500.00	35,191.78
Crocifissa Attardo (until April 26, 2019)	-	14,936.99	-	750.00	-	15,686.99
Mechthild Auge (until April 26, 2019)	-	14,936.99	-	750.00	-	15,686.99
Gabriele Eismann	47,000.00	47,000.00	3,000.00	3,750.00	50,000.00	50,750.00
Edeltraud Glänzer	47,000.00	47,000.00	3,000.00	3,000.00	50,000.00	50,000.00
Jürgen Glaser (since April 26, 2019)	47,000.00	32,191.78	3,000.00	3,000.00	50,000.00	35,191.78
Michaela Freifrau von Glenck (until April 26, 2019)	-	14,936.99	-	750.00	-	15,686.99
Siegfried Karjetta (until April 26, 2019)	-	14,936.99	-	750.00	-	15,686.99
Michael Kleinemeier (since April 26, 2019)	47,000.00	32,191.78	3,000.00	2,250.00	50,000.00	34,441.78
Renate Koehler (since April 26, 2019)	47,000.00	32,191.78	3,000.00	3,000.00	50,000.00	35,191.78
Anne Lange (since April 26, 2019)	47,000.00	32,191.78	3,000.00	2,250.00	50,000.00	34,441.78
Albrecht Merck (until April 26, 2019)	-	14,936.99	-	750.00	-	15,686.99
Peter Emanuel Merck (since April 26, 2019)	47,000.00	32,191.78	3,000.00	3,000.00	50,000.00	35,191.78
Dietmar Oeter	47,000.00	47,000.00	3,000.00	3,750.00	50,000.00	50,750.00
Alexander Putz (until April 26, 2019 and since May 28, 2020)	27,942.47	14,936.99	1,500.00	750.00	29,442.47	15,686.99
Christian Raabe (since April 26, 2019)	47,000.00	32,191.78	3,000.00	3,000.00	50,000.00	35,191.78
Helene von Roeder (since April 26, 2019)	47,000.00	32,191.78	3,000.00	3,000.00	50,000.00	35,191.78
Helga Rübsamen-Schaeff	47,000.00	47,000.00	3,000.00	3,000.00	50,000.00	50,000.00
Gregor Schulz (until April 26, 2019)	-	14,936.99	-	750.00	-	15,686.99
Theo Siegert (until April 26, 2019)	-	14,936.99	-	750.00	-	15,686.99
Daniel Thelen (since April 26, 2019)	47,000.00	32,191.78	3,000.00	3,000.00	50,000.00	35,191.78
Simon Thelen (since April 26, 2019)	47,000.00	32,191.78	3,000.00	3,000.00	50,000.00	35,191.78
Tobias Thelen (until April 26, 2019)	-	14,936.99	-	750.00	-	15,686.99
Veit Ulshöfer (until April 26, 2019)	-	14,936.99	-	750.00	-	15,686.99
Total	**822,500.00**	**823,787.70**	**48,000.00**	**57,000.00**	**870,500.00**	**880,787.70**

As a member of the corporate bodies of E. Merck KG, Darmstadt, Germany, the Supervisory Board member Wolfgang Büchele received an additional payment of € 140,000 for performing this function in 2020 (2019: € 140,000).
As a member of the corporate bodies of E. Merck KG, Darmstadt, Germany, the Supervisory Board member Helga Rübsamen-Schaeff received an additional payment of € 150,000 for performing this function in 2020 (2019: € 150,000).
As a member of the corporate bodies of E. Merck KG, Darmstadt, Germany, the Supervisory Board member Michael Kleinemeier received an additional payment of € 140,000 for performing this function in 2020.
As a member of the corporate bodies of E. Merck KG, Darmstadt, Germany, the Supervisory Board member Helene von Roeder received an additional payment of € 150,000 for performing this function in 2020.
As a member of the corporate bodies of E. Merck KG, Darmstadt, Germany, the Supervisory Board member Peter Emanuel Merck received an additional payment of € 80,000 for performing this function in 2020 (2019: € 80,000).
As a member of the corporate bodies of E. Merck KG, Darmstadt, Germany, the Supervisory Board member Daniel Thelen received an additional payment of € 140,000 for performing this function in 2020 (2019: € 130,246).
As a member of the corporate bodies of E. Merck KG, Darmstadt, Germany, the Supervisory Board member Simon Thelen received an additional payment of € 140,000 for performing this function in 2020 (2019: € 137,151).

Loans, advances or liabilities

The members of the Supervisory Board did not receive any loans or advances in the fiscal year 2020. Similarly, no liability was entered into in favor of the members of the Supervisory Board in the fiscal year 2020.

Ownership, purchase, or sale of shares in the company by members of the Executive Board and the Supervisory Board

As of December 31, 2020, the members of the Executive Board and of the Supervisory Board held fewer than 1% of the issued shares of Merck KGaA, Darmstadt, Germany. Transactions executed by members of the Executive Board and of the Supervisory Board are disclosed on our website at **https://www.emdgroup.com/en/investors/corporate-governance/directors-dealings.html**.

Information on corporate governance practices

Reporting

It is the objective of Merck KGaA, Darmstadt, Germany, to provide the latest information to all shareholders, media, financial analysts, and interested members of the public, while creating the greatest possible transparency. For this reason, we use a wide range of communication platforms to engage in a timely dialogue with all interested parties about the company's situation and business changes. Our principles include providing factually correct, comprehensive, and fair information.

Information subject to disclosure requirements, as well as information that is not, can be accessed worldwide on the Merck KGaA, Darmstadt, Germany, website (**www.emdgroup.com**), which is the company's most important publication platform. In addition to a detailed financial calendar, quarterly statements and/or quarterly and half-year financial reports covering at least the past three years are available there in German and English. In line with the legal requirements, ad hoc announcements are also published on the website. These contain information on circumstances and facts that could impact the share price of Merck KGaA, Darmstadt, Germany.

Regular press conferences, investor meetings on the occasion of investor conferences, and road shows offer another platform for dialogue, the company presentations prepared for this purpose are also available on the Merck KGaA, Darmstadt, Germany, website. In addition, the Investor Relations team is always available to private and institutional investors who wish to receive further information. To ensure the greatest possible transparency, all documents concerning the General Meeting are available on the company website. Additionally, some parts of the General Meeting are generally webcast live on the Internet. The Annual General Meeting on May 28, 2020 was held virtually and hence was webcast live on the Internet in full.

Dealing with insider information

Dealing properly with insider information is very important to us. Our Insider Committee examines the existence of insider information, ensures compliance with legal obligations, and prepares any necessary measures. The members of the Insider Committee are appointed by the Executive Board; at least two members work in Group Legal & Compliance. The Insider Committee meets at regular intervals, yet also meets when circumstances require. The Chief Financial Officer is vested with the authority to make the final decision on handling potential insider information.

In order to ensure a high level of protection for insider information, the Executive Board issued internal insider guidelines applicable throughout the Group worldwide, which were most recently updated in fiscal 2020. The guidelines inform employees about their responsibilities under insider trading laws and give clear instructions for compliant behavior. In addition, they describe the function of the Insider Committee in detail. Moreover, our Code of Conduct, which is binding on all employees, also contains an explicit, detailed reference to the ban on using insider information. Within the scope of obligatory training courses on the Code of Conduct as well as specific training courses on insider law, all employees are instructed on the stipulations of insider trading.

Accounting and audits of financial statements

Merck KGaA, Darmstadt, Germany, prepares its Consolidated Financial Statements and Combined Management Report in accordance with International Financial Reporting Standards (IFRS), as applicable in the European Union, as well as the supplementary German statutory provisions applicable under section 315e (1) of the German Commercial Code (HGB). The Consolidated Financial Statements and the Combined Management Report are prepared by the Executive Board and examined by an auditor, taking into account the German generally accepted standards for the audit of financial statements promulgated by the Institute of Public Auditors in Germany (Institut der Wirtschaftsprüfer, IDW).

The Supervisory Board commissioned KPMG AG Wirtschaftsprüfungsgesellschaft, Berlin, to audit the Consolidated Financial Statements and the Combined Management Report for 2020. Moreover, the Supervisory Board agreed with KPMG AG Wirtschaftsprüfungsgesellschaft, Berlin, that the auditor shall inform the Supervisory Board without delay of any grounds for disqualification or bias occurring during the audit if these cannot be immediately rectified. Additionally, the auditor shall immediately report to the Supervisory Board any findings and issues that emerge during the audit that have a direct bearing upon the tasks of the Supervisory Board. The auditor shall inform the Supervisory Board or note in the audit report any circumstances determined during the audit that would render inaccurate the Declaration of Conformity made by the Executive Board and the Supervisory Board. It has also been agreed with the auditor that in order to assess whether the Executive Board has fulfilled its obligations in accordance with section 91 (2) of the German Stock Corporation Act (AktG), the audit will also cover the company's early warning risk identification system. Moreover, the auditor is required to examine and evaluate the accounting-relevant internal control system insofar as this is necessary and appropriate for assessing the accuracy of financial reporting.

Since 1995, KPMG AG Wirtschaftsprüfungsgesellschaft, Berlin, has been the audit firm for the statutory audit of the Annual Financial Statements and Consolidated Financial Statements of Merck KGaA, Darmstadt, Germany. The auditor responsible for auditing the Consolidated Financial Statements changes regularly. Dirk Janz is currently leading the audit engagement. Mr. Janz has been the auditor in charge of the engagement since fiscal 2020, replacing Mr. Rackwitz after the latter had performed this role for five years. The Supervisory Board had KPMG AG Wirtschaftsprüfungsgesellschaft, Berlin, provide a statement regarding the scope of the business, financial, personal, and other relationships between KPMG AG Wirtschaftsprüfungsgesellschaft, Berlin, its bodies and head auditors, and Merck KGaA, Darmstadt, Germany, its Group companies and the members of their bodies (independence declaration). The statement also covers the scope of the services provided by KPMG AG Wirtschaftsprüfungsgesellschaft, Berlin, in the previous fiscal year as well as the services (other than auditing services) that are contracted for the upcoming year (especially consultancy services) for Merck KGaA, Darmstadt, Germany, and its subsidiaries. Having examined the declaration, the Supervisory Board has found no grounds to doubt the independence of KPMG AG Wirtschaftsprüfungsgesellschaft, Berlin. Neither party identified any conflicts of interest. The Supervisory Board reviews the quality of the audit, including the performance of the auditor in charge of the engagement, annually on the basis of objective indicators.

Due to the requirement to change auditors at regular intervals, Merck KGaA, Darmstadt, Germany, must appoint a new auditor (different than the current one) no later than for fiscal 2024. In fiscal 2019, the Supervisory Board of Merck KGaA, Darmstadt, Germany, therefore decided to prepare a public request for tender for the audit of the annual financial statements and consolidated financial statements of Merck KGaA, Darmstadt, Germany, and to voluntarily change auditors for the fiscal 2023 audit, earlier than required. The public request for tender was published in the German Federal Gazette in February 2020.

Further reports

The Combined Management Report of Merck KGaA, Darmstadt, Germany, and the Group does not contain a non-financial declaration. Instead, we issue a separate combined non-financial (Group) report in accordance with sections 289b-289e and 315b-315c HGB. This is available effective April 13, 2021, as an online version on our website at **https://www.emdgroup.com/en/sustainability-report/2020/**. It is integrated into the 2020 Corporate Responsibility Report in accordance with DRS 20 subsection 252 (b). We have compiled an overview of the information contained in the combined non-financial (Group) declaration at **www.emdgroup.com/nfr20**.

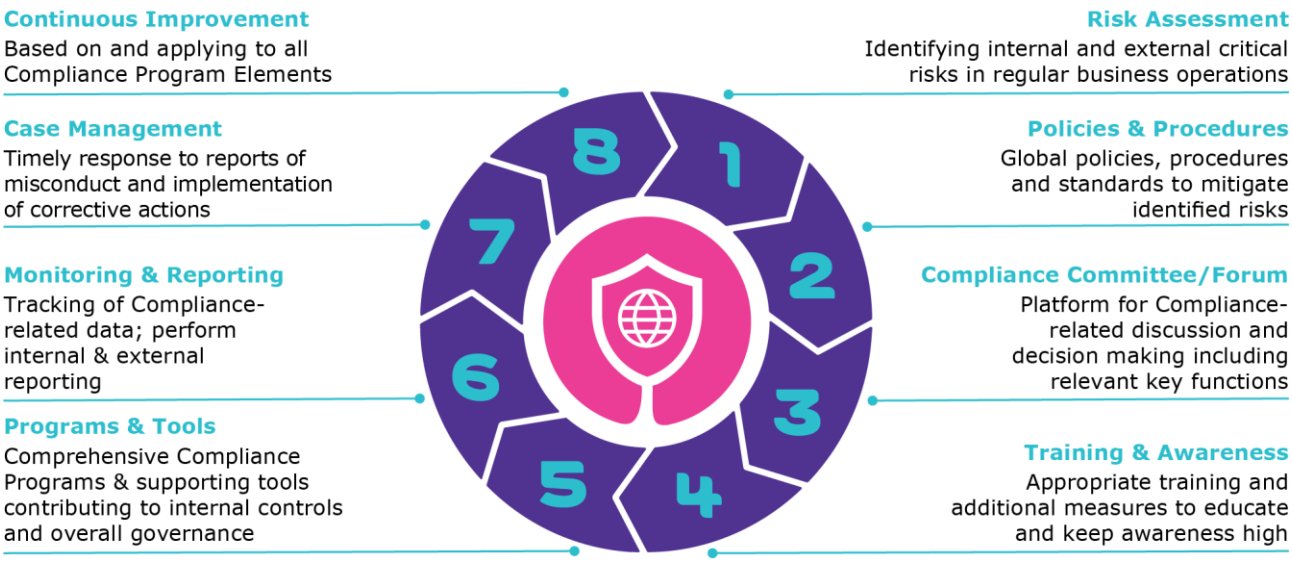
Values and compliance

First and foremost, responsible entrepreneurship means acting in accordance with the law – also known as compliance. All our activities are required to adhere to the applicable laws, regulations, and international ethical standards around the world. Compliance violations would result not only in possible legal action but also could seriously compromise our reputation as an employer and business partner.

Our "Group Compliance & Data Protection" function is responsible for the core topics of anti-corruption, anti-money laundering, business partner due diligence, data protection and transparency requirements, as well as for compliance with healthcare regulations and dawn raids. Group-wide policies, procedures, and processes are in place for these important compliance topics in order to ensure that our business activities are consistent with the relevant laws, regulations, and international ethical standards.

Our compliance management system encompasses important core elements that make up our compliance portfolio:

Elements of our compliance program



The underlying principle of our compliance management system is living our values together. The Compliance department adopts a specific brief in this respect.

A global framework for ethical and legally compliant business processes serves to minimize risk. We achieve this by identifying specific compliance risks and requirements. Suitable policies and controls are implemented in order to reduce risk. Our goals also focus on our employees: It is up to us. This serves to strengthen

employees' sense of responsibility and accountability. We achieve this by informing employees about the applicable compliance rules and ethical standards and by giving them the responsibility for complying with these requirements. As compliance is the second line of defense against risks, it is important that we consistently safeguard what really matters. This is why we regularly implement key figures that allow us to assess risks and the effectiveness of controls. Compliance not only contributes to company growth but also creates targeted value added by allowing us to advise the business sectors and help them to navigate the respective compliance requirements. The advice we provide takes account of changes in business requirements and is adapted accordingly.

Based on a corporate culture that places the fundamental company values – courage, achievement, responsibility, respect, integrity, and transparency – at the center of our entrepreneurial actions, our Code of Conduct (**www.emdgroup.com/company/responsibility/us/regulations-and-guidelines/code-of-conduct.pdf**) helps those involved in the business to implement the values when dealing with one another on a daily basis.

With its Code of Conduct, which was revised in mid-2017, we have established a set of rules and regulations intended to help our employees to act responsibly and to make the right decisions in their daily work.

The Code of Conduct explains the company principles for dealings with business associates, shareholders, colleagues, and employees, and within the scope of our responsibility for society. Therefore, it supports all employees in acting ethically – not only in their dealings with one another but also outside the company. Accordingly, the Code of Conduct is also the main set of rules for our Compliance Program. We have aligned the content of its Code of Conduct with our values and integrated important topics such as data privacy, healthcare compliance, and bioethics. To us, compliance means observing legal and internal regulations and the basic ethical principles anchored in the company's values. With the Code of Conduct and the various unit-specific ethical compliance rules, the values are integrated into daily work and business practice. The Code of Conduct applies to all employees, both at headquarters and in the subsidiaries. We also expect our business associates worldwide to accept these principles or to have their own comparable principles. While supplier management ensures compliant behavior of suppliers, global business partner risk management encompasses the relations with sales-related business associates such as distributors and wholesalers.

The Compliance department monitors observance of the Code of Conduct with support from corresponding monitoring and training programs throughout the Group. All employees are called upon to report potential compliance violations to their supervisor, Legal, HR, or other relevant departments. In cooperation with Group Internal Auditing, the Compliance Office regularly reviews the implementation of Group-wide compliance measures at the subsidiaries. The audits regularly focus on the local compliance structure, the compliance measures taken, and the existence of corresponding compliance guidelines and processes.

The Group Compliance Officer is responsible for the establishment, maintenance, and further development of our global Compliance Program. Among other things, the Group Compliance Officer and his team, consisting of a center of excellence and sector compliance officers, take appropriate measures to help lower the risk of serious violations of antitrust law, anti-corruption rules, and legal regulations and requirements of industry codes in the healthcare sector and support the business sectors with specific compliance input. Responsibility for money laundering prevention was added in 2018, with Compliance coordinating the necessary organizational measures, including training.

A further focus area of the Compliance Program is ensuring legally and ethically correct dealings with medical professionals and adhering to the transparency requirements. Since October 2013, the Group Compliance Officer has agreed on extensive measures with the affected areas of the company in order to establish an internal framework of rules as well as the corresponding processes for approving and documenting interactions with experts that ensure correct publication. We, of course, also ensure compliance with the respectively valid data protection regulations.

The role of the Group Compliance Officer is reflected in the subsidiaries, which ensure via country representatives that compliance measures are implemented in the countries. Since 2013, Compliance tasks in the countries and on a regional basis have largely been performed by full-time compliance officers. As a result,

a higher level of compliance expertise is based locally, and the increasing tasks in all business sectors are taken into account. At the same time, the management structure was streamlined and the reporting lines for the countries were consolidated regionally/globally. Since the end of 2016, the compliance officers in the countries have been reporting to the dedicated compliance officers for the respective business sectors (Healthcare, Life Science, and Performance Materials). A separate responsibility was also created for Group functions. Regular regional and global compliance meetings are held to promote the exchange of information within the Compliance organization. This is supplemented by a global concept for local compliance forums and global compliance committees, at which compliance-related topics including the compliance priorities in the respective countries or at a global level are discussed with senior management. These constitute an important element of risk assessment and quality assurance.

Newcomer training seminars were introduced in 2010 for newly appointed compliance officers. These seminars serve to build up compliance expertise and strengthen cooperation within the Compliance organization. This Group-wide network is used to steer the global Compliance Program. Within the Group Compliance function in Darmstadt, Germany, a center of excellence has been established with responsibility for the continuous maintenance and further development of the Compliance Program and shaping the company's internal compliance guidelines. The Compliance organization is also involved in the relevant due diligence processes for the incorporation of new business units as well as possible divestments and acquisitions, and the subsequent integration of companies. Within the scope of the global compliance program, a high degree of importance is attached to regular compliance seminars of our Compliance Training Plan, which are conducted as web-based training courses and classroom sessions. By presenting various training topics, particularly on the Code of Conduct, corruption, antitrust and competition law, as well as healthcare compliance and data privacy, they serve to sensitize employees and management to the consequences of compliance violations and to show ways of avoiding them. Since we set up a central whistleblowing hotline, the SpeakUp line, our employees, and individuals outside of our company have been able to report compliance violations by telephone or via a web-based application in their respective language. The SpeakUp line is available 24 hours a day, free of charge. Case numbers enable anonymous, two-way communication. The reports received are individually reviewed. If a compliance violation exists, corresponding corrective action is taken based on concrete action plans. If necessary, disciplinary measures are taken. These can range from a simple warning up to the dismissal of the employee who violated a compliance rule. In 2010, we set up a Compliance Case Committee to guide these processes. The Compliance Case Committee consists of senior members from various Group governance functions; they are involved in reviewing compliance violations and introducing countermeasures. The joint work in the Compliance Case Committee enables processes between the various Group functions to be optimally coordinated and designed efficiently.

The Compliance Office reports regularly to the Executive Board, the Finance Committee, and the Supervisory Board, informing them of the status of compliance activities (including training status), compliance risks, and serious compliance violations.

The Executive Board informs the supervisory bodies at least once a year about the key compliance issues.

Data protection

Group data protection at Merck KGaA, Darmstadt, Germany, is integrated into the Group's Compliance organization. As required by law, this department operates independently. The department regularly prepares data protection updates and produces a comprehensive data protection report at regular intervals as part of our broader compliance reporting efforts. In addition to the Group's central Data Protection Officer, many sites worldwide also have local data protection officers.

Our data protection department encompasses various elements that make up our data protection program portfolio:

Elements of our data protection program

Specific guidelines have been put in place to ensure that data protection processes comply with the relevant regulations. The "Policy for Data Protection and Personal Data Privacy" defines the standards according to which data is processed, stored, used, and transmitted at our company. This enables us to provide a high level of protection for the data of our employees, contract partners, customers, and suppliers as well as the data of patients and participants in clinical trials. A central IT tool has also been established in order to comply with the statutory documentation requirements. The tool serves as the basis for key data protection processes. In addition to documenting processing activities, these include processing reports from the local data protection officers, documenting video recordings, and reporting potential data protection violations. Our understanding of data protection throughout the Group is based on European legislation in particular, including the provisions of the EU's General Data Protection Regulation (EU GDPR), which has been in force since May 2018. However, we also comply with and implement local data protection regulations.

Risk and opportunity management

The Executive Board, the Supervisory Board, and the Finance Committee are regularly informed about the current risk portfolio of the Group and the individual companies. More detailed information can be found in the Report on Risks and Opportunities.

Avoidance of conflicts of interest

Within the framework of their work, all Executive Board and Supervisory Board members of Merck KGaA, Darmstadt, Germany, are exclusively committed to the interests of the company and neither pursue personal interests nor grant unjustified advantages to third parties.

Before an Executive Board member takes on honorary offices, board positions, or other sideline activities, this must be approved by the Personnel Committee of the Board of Partners of E. Merck KG, Darmstadt, Germany. The Chairman of the Executive Board, Stefan Oschmann, and the Chief Financial Officer, Marcus Kuhnert, are both members of the Executive Board of E. Merck KG, Darmstadt, Germany. This does not, however, create conflicts of interest.

In its report to the General Meeting, the Supervisory Board discloses any conflicts of interest involving its members and how they were dealt with. Consultancy agreements as well as other service and work contracts of a Supervisory Board member with our company require the approval of the Supervisory Board. In fiscal 2020, there were neither conflicts of interest, nor consultancy agreements or other service or work contracts with Merck KGaA, Darmstadt, Germany, involving Supervisory Board members.

Adherence to environmental and safety standards

At our company, environmental protection is based on closed-loop thinking and the integration of precautionary measures into our process, procedural, and product development planning. The principles and strategies set out in our Environment, Health and Safety Policy implement the guidelines formulated by the national and international associations of the chemical industry in the Responsible Care guidelines. The Responsible Care Global Charter, developed by the International Council of Chemical Associations (ICCA) in 2014, places even greater emphasis on overall responsibility for products, supply chains, and the community. Our company signed this expanded version of Responsible Care Global Charter for the entire Group in the same year. It is currently being implemented by us at an international level. We report our ecological, economic and social performance transparently in accordance with the internationally recognized principles of the Global Reporting Initiative (GRI), taking into account the requirements of the German Sustainability Code and the principles of the UN Global Compact. We are in the process of achieving the first major step toward climate protection, which is to achieve a 20% reduction in our greenhouse gas emissions by 2020 measured against the 2006 baseline. Among other things, we have also set itself the goal of climate-neutral business operations along the entire value chain by 2040 in terms of Scope 1 and Scope 2 as well as our Scope 3 emissions.

Many guidelines specify how the sites and employees of the Group are to observe the principles in their daily work. The Group function Environment, Health, Safety, Security, Quality steers these global activities and ensures compliance with statutory requirements, internal standards, and business needs throughout the entire Group. In this way, Group-wide risks are minimized and continuous improvement is promoted in the areas of environment, health, safety, security, and quality. Corporate Responsibility reports are also published at regular intervals.

Procedures of the Executive Board, Supervisory Board, Board of Partners, and its Committees

Members of the Executive Board of Merck KGaA, Darmstadt, Germany

Information on memberships of statutory supervisory boards and comparable German and foreign supervisory bodies (section 285 No. 10 HGB in conjunction with section 125 (1) sentence 5 AktG).

Member	Memberships of (a) statutory supervisory boards and (b) comparable German and foreign supervisory bodies of corporations
Stefan Oschmann Munich, Chairman	(a) – Springer Nature AG & Co. KGaA (not listed)
Belén Garijo Frankfurt am Main, Vice Chair	(b) – Banco Bilbao Vizcaya Argentaria S.A., Bilbao, Spain (listed) – L'Oréal S.A., Clichy, France (listed)
Udit Batra (until July 31, 2020) Wellesley, Massachusetts, USA, CEO Life Science	No board positions
Kai Beckmann Darmstadt, CEO Performance Materials	(a) – Bundesdruckerei GmbH, Berlin (not listed)
Marcus Kuhnert Königstein, Chief Financial Officer	No board positions
Peter Guenter Frankfurt am Main, CEO Healthcare	(b) – Galapagos N.V., Mecheln, Belgium (listed)

The general partners with no equity interest (Executive Board) manage the business activities in accordance with the laws, the Articles of Association, and the rules of procedure. They are appointed by E. Merck KG, Darmstadt, Germany, with the approval of a simple majority of the other general partners. The members of the Executive Board are jointly responsible for the entire management of the company. Certain tasks are assigned to individual Executive Board members based on a responsibility distribution plan. Each Executive Board member promptly informs the other members of any important actions or operations in his or her respective business area. Among other things, the Executive Board is responsible for preparing the Annual Financial Statements of Merck KGaA, Darmstadt, Germany, and of the Group as well as for approving the quarterly and half-year financial statements of the Group. In addition, the Executive Board ensures that all legal provisions, official regulations, and the company's internal policies are observed, and works to achieve compliance with them by all the companies of the Group. A Group-wide guideline defines in detail which transactions require prior approval by the Executive Board.

The Executive Board provides the Supervisory Board with regular, up-to-date, and comprehensive reports about all company-relevant issues concerning strategy, planning, business developments, the risk situation, risk management, and compliance. The rules of procedure of the Executive Board and of the Supervisory Board, as well as a Supervisory Board resolution, regulate further details on the information and reporting duties of the Executive Board vis-à-vis the Supervisory Board.

The Executive Board informs the Board of Partners and the Supervisory Board at least quarterly of the progress of business and the situation of the company. In addition, the Executive Board informs the aforementioned boards at least annually of the company's annual plans and strategic considerations.

The Executive Board passes its resolutions in meetings that are normally held once a month.

Supervisory Board

The Supervisory Board has 16 members. The Supervisory Board was composed as follows in fiscal 2020:

Member	Memberships of (a) other statutory supervisory boards and (b) comparable German and foreign supervisory bodies of corporations	**Member of the Supervisory Board since**
Wolfgang Büchele (Chairman of the Supervisory Board) Römerberg, Chairman of Exyte GmbH, Stuttgart	(a) – Gelita AG, Eberbach (Chairman) (not listed) (b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1] (not listed) – Wegmann Unternehmens-Holding GmbH & Co. KG, Fürstenfeldbruck (Chairman) (not listed) – Kemira Oyj, Helsinki, Finland (not listed) – KNDS NV, Amsterdam, Netherlands (not listed)	01.07.2009
Michael Fletterich (until May 28, 2020) Gernsheim, Chairman of the Joint Works Council of Merck KGaA, Darmstadt, Germany	No board positions	01.07.1998
Gabriele Eismann Seeheim-Jugenheim, Senior Product Manager (currently full-time member of the Joint Works Council of Merck KGaA, Darmstadt, Germany)	No board positions	09.05.2014
Jürgen Glaser Bingen, Regional Director of the German Mining, Chemical, and Energy Industrial Union (IG BCE), Darmstadt	(a) – SIRONA Dental Systems GmbH, Wals, Austria (not listed) – HFC Prestige Service Germany GmbH (Vice Chairman) (listed) (b) – BKK of Merck KGaA, Darmstadt, Germany (not listed)	26.04.2019
Edeltraud Glänzer Hanover, Chair of August-Schmidt-Stiftung, Bochum	(a) – B. Braun Melsungen AG, Melsungen (not listed)	28.03.2008
Sascha Held **(Vice Chairman of the Supervisory Board)** Riedstadt, Application Consultant (currently full-time member of the Joint Works Council of Merck KGaA, Darmstadt, Germany)	No board positions	26.04.2019
Michael Kleinemeier Heidelberg, Managing Director of e-mobiligence GmbH, Heidelberg	(b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1] (not listed) – Transporeon GmbH, Ulm (not listed)	26.04.2019
Renate Koehler Darmstadt, pharmacist and Manager of Engel-Apotheke pharmacy, Darmstadt	No board positions	26.04.2019
Anne Lange Riedstadt, Application Engineer (currently full-time member of the Joint Works Council of Merck KGaA, Darmstadt, Germany)	No board positions	26.04.2019
Peter Emanuel Merck[2] Hamburg, Managing Partner of Golf-Lounge GmbH, Hamburg	No board positions	26.04.2019
Dietmar Oeter Seeheim-Jugenheim, Vice President Corporate Quality Assurance	No board positions	09.05.2014
Alexander Putz Michelstadt, Laboratory Chemist (currently full-time member of the Joint Works Council of Merck KGaA, Darmstadt, Germany)	No board positions	28.05.2020
Christian Raabe Höchst, IT Business Partner Darmstadt Site	No board positions	26.04.2019
Helene von Roeder Frankfurt am Main, Member of the Executive Board (CFO) of Vonovia SE, Bochum	(b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1] (not listed) – Vonovia Finance B.V., Amsterdam, Netherlands (listed) – AVW Versicherungsmakler GmbH, Hamburg (not listed)	26.04.2019

Member	Memberships of (a) other statutory supervisory boards and (b) comparable German and foreign supervisory bodies of corporations	**Member of the Supervisory Board since**
Helga Rübsamen-Schaeff Langenburg, Chair of the Advisory Board of AiCuris Antiinfective Cures GmbH, Wuppertal	(a) – 4SC AG, Martinsried (listed) – Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany[1] (Chair) (not listed) (b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1] (not listed)	09.05.2014
Daniel Thelen Cologne, Head of Infrastructure Development for western region at DB Netz AG, Frankfurt am Main/Duisburg	(b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1] (not listed)	26.04.2019
Simon Thelen[2] Cologne, Senior Physician at the Clinic for Trauma and Hand Surgery, University Hospital Düsseldorf	(a) – Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany[1] (not listed) (b) – E. Merck KG, Darmstadt, Germany, Darmstadt[1] (not listed)	26.04.2019

[1] Internal board position.

[2] Members delegated according to article 6 (5) of the Articles of Association.

The Supervisory Board performs a monitoring function. It supervises the Executive Board's management of the company. In comparison with the supervisory board of a German stock corporation, the role of the supervisory board of a corporation with general partners (KGaA) is limited. This is due to the fact that the members of the Executive Board are personally liable partners and therefore are responsible for the management of the company. In particular, the Supervisory Board is not responsible for appointing and dismissing general partners or for regulating the terms and conditions of their contracts. This is the responsibility of E. Merck KG, Darmstadt, Germany. Nor does the Supervisory Board have the authority to issue rules of procedure for the Executive Board or a catalog of business transactions requiring approval. This authority likewise belongs to E. Merck KG, Darmstadt, Germany (article 13 (3) sentence 1 and (4) sentence 1 of the Articles of Association).

However, the fact that the Supervisory Board has no possibilities to directly influence the Executive Board restricts neither its information rights nor its audit duties. The Supervisory Board must monitor the Executive Board in terms of legality, regularity, usefulness, and economic efficiency. In particular, the Supervisory Board has the duty to examine the reports provided by the Executive Board. This includes regular reports on the intended business policy, as well as other fundamental issues pertaining to corporate planning, especially financial, investment and HR planning; the profitability of the Group; the progress of business; the risk situation; risk management (including compliance); and the internal auditing system. In addition, by means of consultation with the Executive Board, it creates the basis for supervision of the management of the company by the Supervisory Board in accordance with section 111 (1) AktG.

The Supervisory Board examines the Annual Financial Statements as well as the consolidated financial statements and the Combined Management Report, taking into account in each case the reports of the auditor. Moreover, the Supervisory Board discusses the quarterly statements and the half-year financial report, taking into account in the latter case the report of the auditor on the audit review of the abridged financial statements and the interim management report of the Group. The adoption of the Annual Financial Statements is not the responsibility of the Supervisory Board, but of the General Meeting. The Supervisory Board normally meets four times a year. Further meetings may be convened if requested by a member of either the Supervisory Board or the Executive Board. As a rule, resolutions of the Supervisory Board are passed at meetings at the instruction of the Chairman. In exceptional cases a resolution may be passed by other means, details of which are given in the rules of procedure.

The members of the Board of Partners of E. Merck KG, Darmstadt, Germany, and of the Supervisory Board may be convened to a joint meeting if so agreed by the chairpersons of the two boards.

The Supervisory Board has adopted rules of procedure for its activities that are available on the company's website at **www.emdgroup.com/company/who-we-are/management-and-company-structure/supervisory-board/EN/Rules-of-Procedure-Supervisory-Board-EN.pdf**.

The rules of procedure prescribe that the Supervisory Board may form committees. The Supervisory Board has formed a Nomination Committee comprising three shareholder representatives. Its members are Wolfgang Büchele, Helga Rübsamen-Schaeff, and Simon Thelen. The Nomination Committee is responsible for proposing to the Supervisory Board suitable candidates for its proposal to the Annual General Meeting. Apart from legal requirements and the recommendations of the German Corporate Governance Code, the "Objectives of the Supervisory Board with respect to its composition," "Profile of skills and expertise," and the "Diversity Policy" are to be taken into consideration as well. Owing to the aforementioned limited authority, and since a corresponding need has not yet arisen, the Supervisory Board in fiscal 2020 had no further committees. In the coming fiscal year, the Supervisory Board will address the formation of an Audit Committee at the Supervisory Board level.

The German Stock Corporation Act prescribes that the Supervisory Board of a publicly listed company must have at least one member who has professional expertise in accounting or auditing. Helene von Roeder has particular knowledge and experience of the application of reporting principles and internal controls, is familiar with auditing, and is also the Chair of the Finance Committee of the Board of Partners of E. Merck KG, Darmstadt, Germany. A further provision of the German Stock Corporation Act requires that the members of the Supervisory Board be collectively familiar with the sector in which their company operates. This requirement is specifically addressed in the Supervisory Board's profile of skills and expertise, which stipulates that the Supervisory Board have at least four members who possess such knowledge of the sector. We currently meet this requirement (see also "Objectives of the Supervisory Board with respect to Its Composition and Profile of Skills and Expertise").

Information on the independence of the shareholder representatives can be found under "Objectives of the Supervisory Board with respect to Its Composition and Profile of Skills and Expertise".

The Supervisory Board carried out a self-assessment in fiscal 2020. The self-assessment of the Supervisory Board took the form of an internal efficiency review based on an extensive questionnaire and resulted in a positive opinion on all topics. Potential improvements to further optimize the work of the committees in individual areas were disclosed and corresponding measures initiated. The next self-assessment of the Supervisory Board is scheduled for 2022.

Board of Partners of E. Merck KG, Darmstadt, Germany

Some of the responsibilities that lie with the supervisory board of a German stock corporation are fulfilled at our company by E. Merck KG, Darmstadt, Germany. This applies primarily to the Board of Partners of E. Merck KG, Darmstadt, Germany. Therefore, the Board of Partners as well as the composition and procedures of its committees are described in the following.

The Board of Partners has nine members. The Board of Partners was composed as follows in fiscal 2020:

Member	Memberships of (a) statutory supervisory boards and (b) comparable German and foreign supervisory bodies of corporations
Johannes Baillou Vienna, Austria, Vice Chairman of the Executive Board and General Partner of E. Merck KG, Darmstadt, Germany, Chairman	No board positions
Frank Stangenberg-Haverkamp Darmstadt, Chairman of the Executive Board and General Partner of E. Merck KG, Darmstadt, Germany, Vice Chairman	(a) – Fortas GmbH, Rösrath (Chairman) (not listed) – Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany (not listed) (b) – Travel Asset Group Ltd., London, United Kingdom (Chairman) (not listed)
Wolfgang Büchele Munich, Chairman of Exyte GmbH, Stuttgart	(a) – Merck KGaA, Darmstadt, Germany, Darmstadt (listed) – Gelita AG, Eberbach (Vice Chairman) (not listed) (b) – Wegmann Unternehmens-Holding GmbH & Co. KG, Fürstenfeldbruck (Chairman) (not listed) – Kemira Oyj, Helsinki, Finland (not listed) – KNDS NV, Amsterdam, Netherlands (not listed)
Helga Rübsamen--Schaeff Langenburg, Chair of the Advisory Board of AiCuris Antiinfective Cures GmbH, Wuppertal	(a) – Merck KGaA, Darmstadt, Germany, Darmstadt (listed) – Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany (Chair) (not listed) – 4SC AG, Martinsried (listed)
Michael Kleinemeier Heidelberg, Managing Director of e-mobiligence GmbH, Heidelberg	(a) – Merck KGaA, Darmstadt, Germany, Darmstadt (listed) (b) – Transporeon GmbH, Ulm (not listed)
Katharina Kraft Mannheim, Senior Strategy Manager at BASF SE, Ludwigshafen	No board positions
Helene von Roeder Frankfurt am Main, Member of the Executive Board of Vonovia SE, Bochum	(a) – Merck KGaA, Darmstadt, Germany, Darmstadt (listed) (b) – Vonovia Finance B.V., Amsterdam, Netherlands (listed) – AVW Versicherungsmakler GmbH, Hamburg (not listed)
Daniel Thelen Cologne, Head of Infrastructure Development for Western Region at DB Netz AG, Frankfurt am Main	(a) – Merck KGaA, Darmstadt, Germany, Darmstadt (listed)
Simon Thelen Cologne, Senior Physician at the Clinic for Trauma and Hand Surgery, University Hospital Düsseldorf	(a) – Merck KGaA, Darmstadt, Germany, Darmstadt (listed) – Merck Healthcare KGaA, Darmstadt, Germany, a subsidiary of Merck KGaA, Darmstadt, Germany (not listed)

The Board of Partners supervises the Executive Board in its management of the company. It informs itself about the business matters of Merck KGaA, Darmstadt, Germany, and may inspect and examine the company's accounts, other business documents, and assets for this purpose. According to article 13 (4) of the Articles of Association of Merck KGaA, Darmstadt, Germany, the Executive Board requires the approval of E. Merck KG, Darmstadt, Germany, for transactions that are beyond the scope of the Group's ordinary business activities. For such transactions, approval must first be obtained from the Board of Partners of E. Merck KG, Darmstadt, Germany. The Board of Partners convenes as and when necessary; however, it normally meets four times a year. The members of the Executive Board of Merck KGaA, Darmstadt, Germany, are invited to all meetings of the Board of Partners, unless the Board of Partners resolves otherwise in individual cases. The members of the Board of Partners may convene a joint meeting with the Supervisory Board of Merck KGaA, Darmstadt, Germany, if so agreed by the chairpersons of the two boards.

The Board of Partners may delegate the performance of individual duties to committees. Currently, the Board of Partners has three committees in place: the Personnel Committee, the Finance Committee, and the Research and Development Committee.

Personnel Committee

The Personnel Committee has four members: Johannes Baillou (Chair), Wolfgang Büchele, Michael Kleinemeier, and Frank Stangenberg-Haverkamp. The Personnel Committee meets at least twice a year. Additional meetings are convened as and when necessary. Meetings of the Personnel Committee are attended by the Chairman of the Executive Board of Merck KGaA, Darmstadt, Germany, unless the Committee decides otherwise. The Personnel Committee is responsible for, among other things, the following decisions concerning members and former members of the Executive Board: contents of and entry into employment contracts and pension contracts; granting of loans and advance payments; changes to the compensation structure and adaptation of compensation; approval for taking on honorary offices, board positions, and other sideline activities; and division of responsibilities within the Executive Board of Merck KGaA, Darmstadt, Germany. The Personnel Committee passes its resolutions by a simple majority; in matters concerning the Chairman of the Executive Board, unanimity is required. The Chairman of the Committee regularly informs the Board of Partners of its activities.

Finance Committee

The Finance Committee has four members: Helene von Roeder (Chair), Johannes Baillou, Wolfgang Büchele, and Daniel Thelen. The Finance Committee holds at least four meetings a year, at least one of which is a joint meeting with the auditor of Merck KGaA, Darmstadt, Germany. Further meetings are convened as and when necessary. Meetings of the Finance Committee are attended by the Chief Financial Officer of Merck KGaA, Darmstadt, Germany. Other members of the Executive Board of Merck KGaA, Darmstadt, Germany, may attend the meetings upon request of the Finance Committee. These meetings regularly include the Chairman of the Executive Board. The Finance Committee is responsible for, among other things, analyzing and discussing the Annual Financial Statements, the Consolidated Financial Statements, and the respective reports of the auditor, as well as the half-year financial report (including the report of the auditors for the audit review of the abridged financial statements and interim management report contained in the half-year report) and the quarterly statements. The Finance Committee also reviews the performance of the auditing firm, particularly the auditor in charge of the engagement. Moreover, the Finance Committee recommends to the Chairman of the Supervisory Board annual audit focuses for the auditors of the Annual Financial Statements. It also recommends to the Supervisory Board an auditor for the Annual Financial Statements as well as auditors for the audit review of the abridged financial statements and interim management report contained in the half-year financial report for the Supervisory Board's corresponding suggestion to the General Meeting. In addition, the Finance Committee is concerned with the net assets, financial position, results of operations, and liquidity of our company, as well as accounting, internal auditing, risk management, and compliance issues. Upon request of the Board of Partners, the Finance Committee examines investment projects that must be approved by the Board of Partners and provides recommendations pertaining thereto. It passes its resolutions with a simple majority. The Committee Chairman regularly informs the Board of Partners of the activities of the Finance Committee.

Research and Development Committee

The Research and Development Committee has four members: Helga Rübsamen-Schaeff (Chair), Johannes Baillou, Katharina Kraft, and Simon Thelen. The Research and Development Committee is convened as and when necessary, but holds at least two meetings a year. Meetings of the Research and Development Committee are attended by members of the Executive Board of Merck KGaA, Darmstadt, Germany, upon request of the Committee. These meetings regularly include the Chairman of the Executive Board as well as the CEO Healthcare, the CEO Life Science, and the CEO Performance Materials. The Research and Development Committee is responsible for, among other things, reviewing and discussing the research activities of the Healthcare, and Life Science and Performance Materials business sectors. It passes its resolutions with a simple majority. The Chair of the Committee reports to the Board of Partners on the insights gained from the meetings.

Stipulations to promote the percentage of management positions held by women pursuant to section 76 (4) and section 111 (5) of the German Stock Corporation Act (AktG)

Stipulations pursuant to section 76 (4) AktG (target for the percentage of positions held by women on the two upper management levels below the Executive Board)

We foster diversity within the company, which also includes ensuring a balance of genders in management. To this end, we pursue both voluntary and statutory objectives, and we work continuously and sustainably on achieving them. On December 15, 2016, the Executive Board of Merck KGaA, Darmstadt, Germany, set the new targets for the percentage of positions held by women on the two management levels of Merck KGaA, Darmstadt, Germany, below the Executive Board as follows:

- First management level of Merck KGaA, Darmstadt, Germany, below the Executive Board: 21% of positions held by women
- Second management level of Merck KGaA, Darmstadt, Germany, below the Executive Board: 26% of positions held by women

The deadline set for reaching the new targets is December 31, 2021. The first management level comprises all managers of Merck KGaA, Darmstadt, Germany, with a direct reporting line to the Executive Board of Merck KGaA, Darmstadt, Germany, or who belong to the global executive group. The second management level comprises all managers of Merck KGaA, Darmstadt, Germany, who report to managers with a direct reporting line to the Executive Board of Merck KGaA, Darmstadt, Germany, or the global executive group. In addition, as a global company with correspondingly aligned leadership structures, we continue to pursue a voluntary global target of maintaining the proportion of leadership positions held by women (managers, experts, and project managers in roles 4 and above)[1] at a stable level of 30% in the period until 2021.

[1] The group in question accounts for around 6% of the total workforce; see the description of “Diversity and management”.

Stipulations pursuant to section 111 (5) AktG (target for the percentage of positions on the Supervisory Board held by women)

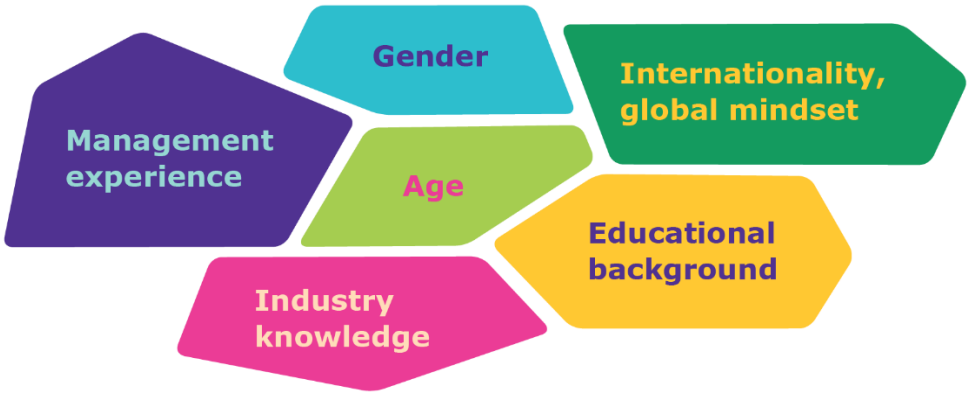
Pursuant to section 111 (5) AktG, the Supervisory Board of companies that are listed or subject to co-determination stipulates binding targets for the percentage of positions on the Supervisory Board and on the Management Board held by women. However, for Merck KGaA, Darmstadt, Germany, stipulations pursuant to section 111 (5) AktG need not be set for the following reasons: The statutory target of 30% pursuant to section 96 (2) AktG is already applied to the Supervisory Board of Merck KGaA, Darmstadt, Germany; this eliminates the obligation to stipulate a further target for the percentage of positions held by women on the Supervisory Board (see section 111 [5] sentence 5 AktG). The obligation to stipulate a target for the percentage of positions held by women on the Management Board pursuant to section 111 (5) AktG is not applicable to the legal form

of a corporation with general partners (Kommanditgesellschaft auf Aktien), as a corporation with general partners neither has a management board comparable to that of a stock corporation, nor does the Supervisory Board have personnel authority over the Executive Board. Instead, the Executive Board of Merck KGaA, Darmstadt, Germany, consists of personally liable general partners (see also the description of Supervisory Board procedures).

Diversity policy pursuant to section 289f (2) No. 6 of the German Commercial Code (HGB)

We are pursuing a Group-wide, global diversity program. At our company, diversity stands for a culture of inclusion, mutual esteem, and respect. To demonstrate this open and dynamic company culture, we promote diversity throughout the Group – and do so at all levels, including the Executive Board and Supervisory Board.

We believe that a diverse workforce boosts the innovative strength of the Group and contributes materially to our business success. That is why we are furthering a culture of diversity independent of age, gender, disability, ethnic or cultural background, religion, industry experience, and educational background. The diversity policy to strategically steer the topics of diversity and inclusion at our company thus focuses on the following key criteria:



Our Group-wide diversity policy encompasses both voluntary as well as legally defined objectives that we continuously and sustainably work to achieve. In this context, it should be noted that with respect to the Executive Board of Merck KGaA, Darmstadt, Germany, many rules can only be applied correspondingly. This is because the Executive Board comprises personally liable general partners of Merck KGaA, Darmstadt, Germany, and is not a management board with employed members of a corporate body (for details, please also see the ”Joint Report of the Executive Board and the Supervisory Board”).

In addition to the aspects presented in the following, reference is made to the objectives of the Supervisory Board with respect to its composition and the profile of skills and expertise of the Supervisory Board (see the information on the ”Objectives of the Supervisory Board with respect to its composition and profile of skills and expertise”). The statements made there are part of the diversity policy for the Supervisory Board presented here.

Age

Our boards are to have a balanced age structure. This permits future-oriented and consistent succession planning and is a key element of sustainable company management and monitoring. Our diversity policy aims for an age range of at least 10 years between the youngest and the oldest member of the respective board.

In their current composition, both boards meet this objective. The age range of the Executive Board is 11 years, while the age range of the Supervisory Board is over 30 years. In addition, maximum age limits apply to both boards. A maximum age of 70 applies to members of the Executive Board, while the standard age limit for Supervisory Board members is 75.

Gender

Gender diversity also plays a crucial role since it enables us to benefit from a larger talent pool, and allows us as a company to develop a better understanding of important customer groups. We have set a global strategic objective of maintaining the proportion of women in leadership positions (managers, experts, and project managers in role 4 and higher)[1] at a stable level of 30% by 2021 (please also refer to the description under "Diversity and Management").

Additionally, we continue to pursue representation of both genders as an objective for the Executive Board. The Board of Partners of E. Merck KG, Darmstadt, Germany, has appointed Belén Garijo, currently the Vice Chair of the Executive Board and Vice CEO of Merck KGaA, Darmstadt, Germany, and former CEO of Healthcare, as the new Chair of the Executive Board and CEO of Merck KGaA, Darmstadt, Germany, effective May 1, 2021, making it the first time a woman has been appointed to these positions. The statutory target of 30% pursuant to section 96 (2) AktG already applies to the Supervisory Board of Merck KGaA, Darmstadt, Germany, and is currently met.

[1] The Group also has employees at sites that are not fully consolidated subsidiaries. These figures refer to all people directly employed by us and therefore may deviate from figures in the financial section of this report.

Internationality and global mindset

As a science and technology company with global operations and major markets on five continents with around 58,000 employees at locations in 66[1] countries, internationality and the associated global mindset is one of our key success factors. According to our diversity policy, the Executive Board's internationality derives from leadership experience or national origin, relative to our key sales markets or those locations that are organizationally and culturally relevant to our employee development efforts. For both criteria, Europe, North America, and Asia-Pacific are currently the key regions. The Executive Board meets this objective with management experience in the named regions, e.g. in the following countries: France, Spain, the United States, Singapore, and Malaysia. In addition, more than one-third of the Executive Board members are not German citizens.

[1] Each country with at least one active employee is included as a separate country.

Management experience

The key prerequisites for high-performance leadership teams are both the diversity of the individual competency profiles and a balance between a Group-internal and external management perspective. Therefore, as a whole the Executive Board must have in-depth knowledge and experience in the following key areas of importance to the company: strategy and planning, finance and accounting, sales and operations, human resources, and legal and compliance, as well as information technology. In addition, for the composition of the Executive Board it is important to ensure a good balance of members from within and outside the company. Our diversity policy seeks to derive inspiration and innovation from outside the company and to identify the latest trends of relevance to the core businesses of the company, while ensuring sustainability and continuity in line with our corporate culture. We have therefore set ourselves the global objective of filling two-thirds of our leadership positions with candidates from within the company.

The current Executive Board fulfills both of the aforementioned objectives: All required aspects of the competency profile are covered by at least one member of the Executive Board. Likewise, three members of the Executive Board possess multiple years of experience working within the Group prior to their appointment to the Executive Board.

Industry experience

To efficiently lead and manage the Group, the Executive Board must have in-depth knowledge of the key industries and business sectors that the company operates in. In accordance with the diversity policy, there should be at least one member of the Executive Board with in-depth expertise of Healthcare, Life Science, or Performance Materials.

The Executive Board will have the full breadth of the sector-specific experience required when Matthias Heinzel joins the Executive Board by April 1, 2021. Christos Ross currently reports to the Chairman of the Executive Board as the interim head of Life Science.

Educational background

In order to translate the tremendous innovative potential of a science and technology company into sustainable business success, interdisciplinary educational backgrounds are a key element of our diversity policy both for the Executive Board and for the Supervisory Board. The current composition of both boards illustrates this interdisciplinary aspect to a very high degree.

The members of the Executive Board contribute knowledge of various fields including veterinary medicine, economic sciences, medicine (pharmacology, physical education), and information technology. In addition, the majority of members of the Executive Board hold a university degree and a doctorate from a German or foreign university.

Moreover, the members of the Supervisory Board have a background in one or more of the following fields of specialization: chemistry, biochemistry, pharmaceutics, mathematics, law, human medicine, business administration and economics, physics, education, and computer sciences, among others.

Seven Supervisory Board members are university graduates and hold doctorates.

Report of the Supervisory Board

The Supervisory Board again properly executed its duties in 2020 in accordance with the law as well as the company's Articles of Association and rules of procedure. In particular, the Supervisory Board monitored the work of the Executive Board diligently and regularly.

Cooperation with the Executive Board

The cooperation with the Executive Board was characterized by intensive, trustworthy exchange. During fiscal 2020, the Executive Board provided the Supervisory Board with regular written and verbal reports on the business development of Merck KGaA, Darmstadt, Germany, and the Group. In particular, the Supervisory Board was informed about the current and potential impact of the Covid-19 pandemic, the market and sales situation of the company against the background of macroeconomic development, and the financial position of the company and its subsidiaries, along with their earnings development and corporate planning. Within the scope of quarterly reporting, the sales and operating results were presented for the Group as a whole, and broken down by business sector. Aside from the Supervisory Board meetings, the Chairman of the Supervisory Board also maintained, and continues to maintain, a regular exchange of information with the Chairman of the Executive Board.

Key topics of the Supervisory Board meetings

Four Supervisory Board meetings were held in fiscal 2020. At these meetings, the Supervisory Board intensely discussed the reports of the Executive Board as well as, together with the Executive Board, company developments and strategic issues.

At the meeting held on February 28, 2020, the Executive Board first intensively addressed the Annual Financial Statements and Consolidated Financial Statements for 2019, the Combined Management Report, the audit report of the auditor on the separate non-financial (Group) report for fiscal 2019, and the proposal for the appropriation of the net retained profit. The auditor explained the audit reports including the focus areas of the audit. The Executive Board and the Head of Accounting reported on the financial statements and discussed the impact of the acquisition of Versum Materials in particular. Furthermore, the Supervisory Board resolved upon the report and the objectives of the Supervisory Board with respect to its composition and the profile of skills and expertise, the Declaration of Conformity with the German Corporate Governance Code, and the Statement on Corporate Governance, which simultaneously includes the joint report on Corporate Governance of the Executive Board and Supervisory Board. The Supervisory Board also approved the proposals to be made to the Annual General Meeting. The Executive Board reported on business performance in 2019 and presented the plans for fiscal 2020 as well as the forecast impact of the Covid-19 pandemic on our global business, which it discussed in detail with the Supervisory Board. The Supervisory Board also took note of the written risk report as well as the report from Group Internal Auditing for 2019. In addition, the Supervisory Board discussed the mandatory change of auditor.

The meeting held on May 13, 2020, again focused on the Covid-19 pandemic. In particular, the Executive Board reported on the global pandemic situation, our crisis strategy (safety and business continuity) and the impact in terms of the financial forecast, which also required the preparation of supplementary reports on the Annual Financial Statements and Consolidated Financial Statements for fiscal 2019 and the Combined Management Report. After intensively addressing the current and potential impact of the Covid-19 pandemic and the supplementary reports, the Supervisory Board approved the supplementary reports and drew up the proposed resolution to be made to the Annual General Meeting recommending the adoption of the Annual Financial Statements (including the supplementary report). The Executive Board also discussed the current business development in the first quarter of 2020 and provided an outlook concerning the expected business development in 2020 as a whole. The report of the Research and Development Committee of the Board of Partners of E. Merck KG, Darmstadt, Germany, for Life Science/Performance Materials was a further focus of

the meeting. The Supervisory Board also discussed the Compliance and Data Protection Report for 2019. Another special topic discussed was the organization of the Annual General Meeting on May 28, 2020, in virtual form. Finally, the Supervisory Board dealt with the pre-selection of potential auditors in connection with the mandatory change of auditor.

At the meeting on July 30, 2020, the Executive Board provided an overview of the continued development of the Covid-19 pandemic and our strategies, concepts, projects, and partnerships for dealing with the pandemic, which it discussed with the members of the Supervisory Board. The Supervisory Board elected Sascha Held as Vice Chairman of the Supervisory Board after Michael Fletterich stepped down as a member of the Supervisory Board and Vice Chairman during the Annual General Meeting on May 28, 2020. At the meeting, the Supervisory Board also focused intensively on the report of the Executive Board on business performance in the second quarter of 2020. In addition, the auditors reported on the results of their review of the half-yearly financial report. Risk management within the company was a further topic. The Head of Risk Management presented the status report for the first half of 2020. No risks that could threaten the continued existence of the company were identified. Moreover, the list of permitted non-audit services was updated, and an external audit of the non-financial declaration was resolved upon. In addition, a formal amendment to the Articles of Association of Merck KGaA, Darmstadt, Germany, was resolved to reflect the departure of the former Executive Board member Udit Batra. The Head of Legal informed the Supervisory Board about new legal provisions concerning transactions with related parties and recapitulated the organization of the virtual Annual General Meeting.

At its fourth meeting on November 11, 2020, the Supervisory Board started by discussing the current development of the Covid-19 pandemic and the report of the Executive Board on the third quarter of 2020. Additional topics focused on by the meeting were the 2020 status reports of Group Internal Auditing, status reports on compliance and data protection, and the report of the Research and Development Committee for Healthcare. Transactions of Merck KGaA, Darmstadt, Germany, with related parties within the meaning of section 111a et seq. of the German Stock Corporation Act (AktG) were also presented and discussed by the Supervisory Board. A procedure was established to regularly assess whether the conditions of section 111a (2) sentence 1 AktG have been met for such transactions. There were no transactions requiring the approval of the Supervisory Board in accordance with section 111b (1) AktG. Furthermore, the Group Executive Conference and the status of the mandatory change of auditor were discussed. A resolution on preparing for the mandatory change of auditor for Merck KGaA, Darmstadt, Germany, for the fiscal 2023 audit was adopted. In addition, a transformation project in the Healthcare business sector was discussed. Finally, the results of the self-assessment of the Supervisory Board were presented by the Head of Legal and discussed by the Supervisory Board.

In parts of its meetings, the Supervisory Board regularly meets without the members of the Executive Board being present.

Annual Financial Statements

The Annual Financial Statements of Merck KGaA, Darmstadt, Germany, the Consolidated Financial Statements of the Group, and the Combined Management Report for Merck KGaA, Darmstadt, Germany, and the Group, including the accounts, were audited by KPMG AG Wirtschaftsprüfungsgesellschaft, Berlin.

The auditors issued an unqualified audit opinion on the Annual Financial Statements of Merck KGaA, Darmstadt, Germany, in accordance with German Auditing Standards.

For the Consolidated Financial Statements prepared in accordance with International Financial Reporting Standards and for the Combined Management Report, the auditors issued the unqualified auditor’s report reproduced in the Annual Report of the Group.

In addition, the auditor audited the calculation of the participation of Merck KGaA, Darmstadt, Germany, in the profit of E. Merck KG, Darmstadt, Germany, in accordance with article 27 (2) of the Articles of Association, as well as the separate combined non-financial (Group) report. The annual financial statements of Merck KGaA, Darmstadt, Germany, the Consolidated Financial Statements of the Group, the Combined Management Report for Merck KGaA, Darmstadt, Germany, and the Group, the proposal of the Executive Board for the appropriation of net retained profit, and the separate combined non-financial (Group) report were submitted to the Supervisory Board together with the auditor's report.

In accordance with article 14 (2) of the Articles of Association, the Supervisory Board also examined the Annual Financial Statements of Merck KGaA, Darmstadt, Germany, the proposal for the appropriation of net retained profit, and the auditor's report presented in accordance with article 27 (2) of the Articles of Association. It also examined the Consolidated Financial Statements of the Group as well as the Combined Management Report for Merck KGaA, Darmstadt, Germany, and the Group, and took note of the auditor's report of KPMG AG Wirtschaftsprüfungsgesellschaft, Berlin. It focused particularly on the key audit matters of particular importance in the audit opinion, on the resulting risks for the financial statements, the approach adopted during the audit as described, and the conclusions drawn by the auditor. Furthermore, the Supervisory Board also examined the separate combined non-financial (Group) report and the memorandum on a limited assurance engagement prepared by the auditor on behalf of the Supervisory Board. The discussion of the relevant agenda item at the Supervisory Board's meeting on February 26, 2021, to approve the financial statements was also attended by the auditors who sign the audit opinion on the Annual Financial Statements of Merck KGaA, Darmstadt, Germany, and the Consolidated Financial Statements of the Group as well as the separate combined non-financial (Group) report. The auditors also reported on their audit at this meeting. The Supervisory Board took note of and approved the results of the audit. On completion of its examination, the Supervisory Board raised no objections and thus approved the Annual Financial Statements for Merck KGaA, Darmstadt, Germany, the Consolidated Financial Statements of the Group, the Combined Management Report of Merck KGaA, Darmstadt, Germany, and the Group prepared by the Executive Board, the report presented by the auditor in accordance with article 27 (2) of the Articles of Association, and the separate nonfinancial (Group) report. The Supervisory Board gave its consent to the proposal of the Executive Board for the appropriation of net retained profit after conducting its own review.

Corporate governance and Declaration of Conformity

Corporate governance is a topic of high priority for the Supervisory Board. In its own estimation, the Supervisory Board has an adequate number of independent members. There were no conflicts of interest, as defined by the German Corporate Governance Code, involving Supervisory Board members during the year under review. In fiscal 2020, the Chairman of the Supervisory Board was prepared to hold talks with investors on topics pertaining to the Supervisory Board as appropriate, and remains willing to do so. In fiscal 2020, the Chairman of the Supervisory Board conducted an investor discussion with the shareholders' association Deutsche Schutzvereinigung für Wertpapierbesitz (DWS) on the nomination of new candidates for the Supervisory Board. No other discussions were requested by investors. Following the most recent self-assessment in fiscal 2020, the next self-assessment of the Supervisory Board is scheduled to take place in fiscal 2022.

After discussing corporate governance issues in detail, the Executive Board (on February 16, 2021) and the Supervisory Board (on February 26, 2021) adopted the updated Declaration of Conformity and issued it jointly on February 26, 2021, in accordance with section 161 AktG. The statement is permanently available on the website of Merck KGaA, Darmstadt, Germany (**www.emdgroup.com/en/investors/corporate-governance/reports.html**). More information about corporate governance at Merck KGaA, Darmstadt, Germany, including the compensation of the Executive Board and Supervisory Board, is given in the Statement on Corporate Governance of the Annual Report.

Committees

Apart from the Nomination Committee, the Supervisory Board of Merck KGaA, Darmstadt, Germany, currently has no further committees on account of the special features that apply to the Supervisory Board of a corporation with general partners (KGaA) under German company law, and because a corresponding need for this has not emerged to date. In the coming fiscal year, the Supervisory Board will address the formation of an Audit Committee at Supervisory Board level. The members of the Nomination Committee did not convene in fiscal 2020. No report is required on the work of other committees.

Personnel matters

All the Supervisory Board meetings were attended by all Supervisory Board members. The composition of the Supervisory Board changed as follows in 2020: Michael Fletterich stepped down as a member of the Supervisory Board during the Annual General Meeting on May 28, 2020, and was replaced by Alexander Putz as a substitute employee representative. Mr. Putz was inducted by Merck KGaA, Darmstadt, Germany, with onboarding activities and continuing education on topics such as corporate governance, the internal organization, and applicable regulations and legal requirements. The members of the Supervisory Board are responsible for undertaking the training and continuing education required for their tasks, such as on changes in the legal framework, with regular support from the company.

Darmstadt, February 26, 2021

The Supervisory Board of Merck KGaA, Darmstadt, Germany

Wolfgang Büchele

Chairman

Objectives of the Supervisory Board with respect to its Composition and Profile of Skills and Expertise

Initial situation

According to recommendation C. I of the German Corporate Governance Code in the version dated December 16, 2019, the Supervisory Board shall specify concrete objectives regarding its composition as well as prepare a profile of skills and expertise for the entire board. In its composition the Supervisory Board shall take into account the number of independent members, consider the principle of diversity, specify an age limit, and disclose the term of Supervisory Board membership.

General notes on the composition of the Supervisory Board

The Supervisory Board of Merck KGaA, Darmstadt, Germany, currently comprises 16 members, eight of whom represent the shareholders and a further eight who represent the employees. The eight employee representative members are elected by employee delegates pursuant to the provisions of the German Co-determination Act (Mitbestimmungsgesetz, MitbestG). These consist of six company employees, including a senior executive, as well as two union representatives. The Supervisory Board has no statutory proposal right with respect to electing the delegates or employee representatives. Two of the eight shareholder representatives are specified by a delegation right of E. Merck Beteiligungen KG, Darmstadt, Germany, a related party of E. Merck KG, Darmstadt, Germany. The Supervisory Board likewise has no statutory proposal right with respect to exercising this delegation right. The other six shareholder representatives are elected by the General Meeting. In accordance with section 124 (3) sentence 1 AktG, the Supervisory Board shall propose to the General Meeting Supervisory Board members for election. These proposals require a majority of the votes of the shareholder representative members of the Supervisory Board. The next scheduled election to the Supervisory Board shall take place at the 2024 Annual General Meeting. The General Meeting is not required to follow the election proposals. The appointment objectives and competency requirements that the Supervisory Board sets forth below therefore do not represent requirements to be met by those eligible to elect or to delegate members. Instead, they are intended to express the objectives pursued by the Supervisory Board in office with regard to its advisory and monitoring functions.

For the Supervisory Board of Merck KGaA, Darmstadt, Germany, professional qualifications and personal expertise are the two most important prerequisites for appointments to seats on the Supervisory Board. When proposing Supervisory Board candidates for election or delegation, the Supervisory Board will always give top priority to these prerequisites, which are essential for fulfilling its legal duties. Overall, the Supervisory Board's policy is to optimally meet its monitoring and advisory duties by having diversity among its members. Diversity includes, in particular, internationality as well as different experience backgrounds and career paths. The proportion of women on the Supervisory Board is also considered to be an aspect of diversity. When preparing proposals for election or delegation to the Supervisory Board, the Supervisory Board shall consider in each case to what extent different, complementary specialist skills; professional and life experience; and an appropriate representation of both genders benefit the work of the Supervisory Board. Additionally, the Supervisory Board shall support the Executive Board in its efforts to increase diversity within the company.

Objectives of the Supervisory Board with respect to its composition

According to recommendation C. I of the German Corporate Governance Code in the version dated December 16, 2019, the Supervisory Board specified the following objectives regarding its composition, and reports below on their status of implementation.

Internationality

The Supervisory Board shall have at least three members with business experience in the main sales markets of Merck KGaA, Darmstadt, Germany. Currently, the main sales markets of Merck KGaA, Darmstadt, Germany, are Europe, America, and Asia-Pacific. The present composition of the Supervisory Board satisfies this objective. More than three Supervisory Board members have entrepreneurial experience in a wide range of European countries. More than three Supervisory Board members have experience in management positions in companies that operate globally.

Women on the Supervisory Board

Six women are currently members of the Supervisory Board of Merck KGaA, Darmstadt, Germany. Accordingly, women make up 37.5% of the Supervisory Board. When nominating candidates for election to the Supervisory Board or making proposals for delegations, the Supervisory Board shall examine whether the percentage of women can be increased by suitable candidates. The Supervisory Board considers the 37.5% share of female members to be satisfactory at the present time. This is due to the percentage of women in leadership positions at our company and in consideration of the composition of the supervisory boards of other companies of comparable size.

Independence

The Supervisory Board shall have an appropriate number of independent shareholder representatives as members. In any case, at least five of the shareholder representatives on the Supervisory Board shall be independent. According to the Articles of Association of Merck KGaA, Darmstadt, Germany, six members representing the shareholders are to be elected by the General Meeting, and two members are to be delegated. Taking this and the special ownership structure of Merck KGaA, Darmstadt, Germany, into account, the shareholder representatives consider five shareholder representatives to be an appropriate number of independent members. In the opinion of the shareholder representatives, the objectives concerning independent members are met at the present time. The shareholder representatives consider the following members to be independent: Wolfgang Büchele, Michael Kleinemeier, Renate Koehler, Peter Emanuel Merck, Helene von Roeder, Helga Rübsamen-Schaeff, Daniel Thelen, and Simon Thelen. In particular, the shareholder representatives do not believe that membership of the Board of Partners of E. Merck KG, Darmstadt, Germany, conflicts with independence. The Board of Partners exists complementary to the competencies and the activities of the Supervisory Board. It is not to be expected that this will lead to material and not merely temporary conflicts of interest. It should also be taken into account that due to its substantial capital investment and unlimited personal liability, E. Merck KG, Darmstadt, Germany, has a strong interest in the businesses of Merck KGaA, Darmstadt, Germany, operating efficiently and in compliance with procedures, counteracting from the outset conflicts of interest between E. Merck KG, Darmstadt, Germany, and Merck KGaA, Darmstadt, Germany, and thus also corresponding conflicts of interest between the members of the respective corporate boards.

No material conflicts of interest

Moreover, no one shall be proposed for election to the Supervisory Board who simultaneously serves on a board of or advises a major competitor of the company, or who, owing to another function, such as advisor to major contract partners of the company, could potentially become involved in a conflict of interest. No Supervisory Board member serves on a board of or advises a major competitor. No Supervisory Board member performs a function that could lead to a lasting conflict of interest.

Age limit

As a rule, the members of the Supervisory Board shall not exceed the age of 75. This objective is met at the present time.

Regular limit on the length of Supervisory Board membership

The objective of the Supervisory Board regarding its composition is that, as a rule, all members belong to the board for an uninterrupted period of no more than 15 years (corresponding to three regular terms of office). This objective is also met at the present time. The length of membership of the Supervisory Board members is set out in the Statement on Corporate Governance in the "Procedures of the Executive Board, Supervisory Board, Board of Partners, and its Committees" section.

Profile of skills and expertise

Additionally, in accordance with recommendation C. I of the German Corporate Governance Code in the version dated December 16, 2019, the Supervisory Board has prepared a profile of skills and expertise and reports on the status of implementation below.

In-depth knowledge of the fields relevant to the company

The Supervisory Board shall have at least four members with in-depth knowledge of and experience in fields that are important to the company, including at least one expert for the Healthcare and Life Science/ Performance Materials sectors, respectively. This requirement is met at the present time. At present, the Supervisory Board has more than four members who have in-depth knowledge of and experience in the Healthcare and Life Science/Performance Materials business sectors. More than four Supervisory Board members also have executive experience in companies that also or specifically operate in the Healthcare and/or Life Science/Performance Materials business sectors.

Management experience

The Supervisory Board shall have at least three members who have experience in managing or supervising a medium- or large-sized company. The Supervisory Board has more than three members who have the corresponding experience. They include Supervisory Board members who were or still are members of the management or executive board at relevant companies, as well as Supervisory Board members who have gained experience in supervisory bodies of German or foreign companies of this size.

Knowledge of business administration

The Supervisory Board must have at least four members who have in-depth knowledge of business administration and at least one member who has professional expertise in accounting or auditing. This requirement is met at the present time.

Experience in other supervisory or control bodies

Lastly, the Supervisory Board shall have at least four members who have experience as members of other supervisory or control bodies (whereby possible membership of the Board of Partners of E. Merck KG, Darmstadt, Germany, is not taken into account). This requirement is also met at the present time.

CONSOLIDATED FINANCIAL STATEMENTS

Consolidated Income Statement

€ million	Note	2020	2019
Net sales	9	**17,534**	**16,152**
Cost of sales	10	-6,835	-6,006
Gross profit		**10,699**	**10,145**
Marketing and selling expenses	11	-4,207	-4,576
Administration expenses		-1,188	-1,154
Research and development costs	12	-2,288	-2,268
Impairment losses and reversals of impairment losses on financial assets (net)	42	-6	-8
Other operating income	13	838	715
Other operating expenses	14	-863	-735
Operating result (EBIT)[1]		**2,985**	**2,120**
Finance income	40	44	97
Finance costs	40	-398	-481
Profit before income tax		**2,630**	**1,735**
Income tax	15	-637	-440
Profit after tax from continuing operations		**1,994**	**1,296**
Profit after tax from discontinued operation	6	**–**	**28**
Profit after tax		**1,994**	**1,324**
thereof: attributable to shareholders of Merck KGaA, Darmstadt, Germany (net income)		1,987	1,320
thereof: attributable to non-controlling interests	34	7	3
Earnings per share (in €)	17		
Basic		4.57	3.04
from continuing operations		4.57	2.97
from discontinued operation		–	0.07
Diluted		4.57	3.04
from continuing operations		4.57	2.97
from discontinued operation		–	0.07

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

Consolidated Statement of Comprehensive Income

€ million	Note	2020	2019
Profit after tax		**1,994**	**1,324**
Items of other comprehensive income that will not be reclassified to profit or loss in subsequent periods			
Net defined benefit liability	33		
Changes in remeasurement		-602	-488
Tax effect		130	100
Changes recognized in equity		-473	-388
Equity instruments	36		
Fair value adjustments		116	76
Tax effect		–	–
Changes recognized in equity		116	76
		-356	-312
Items of other comprehensive income that may be reclassified to profit or loss in subsequent periods			
Cash flow hedge reserve	39		
Fair value adjustments		54	-15
Reclassification to profit or loss		45	-20
Reclassification to assets		–	60
Tax effect		-30	-16
Changes recognized in equity		69	9
Cost of cash flow hedge reserve	39		
Fair value adjustments		-13	11
Reclassification to profit or loss		12	-8
Reclassification to assets		–	21
Tax effect		1	-24
Changes recognized in equity		-1	–
Currency translation difference			
Changes taken directly to equity		-1,864	349
Reclassification to profit or loss		4	-6
Changes recognized in equity		-1,860	344
		-1,792	353
Other comprehensive income		**-2,149**	**41**
Comprehensive income		**-155**	**1,365**
thereof: attributable to shareholders of Merck KGaA, Darmstadt, Germany		-160	1,359
thereof: attributable to non-controlling interests	34	5	6
Comprehensive income		**-155**	**1,365**
thereof: from continuing operations		-155	1,337
thereof: from discontinued operation		–	28

Consolidated Balance Sheet[1]

€ million	Note	Dec. 31, 2020	Dec. 31, 2019	Jan. 1, 2019
Non-current assets				–
Goodwill	18	15,959	17,114	13,764
Other intangible assets	19	7,653	9,221	7,237
Property, plant and equipment	20	6,421	6,192	4,811
Investments accounted for using the equity method		2	–	–
Other non-current financial assets	36	822	738	656
Other non-current receivables	25	25	22	17
Other non-current non-financial assets	22	91	97	76
Deferred tax assets	15	1,543	1,421	1,091
		32,516	**34,805**	**27,652**
Current assets				
Inventories	24	3,294	3,342	2,764
Trade and other current receivables	25	3,221	3,488	3,226
Contract assets	26	169	156	52
Other current financial assets	36	125	57	29
Other current non-financial assets	22	597	591	536
Income tax receivables	15	520	589	460
Cash and cash equivalents	35	1,355	781	2,170
		9,280	**9,003**	**9,236**
Total assets		**41,796**	**43,808**	**36,888**
Total equity	34			–
Equity capital		565	565	565
Capital reserves		3,814	3,814	3,814
Retained earnings		12,378	11,483	11,192
Gains/losses recognized in equity		189	1,980	1,629
Equity attributable to shareholders of Merck KGaA, Darmstadt, Germany		**16,946**	**17,841**	**17,200**
Non-controlling interests		71	73	33
		17,017	**17,914**	**17,233**
Non-current liabilities				
Non-current provisions for employee benefits	33	3,880	3,194	2,540
Other non-current provisions	27	281	254	577
Non-current financial debt	37	9,785	8,644	6,681
Other non-current financial liabilities	38	62	43	33
Other non-current non-financial liabilities	29	100	93	19
Deferred tax liabilities	15	1,441	1,825	1,288
		15,548	**14,053**	**11,138**
Current liabilities				
Current provisions for employee benefits	33	152	110	112
Other current provisions	27	461	823	488
Current financial debt	37	2,357	4,550	2,215
Other current financial liabilities	38	1,008	1,127	1,077
Trade and other current payables	30	1,768	2,054	1,766
Refund liabilities	9	666	565	472
Income tax liabilities	15	1,460	1,402	1,176
Other current non-financial liabilities	29	1,360	1,211	1,211
		9,231	**11,842**	**8,517**
Total equity and liabilities		**41,796**	**43,808**	**36,888**

[1] Previous year's figures have been adjusted, see Note (2) "Reporting principles".

Consolidated Cash Flow Statement

€ million	Note	2020	2019
Profit after tax		**1,994**	**1,324**
Depreciation/amortization/impairment losses/reversals of impairment losses		1,938	1,944
Changes in inventories		-85	-324
Changes in trade accounts receivable		-84	-47
Changes in trade accounts payable/refund liabilities		7	201
Changes in provisions		-110	153
Changes in other assets and liabilities		-123	-391
Neutralization of gains/losses on disposal of fixed assets and other disposals		-98	-57
Other non-cash income and expenses		39	53
Net cash flows from operating activities	16	**3,477**	**2,856**
thereof: from discontinued operations		–	–
Payments for investments in intangible assets		-150	-208
Payments from the disposal of intangible assets		88	23
Payments for investments in property, plant and equipment		-1,413	-813
Payments from the disposal of property, plant and equipment		35	31
Payments for investments in financial assets		-278	-196
Payments for acquisitions less acquired cash and cash equivalents (net)		-11	-5,020
Proceeds from the disposal of other financial assets		340	140
Payments for the acquisition of non-financial assets		-500	-500
Proceeds from the disposal of non-financial assets		501	501
Payments for the disposal of assets held for sale		-8	-130
Proceeds from the disposal of assets held for sale less transferred cash and cash equivalents		55	20
Net cash flows from investing activities	23	**-1,340**	**-6,153**
thereof: from discontinued operations		-8	-129
Dividend payments to shareholders of Merck KGaA, Darmstadt, Germany		-168	-162
Dividend payments to non-controlling interests		-7	-12
Profit withdrawal by E. Merck KG, Darmstadt, Germany		-512	-515
Proceeds from new borrowings of financial debt from E. Merck KG, Darmstadt, Germany		390	406
Repayment of financial debt to E. Merck KG, Darmstadt, Germany		-382	-418
Repayment of bonds		-2,724	-1,290
Proceeds from the issuance of bonds		2,486	3,482
Payments from new borrowings of other current and non-current financial debt		3,561	1,193
Repayment of other current and non-current financial debt		-4,166	-782
Net cash flows from financing activities	41	**-1,522**	**1,902**
thereof: from discontinued operations		–	–
Changes in cash and cash equivalents		**615**	**-1,395**
Changes in cash and cash equivalents due to currency translation		-40	5
Cash and cash equivalents as of January 1		781	2,170
Cash and cash equivalents as of December 31 (consolidated balance sheet)	35	**1,355**	**781**

Consolidated Statement of Changes in Net Equity

For details see Note (34) “Equity”.

		Comprehensive income						
€ million	**Jan. 1, 2020**	Profit after tax	Gains/losses recognized in equity	Dividend payments	Profit transfer to/from E. Merck KG, Darmstadt, Germany, including changes in reserves	Transactions with no change of control	Change in scope of consolidation /Other	**Dec. 31, 2020**
Equity capital	**565**	**–**	**–**	**–**	**–**	**–**	**–**	**565**
General partner’s equity	397	–	–	–	–	–	–	397
Subscribed capital	168	–	–	–	–	–	–	168
Capital reserves	**3,814**	**–**	**–**	**–**	**–**	**–**	**–**	**3,814**
Retained earnings	**11,483**	**1,987**	**-357**	**-168**	**-567**	**-1**	**–**	**12,378**
Retained earnings/net retained profit	13,134	1,987	–	-168	-567	-1	68	14,453
Remeasurement of defined benefit plans	-1,729	–	-473	–	–	–	23	-2,179
Fair value reserve for equity instruments	79	–	116	–	–	–	-91	105
Gains/losses recognized in equity	**1,980**	**–**	**-1,790**	**–**	**–**	**–**	**–**	**189**
Fair value reserve for debt instruments	-1	–	–	–	–	–	–	–
Cash flow hedge reserve	-118	–	69	–	–	–	–	-49
Cost of cash flow hedge reserve	-33	–	-1	–	–	–	–	-34
Currency translation difference	2,131	–	-1,859	–	–	–	–	273
Equity attributable to shareholders of Merck KGaA, Darmstadt, Germany	**17,841**	**1,987**	**-2,147**	**-168**	**-567**	**-1**	**–**	**16,946**
Non-controlling interests	73	7	-2	-7	–	–	–	71
Total equity	**17,914**	**1,994**	**-2,149**	**-175**	**-567**	**-1**	**–**	**17,017**

		Comprehensive income						
€ million	Jan. 1, 2019	Profit after tax	Gains/losses recognized in equity	Dividend payments	Profit transfer to/from E. Merck KG, Darmstadt, Germany, including changes in reserves	Transactions with no change of control	Change in scope of consolidation /Other	Dec. 31, 2019
Equity capital	**565**	**–**	**–**	**–**	**–**	**–**	**–**	**565**
General partner's equity	397	–	–	–	–	–	–	397
Subscribed capital	168	–	–	–	–	–	–	168
Capital reserves	**3,814**	**–**	**–**	**–**	**–**	**–**	**–**	**3,814**
Retained earnings[1]	**11,192**	**1,320**	**-312**	**-162**	**-510**	**–**	**-45**	**11,483**
Retained earnings/net retained profit[1]	12,525	1,320	–	-162	-510	–	-40	13,134
Remeasurement of defined benefit plans	-1,340	–	-388	–	–	–	-2	-1,729
Fair value reserve for equity instruments	7	–	76	–	–	–	-4	79
Gains/losses recognized in equity	**1,629**	**–**	**350**	**–**	**–**	**–**	**–**	**1,980**
Fair value reserve for debt instruments	-1	–	–	–	–	–	–	-1
Cash flow hedge reserve	-128	–	9	–	–	–	–	-118
Cost of cash flow hedge reserve	-33	–	–	–	–	–	–	-33
Currency translation difference	1,790	–	341	–	–	–	–	2,131
Equity attributable to shareholders of Merck KGaA, Darmstadt, Germany[1]	**17,200**	**1,320**	**39**	**-162**	**-510**	**–**	**-45**	**17,841**
Non-controlling interests[1]	33	3	2	-12	–	–	45	73
Total equity	**17,233**	**1,324**	**41**	**-173**	**-510**	**–**	**–**	**17,914**

[1] Previous year's figures have been adjusted, see Note (2) "Reporting principles".

Notes to the Consolidated Financial Statements

General Disclosures

(1) Company information

The accompanying consolidated financial statements for the year ended December 31, 2020, were prepared for MERCK Kommanditgesellschaft auf Aktien (Merck KGaA, Darmstadt, Germany), Frankfurter Strasse 250, 64293 Darmstadt, Germany, entered in the commercial register of the Darmstadt Local Court under HRB 6164. The ultimate parent company of the Group is the parent company of Merck KGaA, Darmstadt, Germany, E. Merck Kommanditgesellschaft (E. Merck KG, Darmstadt, Germany), Darmstadt, Germany. The consolidated financial statements of E. Merck KG, Darmstadt, Germany, can be accessed at **www.bundesanzeiger.de**.

(2) Reporting principles

These consolidated financial statements have been prepared in accordance with the International Financial Reporting Standards (IFRS and IAS) as issued by the International Accounting Standards Board (IASB) and announcements by the IFRS Interpretations Committee (IFRIC and SIC) in force on the reporting date and as adopted by the European Union, as well as the additionally applicable provisions of section 315e of the German Commercial Code (HGB). The fiscal year corresponds to the calendar year. These consolidated financial statements have been prepared in euros, the reporting currency. The figures presented in the consolidated financial statements have been rounded. This may lead to individual values not adding up to the totals presented.

The accounting and measurement policies used in the consolidated financial statements are presented in the following Notes and are marked there.

Standards, interpretations and amendments applicable for the first time in the year under review

The following regulations are binding as of fiscal 2020:

- Amendment to IAS 1 “Presentation of Financial Statements”
- Amendment to IAS 8 “Accounting Policies, Changes in Accounting Estimates and Errors”
- Amendment to IAS 39 “Financial Instruments: Recognition and Measurement”
- Amendment to IFRS 3 “Business Combinations”
- Amendment to IFRS 7 “Financial Instruments: Disclosures”
- Amendment to IFRS 9 “Financial Instruments”
- Amendment to IFRS 16 “Leases”
- Amendments to References to the Conceptual Framework in International Financial Reporting Standards

The new regulations applicable for the first time in fiscal 2020 did not have a material impact on the consolidated financial statements.

Standards, interpretations and amendments applicable for the first time in fiscal 2021

The following regulations are binding as of fiscal 2021:

- Amendment to IAS 39 “Financial Instruments: Recognition and Measurement”
- Amendments to IFRS 4 “Insurance Contracts”
- Amendment to IFRS 7 “Financial Instruments: Disclosures”
- Amendment to IFRS 9 “Financial Instruments”
- Amendment to IFRS 16 “Leases”

We did not opt for early application of any of these regulations. These regulations are not expected to have a material effect on the consolidated financial statements.

Regulations published but not yet endorsed by the European Union

As of the balance sheet date, the following regulations were published by the IASB but not yet endorsed by the European Union:

- IFRS 17 “Insurance Contracts”
- Amendment to IAS 1 “Presentation of Financial Statements”
- Amendment to IAS 16 “Property, Plant and Equipment”
- Amendment to IAS 37 “Provisions, Contingent Liabilities and Contingent Assets”
- Amendment to IFRS 3 “Business Combinations”
- Amendment to IFRS 17 “Insurance Contracts”
- Annual Improvements to IFRS 2018-2020 Cycle

From today’s perspective, the new regulations are not expected to have any material effects on the consolidated financial statements.

Adjustment to the presentation of provisions for employee benefits

To improve comparability and ensure further harmonization with the requirements of the IFRS taxonomy, the presentation of provisions and liabilities in connection with employee benefits was adjusted with effect from January 1, 2020. The balance sheet at the start of the comparative period is presented accordingly.

Provisions for employee benefits previously reported in other non-current provisions were reclassified (January 1, 2019: € 204 million/December 31, 2019: € 237 million) and reported in the item non-current provisions for employee benefits together with provisions for pensions and other post-employment benefits.

The category of current liabilities was expanded to include the item current provisions for employee benefits. This resulted in reclassifications from other current provisions (January 1, 2019: € 112 million/ December 31, 2019: € 110 million).

Without the change in the disclosure of provisions for employee benefits as at December 31, 2020 the other non-current provisions would have amounted to € 566 million and the other current provisions to € 613 million.

Adjustments to the prior-year consolidated balance sheet due to completed purchase price allocations in fiscal 2020

Purchase price allocations for two company acquisitions in 2019 were completed in fiscal 2020, resulting in changes to the fair values of the assets and liabilities acquired. In accordance with IFRS 3, this required the adjustment of the consolidated balance sheet as of December 31, 2019. Further information can be found in Note (6) “Acquisitions and divestments”.

Change of the discount factor for defined benefit pension plans in the eurozone

As of December 31, 2020, the Group changed the way in which it determines the discount factor for defined benefit pension plans in the eurozone. This constitutes a change in an accounting estimate within the meaning of IAS 8. Further information can be found in Note (33) “Provisions for employee benefits”.

Accounting and measurement policies

Currency translation

Functional currency

To a predominant extent, the subsidiaries of Merck KGaA, Darmstadt, Germany, conduct their business independently so that the functional currency is normally the respective local currency.

Some subsidiaries, particularly in the Performance Materials business sector, use the U.S. dollar as a functional currency in deviation from the local currency.

Transactions in non-functional currency

When the financial statements of consolidated companies are prepared, business transactions that are conducted in currencies other than the functional currency are translated using the exchange rate on the date of the transaction.

Translation of financial statements into the reporting currency (euro)

The financial statements of consolidated companies not using the euro as their functional currency are translated into the reporting currency, the euro. Assets and liabilities are measured at the closing rate, and income and expenses are translated at average rates. Any currency translation differences arising during consolidation of Group companies are recognized in equity.

Hyperinflation

Since 2018, Argentina’s economy has been classified as hyperinflationary in accordance with IAS 29 “Financial Reporting in Hyperinflationary Economies”. Accordingly, business activities in Argentina are no longer disclosed at historical cost but are presented adjusted for inflation. For this purpose, the Group uses a combination of the wholesale index IPIM (Índice de precios internos al por mayor) and the consumer price index IPC (Índice de precios al consumidor). The index applied as of the balance sheet date stood at 4,896.2 (December 31, 2019: 3,722.0/January 1, 2019: 2,462.1). The loss on the net monetary position is reported in other operating expenses (see Note (14) “Other operating expenses”).

After adjusting the figures for inflation, the balance sheet items and income and expenses are translated into the reporting currency, the euro, at the closing rate in accordance with IAS 21.42. Prior-year comparative figures are not restated.

Exchange rates of most significant currencies

The exchange rates of the most significant currencies in these consolidated financial statements were as follows:

	Average rate		Closing rate	
€ 1 =	**2020**	2019	**Dec. 31, 2020**	Dec. 31, 2019
Chinese renminbi (CNY)	7.872	7.740	8.000	7.803
Japanese yen (JPY)	121.756	122.314	126.801	121.765
Swiss franc (CHF)	1.070	1.112	1.083	1.086
South Korean won (KRW)	1,344.968	1,300.959	1,336.094	1,295.177
Taiwan dollar (TWD)	33.589	34.578	34.548	33.608
U.S. dollar (USD)	1.141	1.121	1.230	1.121

(3) Discretionary decisions and sources of estimation uncertainty

Dealing with discretionary decisions and sources of estimation uncertainty

The preparation of the consolidated financial statements requires the Group to make discretionary decisions and assumptions as well as estimates to a certain extent. The discretionary scope and estimation uncertainty are assessed in a Group-specific manner. Discretion describes the need to make assumptions concerning recognition or measurement. Estimation uncertainty denotes the degree of availability and reliability of historical experience and external data for future developments.

Increased uncertainty due to the Covid-19 pandemic

The Group is continuously examining the impact of the Covid-19 pandemic on its business and the resulting effects for the Group's accounting. To date, the Fertility franchise in the Healthcare business sector and the Surface Solutions and Display Solutions business units in the Performance Materials business sector have been most negatively affected by the Covid-19 pandemic. By contrast, the Process Solutions business unit in the Life Science business sector in particular is benefiting from increased demand, while all the other areas have seen either a slight negative impact or been largely unaffected by the pandemic. Based on the course of business and current planning, there was nothing to suggest that the going concern assumption should not have been applied in preparing these consolidated financial statements. As a preventive measure, however, the Group had increased its cash and cash equivalents in order to secure its liquidity in the meantime. There was no risk of a liquidity bottleneck at any time. Due to the high dynamics of the pandemic and the lack of historical experience, the estimates in these consolidated financial statements are subject to a greater degree of uncertainty than would usually be the case. Where making estimates involved particular challenges as a result of the Covid-19 pandemic, this is discussed in the following overview and the respective notes.

Overview of significant discretionary decisions and sources of estimation uncertainty

The accounting matters with the most significant discretionary decisions as well as the most comprehensive assumptions relating to the future and sources of estimation uncertainty are described below:

Accounting matter	**Carrying amount as of Dec. 31, 2020 in € million**	IFRS	Discretionary scope/ estimation uncertainty	Sensitivity analysis	Increased uncertainty due to the Covid-19 pandemic	Note
Goodwill	15,959			yes	yes	18
Determination of recoverable amount		IAS 36	high			
Other intangible assets	7,653			yes	yes	6, 19
Identification and measurement of intangible assets within the scope of business combinations		IFRS 3	high			
In-licensing of intangible assets		IAS 38	medium			
Determination of amortization		IAS 38	medium			
Identification of impairments or reversal of impairments		IAS 36	high			
Property, plant, and equipment	6,421			no	no	20
Determination of depreciation		IAS 16	medium			
Identification of impairments or reversal of impairments		IAS 36	medium			
Leases	429			yes	no	21
Recognition and measurement of lease arrangements		IFRS 16	medium			
Inventories	3,294			no	yes	24
Identification of impairments or reversal of impairments		IAS 2	medium			
Trade and other receivables	3,221			yes	yes	25, 42
Determination of loss allowance		IFRS 9	medium			
Other financial assets				yes	no	36, 43
Determination of fair values of contingent considerations	260	IFRS 13	high			
Determination of fair values of equity instruments	499	IFRS 9, IFRS 13	medium			
Provisions for pensions and other post-employment benefits				yes	yes	33
Determination of parameters for the valuation of present value of defined-benefit obligations	6,352	IAS 19	medium			
Other provisions and contingent liabilities	741			no	no	27, 28, 33
Recognition and measurement of other provisions and contingent liabilities		IAS 37	high			
Determination of parameters for the valuation of fair values of share-based payment programs		IFRS 2	medium			
Collaboration agreements				yes	no	7
Revenue recognition for upfront and milestone payments in collaboration agreements		-	medium			
Revenue recognition				yes	no	9
Measurement of sales deductions and refund liabilities	666	IFRS 15	high			
Income tax				no	no	15
Recognition and measurement of income tax liabilities	1,460	IAS 12	high			
Recognition and measurement of deferred taxes from temporary differences		IAS 12	medium			
Recognition of deferred tax assets from tax loss carryforwards	20	IAS 12	high			
Assets held for sale				no	no	6
Date on which assets and liabilities are classified as “held for sale”		IFRS 5	medium			

(4) Subsequent events

Effective January 1, 2021, Mr. Peter Guenter was appointed as a new member of the Executive Board and CEO of the Healthcare business sector.

Subsequent to the balance sheet date, no further events of special importance occurred that could have a material impact on the net assets, financial position or results of operations.

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Group Structure

(5) Changes in the scope of consolidation

Accounting and measurement policies

Changes in the scope of consolidation

Overall, the impact of subsidiaries not consolidated due to immateriality on net sales, profit after tax, assets, and equity was less than 1% relative to the entire Group. The shares in these companies are reported in non-current financial assets (see Note (36) “Other financial assets”).

The scope of consolidation changed as follows in the reporting period:

Fully consolidated companies as of Dec. 31, 2019		**335**
Additions	Companies established	4
	Acquisitions	2
	Materiality	–
Retirements	Liquidations/mergers	-8
	Divestments	-5
	Immateriality	-2
	Loss of control	–
Fully consolidated companies as of Dec. 31, 2020		**326**
Subsidiaries rated at-equity as of Dec. 31, 2019		–
Subsidiaries rated at-equity as of Dec. 31, 2020		1
Non-consolidated subsidiaries as of Dec. 31, 2019		33
Non-consolidated subsidiaries as of Dec. 31, 2020		33

The list of non-consolidated subsidiaries mainly comprises non-operating shelf companies as well as entities subject to liquidation procedures, which are subsequently measured at fair value through other comprehensive income. The company accounted for using the equity method is Syntropy Technologies LLC, United States, which was formed in fiscal 2020. This company generated sales of € 1 million in the year under review.

The list of shareholdings presents all the companies included in the consolidated financial statements as well as all of the shareholdings of Merck KGaA, Darmstadt, Germany (see Note (50) “List of shareholdings”).

(6) Acquisitions and divestments

Accounting and measurement policies

Business combinations

The balance sheet items goodwill, other intangible assets and deferred taxes are significantly influenced by purchase price allocations implemented within the scope of business combinations. Because prices observable on the market are mostly not available for the acquired other intangible assets, the Group relies on the expertise of external professionals for all material company acquisitions. The following overview shows the methods routinely used to measure intangible assets within the scope of purchase price allocations:

	Measurement method for determining fair value
Customer relationships	Multi period excess earnings method
Technology	Relief from royalty method
Trademark	Relief from royalty method

Results from foreign currency hedging of expected business combinations, if they meet the requirements for hedge accounting, are offset against the carrying value of the net assets acquired.

Significant discretionary decisions and sources of estimation uncertainty

Business combinations

The recognition and measurement of assets, liabilities, and contingent liabilities at fair value within the context of purchase price allocations are associated with significant estimation uncertainty.

In particular, estimation uncertainty and discretionary decisions exist regarding:

- planning of future cash flows,
- the customer churn rate, which indicates how existing customer relationships will change in the future,
- the license rate for technologies, which estimates royalty savings on the basis of comparable transactions of similar technologies,
- the discount factor, which is applied for maturity- and risk-based discounting of expected cash inflows,
- the useful life and the degree of technical obsolescence which depend, among other things, on assumptions about technological trends.

Acquisitions in the fiscal year

Acquisition of Resolution Spectra Systems S.A.S., France

On June 30, 2020, the Group completed the acquisition of all of the shares in Resolution Spectra Systems S.A.S., a leading provider of systems for real-time analysis and monitoring of bioprocesses. The acquisition strengthens the Group's bioprocessing product portfolio within the Life Science business sector. The purchase price comprised a fixed compensation of € 4 million and future sales-based milestone payments of up to € 4 million. The purchase price allocation was completed as of December 31, 2020. The intangible assets identified within the scope of purchase price allocation and recognized as of the initial consolidation date were attributable to technology-related intangible assets of € 4 million. Goodwill amounted to € 5 million. The impact on the Group's net assets, financial position, and results of operations has been negligible both since actual inclusion in the consolidated financial statements and on the basis of notional consolidation from January 1, 2020.

Acquisition of AmpTec GmbH, Hamburg

On December 22, 2020, the Group acquired all of the shares in AmpTec GmbH (AmpTec), Hamburg, one of the leading contract development and manufacturing organizations for mRNA (messenger ribonucleic acid).

The deal strengthens the Group's capabilities to develop and manufacture mRNA. The acquisition adds to the Group's lipid manufacturing expertise and creates an integrated offering across the entire mRNA value chain. The company will be integrated into the Process Solutions business unit, which is part of the Life Science business sector. The preliminary purchase price comprised a payment of € 7 million and milestone payments of up to € 18 million for the achievement of technological development targets and sales- and profit-based targets. Valuation of the contingent purchase price payments resulted in a purchase price of € 13 million in accordance with IFRS 3. As the transaction took place just a few days before the reporting date, purchase price allocation had not yet been performed as of December 31, 2020. Accordingly, the difference between the purchase price and the carrying amounts of the net assets acquired is reported in full as goodwill in the amount of € 13 million. AmpTec has more than 40 employees and generated sales of € 2 million in fiscal 2020. The impact on the Group's net assets, financial position, and results of operations has been negligible both since actual inclusion in the consolidated financial statements and on the basis of notional consolidation from January 1, 2020.

Acquisitions in the previous year

Acquisition of Versum Materials, Inc., United States

On April 12, 2019, the Group announced the conclusion of a final agreement to acquire all issued and outstanding shares of Versum Materials, Inc, (Versum) for US$ 53 per share in cash. The transaction closed on October 7, 2019. Its completion followed previous approvals issued by the relevant authorities, the approval of the shareholders of Versum and the fulfillment of other customary closing conditions.

Versum's business activities

Versum was one of the world's leading providers of process chemicals, gases, and equipment for semiconductor manufacturing. In fiscal 2018, the company generated annual sales of around € 1.2 billion in accordance with U.S. GAAP. It had around 2,300 employees and operated 14 production sites and seven research and development facilities in Asia and North America. The former Versum business was integrated into the Semiconductor Solutions business unit, which is part of the Performance Materials business sector. The objective of the transaction is to develop the Group as a leading player in the field of electronic materials for the semiconductor and display industries.

Due to the acquisition date, the Versum business acquired in fiscal 2019 contributed to the net income of the Group only from October 7, 2019.

Purchase price allocation

Determining the fair values required extensive analyses and calculations by an external professional. This process was completed in September 2020 and resulted in adjustments to intangible assets, property, plant and equipment and the associated deferred tax liabilities compared with the preliminary purchase price allocation in the 2019 financial statements. The changes in fixed assets were due in particular to the country-specific allocation of intangible assets, which in addition resulted in changes in the deferred taxes as a result of different national tax rates. There were also reclassifications within fixed assets. The final fair values at the acquisition date were as follows:

	Fair value at the acquisition date
€ million	**Versum**
Non-current assets	
Intangible assets (excluding goodwill)	2,889
Property, plant and equipment	512
Other non-current assets	62
	3,463
Current assets	
Inventories	224
Trade and other current receivables	155
Cash and cash equivalents	270
Other current assets	87
	737
Total assets	**4,199**
Non-current liabilities	
Non-current financial debt	938
Other non-current provisions and liabilities	81
Deferred tax liabilities	759
	1,778
Current liabilities	
Trade payables and other liabilities	61
Income tax liabilities	122
Other currrent liabilities and provisions	161
	345
Total liabilities	**2,123**
Net assets acquired	**2,076**
Purchase price for the acquisition of shares in accordance with IFRS 3	**5,198**
Positive difference (goodwill)	**3,121**

Material contingent liabilities were not identified as part of final purchase price allocation. The inventories measured at fair value were recognized in the cost of sales over a period of six months. The property, plant and equipment is depreciated over a period of up to 29 years. This resulted in depreciation of € 79 million in fiscal 2020 (2019: € 15 million).

The following overview shows the intangible assets identified within the scope of final purchase price allocation and recognized at the acquisition date:

€ million/years (preliminary)	**Fair value at the acquisition date**	Useful life
Customer relationships	2,356	7-19
Technology (patented and unpatented)	467	5-9/indefinite
Trademarks	44	12
Other intangibe assets	22	7
Total	**2,889**	
Goodwill	3,121	indefinite
Total	**6,010**	

Amortization of the intangible assets acquired amounted to € 220 million in fiscal 2020 (2019: € 55 million).

If customer relationships were one year longer, the fair value of the customer relationships recognized in intangible assets would be € 44 million higher on the date of their acquisition. A shortening of the customer relationships by one year would reduce their fair value by € 46 million. The positive difference of € 3,121 million was recognized as goodwill. It includes expected synergies resulting from the integration of Versum into the Group, expected revenues from technical innovations and developments that go beyond the current product, development, and customer portfolios, and unrecognized intangible assets such as the expertise of the workforce. The goodwill was allocated in full to the Performance Materials business sector. The goodwill is expected to be non-tax deductible. The change in goodwill valued in foreign currency between initial recognition and December 31, 2020 is broken down as follows:

€ million	**Change in goodwill**
Goodwill on December 31, 2019[1]	3,058
Exchange rate effects	-271
Goodwill on December 31, 2020	**2,787**

[1] Previous year's figure have been adjusted.

Other acquisitions in the previous year

On June 17, 2019, the Group acquired the laboratory informatics provider BSSN Software GmbH, Darmstadt, (BSSN). BSSN develops and markets software for managing and integrating data, which unifies data from laboratory instruments and data systems and makes them available for analyzing, processing, and sharing. The business was integrated into the Applied Solutions business unit, which is part of the Life Science business sector. The purchase price amounted to € 16 million, including milestone payments amounting to € 6 million for reaching technological development targets. The first milestone payment of € 2 million was made in June 2020. The intangible assets identified within the scope of purchase price allocation and recognized as of the initial consolidation date were attributable to technology-related intangible assets of € 6 million.

The Group completed the acquisition of Intermolecular, Inc., United States, on September 20, 2019, for US$ 1.20 per share in cash (the equivalent of € 56 million for 100% of shares). Intermolecular possesses application-specific materials expertise and platforms for accelerated learning and experimentation with a powerful analysis infrastructure that complements the Group's business and technology portfolio in the Semiconductor Solutions business unit, which is part of the Performance Materials business sector. In fiscal 2018, Intermolecular generated sales of US$ 34 million and had around 90 employees. Final purchase price allocation did not result in any changes compared with the preliminary purchase price allocation presented in the previous year's annual report.

The Group completed the acquisition of FloDesign Sonics, Inc., United States, on October 10, 2019. The company developed a platform for industrial manufacturing of cell and gene therapies that allows cells to be manipulated using ultrasonic waves. It forms part of the Life Science business sector. The purchase price included fixed compensation of € 32 million. Future milestone payments of up to € 30 million for the achievement of technological development targets and an additional sales-based milestone payment were agreed as further elements of the purchase price. Taking into account the contingent purchase price payments, this resulted in a purchase price of € 46 million in accordance with IFRS 3. Final purchase price allocation did not result in any changes compared with the preliminary purchase price allocation presented in the previous year's annual report.

Adjustments to the prior-year consolidated balance sheet due to completed purchase price allocation in fiscal 2020

The preliminary purchase price allocations for Versum and BSSN were completed in fiscal 2020. The consolidated balance sheet as of December 31, 2019 was retrospectively adjusted as follows:

€ million	Dec. 31, 2019 as reported	Adjustments for Versum	Adjustments for BSSN	**Dec. 31, 2019 adjusted**
Non-current assets				
Goodwill	17,141	-23	-4	17,114
Other intangible assets	9,175	40	6	9,221
Property, plant and equipment	6,213	-22		6,192
Other nun-current financial assets	738			738
Other non-current receivables	22			22
Other nun-current non-financial assets	97			97
Deferred tax assets	1,421			1,421
	34,808	**-4**	**1**	**34,805**
Current Assets				
Inventories	3,342			3,342
Trade and other current receivables	3,488			3,488
Contract assets	156			156
Other current financial assets	57			57
Other current non-financial assets	591			591
Income tax receivables	589			589
Cash and cash equivalents	781			781
	9,003	**–**	**–**	**9,003**
Total assets	**43,811**	**-4**	**1**	**43,808**
Equity				
Equity capital	565			565
Capital reserves	3,814			3,814
Retained earnings	11,507	-24		11,483
Gaines/losses recognized in equity	1,980			1,980
Equity attributable to shareholders of Merck KGaA, Darmstadt, Germany	**17,865**	**-24**		**17,841**
Non-controlling interests	48	24		73
	17,914	**–**	**–**	**17,914**
Non-current liabilities				
Non-current provisions for employee benefits	3,194			3,194
Other non-current provisions	254			254
Non-current financial debt	8,644			8,644
Other non-current financial liabilities	43			43
Other non-current non-financial liabilities	93			93
Deferred tax liabilities	1,828	-4	1	1,825
	14,056	**-4**	**1**	**14,053**
Current liabilities				
Current provisions for employee benefits	110			110
Other current provisions	823			823
Current financial debt	4,550			4,550
Other current financial liabilities	1,127			1,127
Trade and other current payables	2,054			2,054
Refund liabilities	565			565
Income tax liabilities	1,402			1,402
Other current non-financial liabilities	1,211			1,211
	11,842	**–**	**–**	**11,842**
Total equity and liabilities	**43,811**	**-4**	**1**	**43,808**

The completion of purchase price allocation for the acquisitions made in previous year did not have any material effect on the consolidated income statement.

Divestments in the fiscal year

Significant discretionary decisions and sources of estimation uncertainty

Divestments

The assessment as to when a non-current asset, disposal group, or discontinued operation meets the prerequisites of IFRS 5 for classification as “held for sale” is subject to discretionary judgment. Even in the case of an existing management decision to review a disposal, an uncertain assessment has to be made as to the probability of whether a corresponding disposal will occur during the year.

Divestment of the Allergopharma allergy business

On February 19, 2020, the Group signed an agreement to sell its Allergopharma allergy business to Dermapharm Beteiligungs GmbH, Grünwald, Germany. Following approval by the relevant regulatory authorities and other customary closing conditions, the transaction was closed effective March 31, 2020 with the exception of the immaterial business in China, which was closed separately on August 31, 2020. Allergopharma is a leading provider of specific immunotherapy for type 1 allergies. Allergopharma products were available in 18 countries. The transaction encompassed the Allergopharma business in Europe and Asia, including a wide range of therapeutic and diagnostic products, as well as the production site in Reinbek. An existing adrenaline autoinjector development project for the treatment of anaphylactic reactions did not form part of the transaction and remained with the Group. The final purchase price was € 70 million. After deducting the cash transferred, the Group received € 56 million. This was reported in the cash flow statement in cash flows from investment activities in the year under review. The gain on disposal in the amount of € 35 million was reported in other operating income in the consolidated income statement.

In the management’s estimation, the conditions for classification as a disposal group within the meaning of IFRS 5 were met only when the agreement on the divestment of the Allergopharma business was signed.

Divestment of Litec-LLL GmbH, Greifswald

The Group sold Litec-LLL GmbH on August 31, 2020 as part of a management buyout. The company specializes in lighting materials. The selling price was € 3 million; the gain on disposal and the cash received amounted to less than € 1 million.

(7) Collaboration and licensing agreements

Accounting and measurement policies

Out-licensing agreements

The Group concludes material out-licensing agreements for intellectual property in the Healthcare business sector in particular. In the vast majority of cases, the granting of a license constitutes a distinct performance obligation that must usually be recognized at a point in time. Due to the uncertainty of development results and regulatory events, the recognition of contingent consideration usually does not take place until the result in question has materialized. In principle, sales-based and usage-based royalties are recognized only after the contract partner makes the corresponding sales or uses the intellectual property. As out-licensing transactions in the Healthcare business sector do not form part of ordinary activities, the corresponding income from upfront payments, milestone payments, and royalties is reported in other operating income (see Note (13) “Other operating income”).

Collaboration agreements

In addition to out-licensing agreements for selling intellectual property, the Group enters into collaboration agreements in the Healthcare business sector in which the Group works with partners to develop pharmaceutical drug candidates and, if regulatory approval is granted, to commercialize them. Because the partner companies do not have customer characteristics, these collaboration agreements do not fall directly within the scope of IFRS 15 and the associated income from upfront payments, milestone payments, and royalties is shown under other operating income. Reimbursements of research and development costs made between the collaboration partners are recognized on a net basis in research and development costs. The two most significant collaborations are the agreements with GlaxoSmithKline plc, United Kingdom, (GSK) and Pfizer Inc., United States, (Pfizer) in the field of immuno-oncology.

The Group recognizes the consideration received in the course of collaboration agreements for bundled obligations arising from granting rights to intellectual property as well as other goods and services promised as income over a period of time, in line with industry practice. Income is caught up cumulatively upon receipt of uncertain future milestone payments attributable to contractual obligations which have already been fulfilled. This refers especially to milestone payments subsequent to regulatory approval. Furthermore, collaboration agreements in the Healthcare business sector typically allocate the sales generated in specific markets, or with specific products, to the respective collaboration partners in the event of a successful approval; in turn, specific income and expense items are carried by the collaboration partners according to predefined allocation ratios. Under these circumstances, the Group recognizes the sales from the commercialization of products to third-party customers, if the Group takes on the role of a principal within the meaning of IFRS 15. Expenses resulting from payments made to collaboration partners in connection with profit share agreements are recognized in other operating expenses.

Joint arrangements in the Performance Materials business sector

The Group is a contract partner in two joint arrangements in the Performance Materials business sector. In both cases, the Group has joint control with the respective partner. Although they are legally separate from the partners, these joint arrangements are classified as joint operations in line with IFRS 11.B31. The Group and the contract partner ensure their contractually agreed access to the production outputs by preventing third party access. Assets, liabilities, income, and expenses from these joint arrangements allocated to the Group are accounted for in accordance with the IFRS applicable to the respective assets, liabilities, income and expenses.

Significant discretionary decisions and sources of estimation uncertainty

Collaboration and licensing agreements

As part of the accounting treatment of collaboration and licensing agreements, significant discretionary decisions have to be made in the following areas:

- Classification of joint arrangements as joint operations or joint ventures,
- Identification of an appropriate income recognition method, and
- Determination of the appropriate timing of income recognition.

Estimates are to be made especially when it comes to determining the transaction price and progress on the performance obligation.

Strategic alliance with GlaxoSmithKline plc, United Kingdom, to co-develop and co-commercialize active ingredients in immuno-oncology

On February 5, 2019, the Group entered into a global agreement in the field of immuno-oncology with a subsidiary of GSK to co-develop and co-commercialize the drug candidate Bintrafusp alfa (formerly M7824). The bifunctional fusion protein, Bintrafusp alfa, is currently an investigational candidate for several types of cancer. The overriding objective of the strategic alliance is to share the risks of development and commercialization. The execution of the collaboration agreement is not being structured through a separate vehicle.

After fulfilling the agreed conditions, the Group received an upfront payment of € 300 million in fiscal 2019, which was recognized as deferred income on the balance sheet and reported in other liabilities. In addition, the Group can receive future payments of up to € 2.5 billion (2019: up to € 2.9 billion) for achieving certain milestones related to approval and commercialization. The Group recognizes the upfront payment as income over time in accordance with the fulfillment of performance obligations existing on the basis of contractual agreements. A cost-based method is used to recognize these payments.

The Group and GSK are jointly responsible for the development and potential commercialization further down the line. According to the collaboration agreement, during the development period each company bears one half of the development expenses. While the Group would realize the net sales in the United States and GSK in all other countries in the event of regulatory approval, the partners would evenly split the net results of net sales less defined expense components.

In fiscal 2020, the Group recognized research and development costs amounting to a low three-digit million euro figure (2019: double-digit million euro figure). In addition, the Group recognized € 85 million of the upfront payment collected within other operating income (2019: € 92 million) If the percentage of completion had been 10% higher, this would have increased other operating income and profit before tax by € 30 million (while a 10% lower percentage of completion would have meant a reduction of € 30 million).

On January 20, 2021, the Group announced the discontinuation of the INTR@PID Lung 037 clinical study on the first-line treatment of patients with non-small cell lung cancer following the review of clinical data by the independent data monitoring committee. The impact of this adjusting event is included in these consolidated financial statements in a low double-digit million euro amount.

Strategic alliance with Pfizer Inc., United States, to jointly co-develop and co-commercialize active ingredients in immuno-oncology

On November 17, 2014, the Group formed a global strategic alliance with Pfizer to co-develop and co-commercialize the anti-PD-L1 antibody avelumab. Avelumab received its first regulatory approvals in 2017 under the trade name Bavencio®. This antibody is also being studied in multiple broad-based clinical trials as a potential treatment for further tumor types as a single agent as well as in combination with a wide array of approved or still investigational active ingredients. The overriding objective of the strategic alliance is to share the development risks and to expand the two companies' presence in immuno-oncology. The execution of the collaboration agreement is not being structured through a separate vehicle.

Upon entry into the agreement in 2014, Pfizer made an upfront cash payment of US$ 850 million (€ 678 million) to the Group. Pfizer also committed to making further payments of up to US$ 2 billion to the Group subject to the achievement of defined development and commercial milestones. Based on the collaboration agreement, the Group was also granted the right to co-commercialize Xalkori® (crizotinib) with Pfizer for multiple years. Both the upfront payment and the value of the right to co-commercialize Xalkori® were recognized in the income statement until the end of fiscal 2019 and reported in other operating income. The residual book value of the intangible asset as of December 31, 2020 amounted to € 10 million (December 31, 2019: € 45 million).

According to the collaboration agreement, during the development period each company bears one half of the development expenses. In the commercialization phase, the Group recognizes the majority of sales from the commercialization of Bavencio® while the Group and Pfizer evenly split the net amount of sales less defined expense components. Net sales from the commercialization of Bavencio® amounted to € 156 million in the year under review (2019: € 103 million). As in the previous year, the Group recognized research and development costs in a low three-digit million euro amount in fiscal 2020, as well as profit share expenses in the amount of € 63 million (2019: € 42 million). The Group also realized other operating income of € 281 million in the previous year. This resulted from the achievement of three approval milestones as well as the recognition in the income statement of both the upfront payment and the value of the right to co-commercialize Xalkori®. For further information, please refer to Note (13) "Other operating income".

Restructuring of the collaboration with F-star Delta Ltd., United Kingdom, in the field of immuno-oncology in the previous year

In June 2017, the Group announced a strategic collaboration with F-star Delta Ltd, United Kingdom, (F-star) for the development and commercialization of bispecific immuno-oncology antibodies. In 2019, the existing licensing and collaboration agreement with F-star was restructured due to the reprioritization of resources and programs, meaning that all rights to the original drug candidate FS118 reverted to F-star. The option to acquire F-star Delta Ltd. was terminated. In the course of the realignment, the Group in-licensed an innovative bispecific antibody and, in addition, holds an option to in-license a further bispecific antibody from F-star's antibody platform. Both bispecific antibodies were handled under the previous collaboration. As a result of the aforementioned changes, impairment losses totaling € 72 million were recognized in 2019 for an intangible asset and the reverted option.

Out-licensing of the rights to a drug candidate in the area of osteoarthritis to Novartis AG, Switzerland

On October 1, 2020, the Group concluded an agreement with Novartis AG, Switzerland, (Novartis) on the out-licensing of M6495, a Phase II-ready drug candidate for the treatment of osteoarthritis. The Group received an upfront payment of € 50 million and is entitled to potential additional payments of up to € 400 million subject to the achievement of certain sales and development milestones, as well as royalties on future net sales. Novartis will assume full responsibility for the development and commercialization of M6495. The income from the out-licensing of intellectual property in the amount of € 27 million was reported in other operating income.

Out-licensing of the rights to the investigational therapy atacicept to Vera Therapeutics, Inc., United States

On November 9, 2020, the Group concluded an agreement with the biotechnology company Vera Therapeutics, Inc., United States, (Vera Therapeutics) on the out-licensing of the rights for the investigational therapy atacicept. Vera Therapeutics will initiate a Phase IIb study with atacicept in IgA nephropathy (IgAN). As part of the agreement, the Group received a 10% equity interest in Vera Therapeutics and the right to future milestone payments totaling up to € 605 million depending on the achievement of certain development and sales milestones, as well as royalties on future net sales. On initial recognition, the equity instruments received had a fair value of € 11 million. Vera Therapeutics will assume full responsibility for the development and commercialization of the atacicept program in all indications. The income from the out-licensing of intellectual property in the amount of € 27 million was reported in other operating income. This included a payment received in December 2020 for the achievement of a development milestone.

Collaboration with Artios Pharma Limited, United Kingdom, in the area of DNA repair mechanisms

On December 3, 2020, the Group and Artios Pharma Limited, United Kingdom (Artios) announced the conclusion of a global strategic cooperation in the area of DNA repair mechanisms. The aim of the collaboration is the development of therapies for the personalized treatment of cancers. Under the terms of the agreement, the partners will use Artios's platform to jointly identify multiple target molecules and lead structures. The Group has the option of acquiring control over the exclusive worldwide rights to develop and commercialize selected drug candidates resulting from the collaboration. In exchange, Artios will receive an upfront payment as well as near-term payments totaling US$ 30 million. If the Group chooses to exercise the option, Artios will receive up to US$ 860 million for each of the products commercialized by the Group in addition to staggered royalty payments on future net sales.

Arrangements in the Performance Materials business sector

Upon acquiring Versum Materials, Inc., United States, (Versum), the Group became an equal 50% partner in Hydrochlor, LLC, United States, (Hydrochlor) under a joint arrangement with Linde plc, Ireland. Hydrochlor was founded with the aim of supplying hydrogen chloride exclusively to the two partner companies. Also upon acquiring Versum, the Group became a partner under an agreement with Showa Denko K.K., Japan. The aim of the agreement is to manufacture a supplier product to supply to the two partner companies exclusively. Even though both agreements are legally separate from the respective partner companies, each agreement was classified as a joint operation since the respective arrangements are designed to provide output to the contract partners and each agreement is the sole source of funding for settling liabilities.

Operating Activities

(8) Segment Reporting

Accounting and measurement policies

Segment Reporting

The internal organizational and reporting structure of the Group forms the basis of the segmentation of its business operations. It is founded on the business models of the business sectors, which led to homogeneous risk structures within the segments. Resource allocation and the assessment of the segments' business development are performed by the Executive Board of Merck KGaA, Darmstadt, Germany, as the chief operating decision-maker.

Corporate and Other includes income and expenses, assets and liabilities, as well as cash flows that cannot be allocated to the reportable segments presented. They originate mainly from the central Group functions. Moreover, the column serves the reconciliation to the Group figures. As these are managed at Group level, financial expenses and financial income, which include interest expenses and interest income, as well as income tax expenses and income are also disclosed under Corporate and Other.

Apart from sales, the success of a segment is mainly determined by EBITDA pre (segment result) and business free cash flow. EBITDA pre and business free cash flow are performance indicators not defined by International Financial Reporting Standards (IFRS). However, they represent important variables used to steer the Group. To enable operational performance to be controlled using the performance indicator EBITDA pre, this is calculated excluding depreciation and amortization, impairment losses and reversals of impairment losses, and adjustments.

Information by business sector – 2020

€ million	Healthcare	Life Science	Performance Materials	Corporate and Other	Group
Net sales[1]	**6,639**	**7,515**	**3,380**	**–**	**17,534**
Intersegment sales	–	18	–	-18	–
Operating result (EBIT)[2]	**1,804**	**1,599**	**240**	**-658**	**2,985**
Depreciation	324	786	561	84	1,756
Impairment losses	56	3	123	–	183
Reversals of impairment losses	–	–	–	–	–
EBITDA[2]	**2,184**	**2,387**	**925**	**-573**	**4,923**
Adjustments[2]	83	18	99	78	279
EBITDA pre (segment result)[2]	**2,267**	**2,405**	**1,024**	**-495**	**5,201**
EBITDA pre margin (in % of net sales)[2]	34.1%	32.0%	30.3%	–	29.7%
Assets by business sector	7,358	20,145	9,735	4,558	41,796
Liabilities by business sector	-2,494	-1,589	-666	-20,030	-24,780
Investments in property, plant and equipment[3]	480	653	230	49	1,413
Investments in intangible assets[3]	43	51	46	10	150
Non-cash changes in provisions[4]	-294	-13	18	75	-213

[1] Excluding intersegment sales.

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

[3] According to the consolidated cash flow statement.

[4] Excluding provisions for pensions and other post-employment benefits.

Information by business sector – 2019

€ million	Healthcare	Life Science	Performance Materials	Corporate and Other	Group
Net sales[1]	**6,714**	**6,864**	**2,574**	**–**	**16,152**
Intersegment sales	–	21	–	-21	–
Operating result (EBIT)[2]	**1,149**	**1,280**	**307**	**-617**	**2,120**
Depreciation	713	784	328	80	1,905
Impairment losses	34	6	2	–	42
Reversals of impairment losses	–	–	–	–	–
EBITDA[2]	**1,896**	**2,070**	**637**	**-537**	**4,066**
Adjustments[2]	25	59	166	68	318
EBITDA pre (segment result)[2]	**1,922**	**2,129**	**803**	**-469**	**4,385**
EBITDA pre margin (in % of net sales)[2]	28.6%	31.0%	31.2%	–	27.1%
Assets by business sector[3]	7,560	21,596	10,785	3,867	43,808
Liabilities by business sector[3]	-3,055	-1,519	-716	-20,605	-25,894
Payments for investments in property, plant and equipment[4]	343	296	125	49	813
Payments for investments in intangible assets[4]	91	86	12	19	208
Non-cash changes in provisions[5]	44	6	25	38	112

[1] Excluding intersegment sales.

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

[3] Previous year's figure have been adjusted, see Note (6) "Acquisitions and divestments".

[4] According to the consolidated cash flow statement.

[5] Without provisions for pensions and other post-employment benefits.

Information by country and region – 2020

€ million	**Europe**	thereof: Germany	thereof: Switzerland	**North America**	thereof: USA	**Asia-Pacific**	thereof: China	**Latin America**	**Middle East and Africa**	**Group**
Net sales by customer location[1]	4,991	979	292	4,739	4,524	6,313	2,529	910	581	17,534
Net sales by company location[1]	5,515	1,501	462	4,830	4,639	5,962	2,224	868	361	17,534
Goodwill and other intangible assets[2]	4,930	1,585	1,628	17,876	17,866	804	63	1	–	23,612
Property, plant and equipment	3,581	1,610	877	1,664	1,657	973	343	147	56	6,421
Research and development costs	-1,931	-884	-905	-269	-269	-63	-21	-14	-10	-2,288
Number of employees	26,586	13,292	2,383	13,312	13,131	13,518	4,275	3,384	1,296	58,096

[1] Excluding intersegment sales.

[2] Goodwill and other intangible assets show an allocation by currency area.

Information by country and region – 2019

€ million	**Europe**	thereof: Germany	thereof: Switzerland	**North America**	thereof: USA	**Asia-Pacific**	thereof: China	**Latin America**	**Middle East and Africa**	**Group**
Net sales by customer location[1]	4,735	1,010	212	4,214	4,011	5,599	2,275	1,012	591	16,152
Net sales by company location[1]	5,233	1,475	389	4,283	4,101	5,298	2,048	965	373	16,152
Goodwill and other intangible assets[2,3]	5,113	1,644	1,682	20,165	20,154	1,054	77	2	–	26,335
Property, plant and equipment[2]	3,386	1,590	746	1,594	1,586	996	353	159	57	6,192
Research and development costs	-1,997	-923	-945	-164	-160	-79	-34	-18	-11	-2,268
Number of employees	26,714	13,806	2,337	12,829	12,648	12,728	4,110	3,430	1,335	57,036

[1] Excluding intersegment sales.

[2] Previous year's figure have been adjusted, see Note (6) "Acquisitions and divestments".

[3] Goodwill and other intangible assets show an allocation by currency area.

The Group divides its business activities into three business sectors: The Healthcare business sector contains the business with prescription pharmaceuticals. The customers mainly comprise wholesalers, hospitals, and pharmacies. The Life Science business sector comprises products for scientific institutions and research and analytical laboratories in the pharmaceutical/biotechnology industry and applications for customers manufacturing chemical and biological pharmaceuticals. In line with the product portfolio, customers in this business sector primarily include companies of the pharmaceuticals and biotechnology sector as well as retailers and universities. The Performance Materials business sector consists of the entire specialty chemicals business and primarily services industrial companies. The fields of activity of the individual segments are described in detail in the sections on the business sectors in the combined management report.

No single customer accounted for more than 10% of Group sales in fiscal 2020 or 2019. Transfer prices for intragroup net sales were determined on an arm's-length basis. The intersegment sales reported in the above table are valued at group production cost.

The following table presents the reconciliation of Segment results of all operating businesses to the profit before income tax of the Group:

€ million	**2020**	2019
EBITDA pre of the operating businesses[1]	**5,696**	**4,854**
Corporate and Other	-495	-469
EBITDA pre of the Group[1]	**5,201**	**4,385**
Depreciation/amortization/impairment losses/reversals of impairment losses	-1,938	-1,946
Adjustments[1]	-279	-318
Operating result (EBIT)[1]	**2,985**	**2,120**
Financial result	-354	-385
Profit before income tax	**2,630**	**1,735**

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

The adjustments comprised the following:

€ million	**2020**	2019
Restructuring costs	-162	-120
Integration costs/IT costs	-108	-95
Gains (+)/losses (-) on the divestment of businesses	-10	-6
Acquisition-related adjustments	10	-84
Other adjustments	-9	-13
Adjustments before impairment losses/reversals of impairment losses[1]	**-279**	**-318**
Impairment losses	-128	-9
Reversals of impairment losses	–	–
Adjustments (total)[1]	**-407**	**-328**

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

Restructuring expenses in the amount of € 162 million (2019: € 120 million) primarily relate to the Thrive transformation program in the Healthcare business sector that was initiated in the year under review (2020: € 88 million/2019: € 0 million). Restructuring expenses were incurred for the Bright Future program in the Performance Materials business sector in the amount of € 20 million (2019: € 50 million) and the relocation of various tasks to the shared service organization in the amount of € 9 million (2019: € 26 million). Further expenses of € 15 million related to various restructuring measures in the Life Science business sector (2019: € 9 million).

Integration and IT expenses in the amount of € 108 million (2019: € 95 million) primarily resulted from the introduction of new ERP systems (2020: € 50 million/2019: € 57 million) and the integration of Versum Materials, Inc., United States (Versum) (2020: € 37 million/2019: € 12 million). Impairment losses on intangible assets increased to € 128 million (2019: € 9 million) and are primarily related to intangible assets in the Performance Materials business sector.

Acquisition-related adjustments resulted in income of € 10 million (2019: expenses of € 84 million). This resulted in particular from the adjustment of the provision for the EU Commission’s competition law review of the Sigma-Aldrich acquisition (Note (27) “Other provisions”) in the mid double-digit million euro range. This was offset by expenses of € 22 million (previous year: € 80 million) in connection with the acquisition of Versum, mainly resulting from the consumption of inventories revalued at the time of acquisition.

The adjustments are disclosed in the consolidated income statement as part of the respective functional costs and allocated to them as follows:

2020

€ million	thereof: cost of sales	thereof: marketing and selling expenses	thereof: administration expenses	thereof: research and development expenses	thereof: other operating income and expenses	**Total**
Restructuring expenses	-33	-55	-28	-25	-21	-162
Integration expenses/IT expenses	-1	-5	-71	-1	-30	-108
Gains (+)/losses (–) on the divestment of businesses	–	–	–	–	-10	-10
Acquisition-related adjustments	-19	–	–	–	29	10
Other adjustments	–	–	–	–	-9	-9
Adjustments before impairment losses/reversals of impairment losses[1]	**-53**	**-60**	**-98**	**-27**	**-41**	**-279**
Impairment losses	–	–	–	–	-128	-128
Reversals of impairment losses	–	–	–	–	–	–
Adjustments in the operating result (total)[1]	**-53**	**-60**	**-98**	**-27**	**-169**	**-407**

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

2019

€ million	thereof: cost of sales	thereof: marketing and selling expenses	thereof: administration expenses	thereof: research and development expenses	thereof: other operating income and expenses	Total
Restructuring expenses	-20	-10	-40	-29	-22	-120
Integration expenses/IT expenses	–	–	-70	–	-25	-95
Gains (+)/losses (–) on the divestment of businesses	–	–	1	–	-6	-6
Acquisition-related adjustments	-35	–	–	–	-49	-84
Other adjustments	–	–	–	–	-13	-13
Adjustments before impairment losses/reversals of impairment losses[1]	**-56**	**-10**	**-109**	**-29**	**-114**	**-318**
Impairment losses	–	–	–	–	-9	-9
Reversals of impairment losses	–	–	–	–	–	–
Adjustments in the operating result (total)[1]	**-56**	**-10**	**-109**	**-29**	**-123**	**-328**

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

Business free cash flow was determined as follows:

€ million	**2020**	2019
EBITDA pre[1]	**5,201**	**4,385**
Investments in property, plant and equipment, software as well as advance payments for intangible assets	-1,439	-1,026
Changes in inventories	48	-577
Changes in trade accounts receivable as well as receivables from royalties and licenses	144	-259
Lease payments[2]	-144	-136
Elimination of acquisitions/divestments	-45	346
Business Free Cash Flow[1]	**3,765**	**2,732**

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

[2] Excluding payments for low-value leases and interest components included in lease payments.

(9) Net sales

Accounting and measurement policies

Nature and timing of revenue recognition

Net sales are recognized when (or as) the customer obtains control of the asset. For sales of goods, the customer typically obtains control as soon as delivery is made, given that the customer is generally not able to obtain any benefits from the asset before that point in time. To a lesser extent, the Group generates net sales from the sale of goods based on bill-and-hold arrangements. In these cases, net sales are recognized before the goods are delivered to the customer, as soon as the Group has invoiced the products and the additional criteria laid out in IFRS 15.B81 are fulfilled. In the case of equipment sales, the criteria for revenue recognition are only met after installation has been successfully completed – to the extent that the installation requires specialized knowledge, does not represent a clear ancillary service and the relevant equipment can only be used by the customer once successfully set up.

For service contracts, and customer-specific contract manufacturing of goods and equipment, the Group recognizes revenue over time based on the progress towards complete satisfaction of the performance obligation, if there is a contractual claim for payment against the customer for the services already performed. Input- and output-oriented methods are used to appropriately determine progress on a contract-specific basis. Specifically, this is largely performed on the basis of the costs incurred, the time elapsed, or the milestones achieved as of the reporting date.

Intellectual property is out-licensed to a limited extent in the Healthcare and Life Science business sectors. In the Healthcare business sector, these transactions do not usually form part of ordinary activities, meaning that the corresponding income is reported in other operating income (see Note (7) “Collaboration agreements” and Note (13) “Other operating income”).

Net sales from contracts comprising several separate performance obligations are recognized when the respective performance obligation has been fulfilled. This affects, in particular, the sale of goods in combination with services. Multiple-element arrangements of this nature exist to a limited extent in the Applied Solutions business unit in the Life Science business sector and in the Semiconductor Solutions business unit in the Performance Materials business sector.

Determining the transaction price

The Group grants customers various kinds of rebates and discounts. These, as well as anticipated customer refund claims, state compulsory charges, and rebates from health plans and programs are deducted from sales. The most significant portion of these deductions from sales is attributable to the Healthcare business sector.

Sales deductions provided on the invoice as price-reducing items, which will likely be applied by customers when making the respective payments, are recognized as reduction of trade accounts receivable. Expected refunds, such as bonus payments, reimbursements for rights of return, or rebates from health plans and programs, are recognized in the separate item “refund liabilities” on the consolidated balance sheet.

The measurement of sales deductions and refund liabilities resulting from expected rebates and discounts considers the following:

- past experience,
- pricing information, and
- expected sales volume growth rates.

The measurement of sales deductions and refund liabilities resulting from rights of return takes into account historical rates of return for individual product groups, information from distributors on inventory levels, and publicly available information on product sales from sector-specific service providers (in the Healthcare business sector).

Contractual payment terms

Given that the Group generates the large majority of its sales through transactions with simple structures, the company usually has an enforceable right to payment after the performance obligation has been fulfilled. The payment targets contractually agreed between Group and its customers usually range between 30 and 60 days. For some service contracts, the company receives the contractually agreed consideration before the service is delivered; in such cases, the consideration received is presented as a contract liability on the consolidated balance sheet until the revenue has been recognized.

Practical expedients

The Group uses the practical expedient of IFRS 15 in which the promised amount of consideration is not adjusted for the effects of a significant financing component if the period between the fulfillment of a performance obligation and the payment by the customer only amounts to up to one year.

Significant discretionary decisions and sources of estimation uncertainty

Sales deductions

The measurement of sales deductions and the corresponding refund liabilities requires extensive estimates. Uncertainties exist in particular concerning the extent to which past experience serves as a reliable basis for estimating the future development of expected refunds, such as bonus payments, reimbursements for rights of return, or rebates from health plans. External information from distributors and industry services outside of the Group's control, which are also subject to uncertainty, are used to determine sales deductions.

Due to a lack of past experience, the estimate uncertainty referenced above is particularly relevant for product launches in the Healthcare business sector.

Any changes in estimates of the parameters listed above have a cumulative impact on the net sales recognized in the respective adjustment period.

If the carrying amount of refund liabilities had been 10% higher as of the reporting date, this would have resulted in a € 67 million (2019: € 57 million) reduction in profit before tax.

The following tables present a breakdown of net sales by key product lines/products:

Healthcare

€ million	**2020**		2019	
Oncology	**1,116**	**17%**	**1,030**	**15%**
thereof: Erbitux®	891	13%	871	13%
thereof: Bavencio®	156	2%	103	2%
Neurology & Immunology	**1,662**	**25%**	**1,594**	**24%**
thereof: Rebif®	1,131	17%	1,273	19%
thereof: Mavenclad®	531	8%	321	5%
Fertility	**1,079**	**16%**	**1,247**	**19%**
thereof: Gonal-f®	630	9%	743	11%
General Medicine & Endocrinology	**2,585**	**39%**	**2,557**	**38%**
thereof: Glucophage®	903	14%	877	13%
thereof: Concor®	529	8%	530	8%
thereof: Euthyrox®	455	7%	402	6%
thereof: Saizen®	234	4%	238	4%
Other	**197**	**3%**	**287**	**4%**
Total	**6,639**	**100%**	**6,714**	**100%**

Life Science

€ million	**2020**		2019[1]	
Process Solutions	3,596	48%	3,002	44%
Research Solutions	2,215	29%	2,170	31%
Applied Solutions	1,704	23%	1,692	25%
Total	**7,515**	**100%**	**6,864**	**100%**

[1] Previous year's figures have been adjusted due to an internal realignment.

Performance Materials

€ million	**2020**		2019[1]	
Semiconductor Solutions	1,901	56%	878	34%
Display Solutions	1,108	33%	1,256	49%
Surface Solutions	370	11%	438	17%
Other	1	–	2	–
Total	**3,380**	**100%**	**2,574**	**100%**

[1] Previous year's figures have been adjusted due to an internal realignment.

The following tables present a more detailed breakdown of net sales by business sector from contracts with customers.

2020

€ million

Net sales by product type	**Healthcare**		**Life Science**		**Performance Materials**		**Group**	
Goods	6,496	98%	6,585	88%	3,029	90%	16,111	92%
Equipment	5	–	386	5%	254	7%	645	4%
Services	56	1%	535	7%	96	3%	686	4%
License income	–	–	9	–	1	–	10	–
Commission income	18	–	–	–	–	–	18	–
Income from co-commercialization agreements	65	1%	–	–	–	–	65	–
Total	**6,639**	**100%**	**7,515**	**100%**	**3,380**	**100%**	**17,534**	**100%**

Net sales by region (customer location)								
Europe	2,158	32%	2,583	35%	250	8%	4,991	29%
North America	1,554	23%	2,701	36%	484	14%	4,739	27%
Asia-Pacific	1,831	28%	1,900	25%	2,582	76%	6,313	36%
Latin America	641	10%	241	3%	28	1%	910	5%
Middle East and Africa	455	7%	89	1%	37	1%	581	3%
Total	**6,639**	**100%**	**7,515**	**100%**	**3,380**	**100%**	**17,534**	**100%**

2019

€ million

Net sales by product type	Healthcare		Life Science		Performance Materials		Group	
Goods	6,531	97%	5,972	87%	2,497	97%	15,000	93%
Equipment	7	–	397	6%	50	2%	454	3%
Services	100	2%	486	7%	25	1%	611	4%
License income	–	–	8	–	–	–	8	–
Commission income	18	–	2	–	1	–	21	–
Income from co-commercialization agreements	58	1%	–	–	–	–	58	–
Total	**6,714**	**100%**	**6,864**	**100%**	**2,574**	**100%**	**16,152**	**100%**

Net sales by region (customer location)								
Europe	2,241	33%	2,277	33%	217	9%	4,735	29%
North America	1,474	22%	2,474	36%	267	10%	4,214	26%
Asia-Pacific	1,816	27%	1,743	26%	2,041	79%	5,599	35%
Latin America	702	11%	278	4%	32	1%	1,012	6%
Middle East and Africa	482	7%	92	1%	17	1%	591	4%
Total	**6,714**	**100%**	**6,864**	**100%**	**2,574**	**100%**	**16,152**	**100%**

Group net sales amounted to € 17,534 million in fiscal 2020 (2019: € 16,152 million), out of which € 697 million (2019: € 683 million) was recognized over time. This related mainly to net sales from services and from customer-specific equipment in the Applied Solutions and Process Solutions business units in the Life Science business sector and in the Semiconductor Solutions business unit in the Performance Materials business sector.

The table below shows future net sales from concluded contracts:

	Year of expected revenue recognition		
€ million	2021	2022 or later fiscal years	**Total**
As of Dec. 31, 2020	3,892	376	4,268

	Year of expected revenue recognition		
€ million	2020	2021 or later fiscal years	**Total**
As of Dec. 31, 2019	2,018	145	2,163

The significant increase compared with the previous year resulted, in particular, from the positive performance of the Process Solutions business unit in the Life Science business sector.

The following table shows the change in refund liabilities:

2020

	Rebates/Bonus payments		Rights of return		
€ million	Total	thereof: United States	Total	thereof: United States	**Total**
Jan. 1, 2020	**522**	**315**	**43**	**29**	**565**
Additions due to business combinations	–	–	–	–	–
Other additions	1,713	1,234	41	20	1,754
Disposals due to divestments/Reclassification to assets held for sale	-8	–	–	–	-8
Utilizations	-1,501	-1,081	-33	-17	-1,534
Cumulative increase (-)/decrease (+) in net sales	-66	-67	-3	-4	-69
thereof: attributable to performance obligations satisfied in prior periods	-48	-48	-3	-3	-51
Currency translation difference	-39	-35	-4	-3	-42
Other	1	–	–	–	1
Dec. 31, 2020	**622**	**368**	**44**	**26**	**666**

2019

	Rebates/Bonus payments		Rights of return		
€ million	Total	thereof: United States	Total	thereof: United States	Total
Jan. 1, 2019	**423**	**274**	**49**	**31**	**472**
Additions due to business combinations	–	–	–	–	–
Other additions	1,488	1,145	36	23	1,524
Disposals due to divestments/Reclassification to assets held for sale	–	–	–	–	–
Utilizations	-1,344	-1,067	-41	-25	-1,385
Cumulative increase (-)/decrease (+) in net sales	-44	-43	-2	–	-46
thereof: attributable to performance obligations satisfied in prior periods	-43	-43	-2	–	-45
Currency translation difference	8	6	1	1	9
Other	-9	–	–	–	-9
Dec. 31, 2019	**522**	**315**	**43**	**29**	**565**

The development of contract assets and contract liabilities is shown in Note (26) “Contract assets” and in Note (29) “Other non-financial liabilities”.

(10) Cost of sales

Accounting and measurement policies

Cost of sales

The cost of sales primarily includes the cost of manufactured products sold as well as the merchandise sold.

Cost comprises the following items: directly attributable costs, such as cost of materials, personnel, and energy costs, depreciation and amortization, overheads attributable to the production process, inventory impairment losses and their reversals.

Cost of sales included amortization of intangible assets (excluding amortization of internally generated or separately acquired software) in the amount of € 210 million (2019: € 188 million). Material costs amounted to € 3,074 million in 2020 (2019: € 2,743 million) and were largely reported under cost of sales.

Impairment losses on inventories in 2020 amounted to € 312 million (previous year: € 275 million); reversals of impairment losses came to € 97 million (previous year: € 74 million).

The increase in impairments compared with the previous year was primarily attributable to the Life Science business sector. Falling demand for part of the product portfolio due to the Covid-19 pandemic led to an increased need for impairments.

(11) Marketing and selling expenses

Accounting and measurement policies

Marketing and selling expenses

Marketing and selling expenses within logistics costs also include expenses for transportation services performed on behalf of customers. The corresponding income from these services is presented under net sales.

Amortization of the intangible assets under marketing and selling expenses is mainly attributable to customer relationships, marketing authorizations, licenses and similar rights, brands, and trademarks, which can be functionally allocated to Marketing and selling.

Marketing and selling expenses comprised the following items:

€ million	**2020**	2019
Sales force	-910	-954
Internal sales services	-862	-845
Sales promotion	-413	-521
Logistics	-899	-794
Amortization of intangible assets[1]	-636	-923
Royalty and license expenses	-164	-200
Other marketing and selling expenses	-324	-339
Marketing and selling expenses	**-4,207**	**-4,576**

[1] Excluding amortization of internally generated or separately acquired software.

The reduction in expenses for the sales force and sales promotion is largely due to the lockdown in a number of jurisdictions in order to combat the Covid-19 pandemic. The increase in logistics expenses was due in particular to modified transportation routes and higher freight rates as a result of the Covid-19 pandemic.

The lower level of amortization of intangible assets was due to the end of the scheduled amortization of assets recognized in connection with the acquisition of Serono SA, Switzerland.

Of the royalty and license expenses, € 51 million (2019: € 68 million) related to license expenses for Glucophage® in China with the distribution partner Bristol-Myers Squibb, Corp., United States, and € 41 million (2019: € 41 million) related to the commercialization of Erbitux® in Japan.

(12) Research and development costs

Accounting and measurement policies

Research and development costs

The item comprises the costs of the Group's own research and development departments, the expenses incurred as a result of research and development collaborations as well as the costs of clinical trials in the Healthcare business sector (both before and after approval is granted).

For information on the capitalization of development costs, see Note (19) "Other intangible assets".

Cost reimbursements for research and development are offset against research and development costs.

The net income from repayments of subsidies received and reimbursements recognized within research and development costs amounted to € 127 million in 2020 (2019: € 99 million). The increase was mainly due to the strategic alliance with GlaxoSmithKline plc, United Kingdom, in the field of immuno-oncology (see Note (7) "Collaboration agreements").

Net income from repayments of subsidies received and reimbursements included reimbursements from governmental institutions as well as repayments of previously recognized governmental subsidies, which amounted to net income of € 2 million in total (2019: net expenses of € 5 million).

(13) Other operating income

Accounting and measurement policies

Other operating income

Other operating income comprises all income that cannot be allocated to net sales or finance income on account of its character.

Income from upfront payments, milestone payments, and royalties

Income from upfront and milestone payments, royalties, and license payments comprises consideration received by the Group from contract partners that are not customers. This relates in particular to collaboration and out-licensing agreements in the Healthcare business sector (see Note (7) "Collaboration agreements").

Income from the revaluation of contingent considerations

The accounting treatment of contingent consideration agreed at the sale of a business as defined in IFRS 3 is shown in Note (36) "Other financial assets".

Other operating income was broken down as follows:

€ million	2020	2019
Income from the reversal of provisions for litigation	424	18
Income from upfront payments, milestone payments and royalties	229	557
Income from disposal of businesses and non-current assets	97	44
Income from miscellaneous services	5	3
Income from the revaluation of contingent considerations	1	8
Remaining other operating income	81	84
Other operating income	**838**	**715**

Income from the reversal of provisions for litigation totaling € 424 million (2019: € 18 million) primarily related to the legal dispute with Biogen Inc., United States, concerning the sale of the product Rebif®, as well as the adjustment of the provision for the EU antitrust proceedings in connection with the acquisition of Sigma-Aldrich Corporation, United States. Additional information can be found in Note (27) “Other provisions”.

Income from upfront payments, milestone payments, and royalties totaling € 229 million (2019: € 557 million) resulted in particular from the collaboration agreement with GlaxoSmithKline plc, United Kingdom (2020: € 85 million/2019: € 92 million). The prior-year figure also included income from the strategic alliance with Pfizer Inc., United States, in the amount of € 281 million. For further information see Note (7) “Collaboration agreements”. License income primarily resulted from interferon beta products (Biogen Inc., United States) in the amount of € 74 million (2019: € 89 million) and a license for the antidepressant Viibryd® (AbbVie Inc., United States) in the amount of € 38 million (2019: € 0 million). It also included a milestone payment in connection with the out-licensing of atacicept to Vera Therapeutics, Inc., United States, in the amount of € 14 million.

The income from the disposal of businesses and non-current assets was largely attributable to the sale of the Allergopharma allergy business to Dermapharm Beteiligungs GmbH, Grünwald (€ 35 million), the out-licensing of the osteoarthritis drug candidate M6495 to Novartis AG, Switzerland (€ 27 million), and the sale of atacicept to Vera Therapeutics, Inc., United States (€ 13 million).

As in the previous year, other operating income included income from services performed in connection with the Consumer Health business that was divested in 2018.

(14) Other operating expenses

Accounting and measurement policies

Other operating expenses

Other operating expenses comprise all expenses that cannot be reasonably allocated to a functional cost type or finance costs.

The breakdown of other operating expenses was as follows:

€ million	**2020**	2019
Impairment losses on non-financial assets	-183	-42
Project expenses (including integration and IT projects)	-93	-112
Profit share agreements	-80	-60
Currency effects from operating activities	-57	-98
Non-income related taxes	-56	-55
Expenses from litigation	-52	-60
Premiums, fees and contributions	-36	-33
Restructuring expenses	-29	-24
Expenses on revaluation of contingent considerations	-17	-8
Expenses for miscellaneous services	-15	-16
Expenses for disposal of businesses and non-current assets	-5	-14
Remaining other operating expenses	-240	-212
Other operating expenses	**-863**	**-735**

Impairments of non-financial assets in the amount of € 160 million (2019: € 33 million) were attributable to intangible assets (see Note (19) “Other intangible assets”) and in the amount of € 23 million (2019: € 8 million) to property, plant and equipment (see Note (20) “Property plant and equipment”).

Project expenses of € 93 million (2019: € 112 million) were primarily incurred on advisory services in connection with the integration of Versum Materials, Inc., United States, as well as expenses for the global Covid-19 crisis team and for masks, tests and donations. Consulting and personnel expenses were also incurred in connection with the Syntropy joint venture with Palantir Technologies, Inc., United States, and advisory services relating to the divested Consumer Health business, as well as for the global harmonization of the IT landscape.

Expenses from profit share agreements amounting to € 80 million (2019: € 60 million) were primarily incurred in connection with the strategic alliance with Pfizer Inc., United States, in the field of immuno-oncology (see Note (7) “Collaboration agreements”), as well as the cooperation with Bristol Myers Squibb Co., United States, in Japan to a significantly lesser extent.

Information on litigation expenses is included in Note (27) “Other provisions”.

Restructuring expenses totaling € 29 million (2019: € 24 million) related in particular to advisory expenses in connection with the THRIVE program (see Note (27) “Other provisions”) in the Healthcare business sector that it was not possible to allocate to the respective functions.

Expenses for the revaluation of contingent considerations in the amount of € 17 million in fiscal 2020 (2019: € 8 million) resulted from the remeasurement of contingent consideration arising in connection with the sale of the shares in Prexton Therapeutics SA, Switzerland, to Lundbeck A/S, Denmark, in 2018. They also included adjustments of contingent considerations from the divestment of the biosimilars business to subsidiaries of Fresenius SE & Co. KGaA, Bad Homburg vor der Höhe, in 2017 and the Kuvan® business to BioMarin Pharmaceutical Inc., United States, in 2016.

Remaining other operating expenses included, among other things, environmental protection costs and personnel expenses that it was not possible to reliably allocate to the functional areas. This item also contained the expense for donations of Cesol® 600 tablets containing the active ingredient praziquantel to the World Health Organization (WHO).

Remaining other operating expenses also included the loss on the net monetary position in connection with hyperinflation accounting in Argentina in the amount of € 9 million (2019: € 10 million).

(15) Income tax

Accounting and measurement policies

Current income taxes

Current income taxes for the reporting period and, where applicable, for prior periods are calculated in the amounts that the tax authorities are expected to demand or reimburse. The calculation is based on the company-specific tax rate applicable in the relevant tax year.

Uncertain income tax claims and liabilities

Assessments relating to specific matters are made to calculate uncertain income tax claims and liabilities. Uncertain income tax matters are recognized depending on the likelihood that the responsible tax authorities will accept the respective income tax treatment. If recognition by the tax authorities is considered unlikely, the respective uncertain tax asset or uncertain tax liability is measured at the most likely amount. Uncertain income tax liabilities are disclosed within income tax liabilities. Expected income tax-related penalties and interest that do not fall within the scope of IAS 12 are treated as provisions in line with the relevant provisions of IAS 37.

Deferred taxes

Deferred tax assets resulting from deductible temporary differences that exceed deferred tax liabilities relating to the same taxation authority and the same taxable entity are recognized if it is considered likely that taxable profit will be available in the future to apply such tax assets. This corresponds to the procedure for recognizing deferred tax assets on unused tax credits and tax loss and interest carryforwards.

The recognition of deferred tax assets requires an estimate of the probability of future use. The influencing factors considered as part of this assessment include the following:

- temporary differences relating to the same taxation authority and the same taxable entity that will be subject to taxation in the future
- results history,
- results planning, and
- existing tax planning of the respective Group company.

Deferred tax liabilities are recognized for projected dividend payments of subsidiaries. If no dividend payments are projected in the foreseeable future, no deferred tax liability is recognized for the difference between proportional equity and the investment value determined for tax purposes.

Significant discretionary decisions and sources of estimation uncertainty

Income tax

The calculation of the reported assets and liabilities from current and deferred income taxes requires extensive discretionary judgments, assumptions, and estimates.

When assessing income tax claims and liabilities, the interpretation of tax provisions may be subject to particular uncertainty. The possibility that the relevant tax authorities will take a different view concerning the correct application and interpretation of tax standards cannot be ruled out. Changes to the assumptions underlying the correct interpretation of tax standards, for example as a result of changes in legislation, affect the accounting treatment of uncertain income tax assets and liabilities in fiscal 2020.

Regarding deferred tax items, there were degrees of uncertainty concerning the date on which an asset is realized or a liability settled and concerning the tax rate applicable on this date. This applies in particular to deferred taxes recognized in the course of acquisitions. Assessing the recoverability, particularly of tax credits and tax loss and interest carryforwards, requires assumptions and estimates concerning the future taxable income of the respective Group company. Furthermore, the extent to which a subsidiary's planned dividend distribution is probable in the foreseeable future is discretionary.

Income taxes in the consolidated income statement were broken down as follows:

€ million	**2020**	2019
Current income taxes in the period	-959	-834
Income taxes for previous periods	-11	-59
Deferred taxes in the period	333	453
thereof: from temporary differences	334	466
thereof: from tax losses carried forward	-7	-6
thereof: from changes in tax rates	6	-7
Income taxes	**-637**	**-440**

Tax reconciliation

The following table presents the reconciliation from the theoretical income tax expense to the income tax expense according to the consolidated income statement. The theoretical income tax expense is determined by applying the statutory tax rate of a corporation headquartered in Darmstadt of 31.7% (2019: 31.7%).

€ million	**2020**	2019
Profit before income tax	2,630	1,735
Tax rate	31.7%	31.7%
Theoretical income tax expense	-834	-550
Tax rate differences	307	192
Tax effect of companies with a negative contribution to consolidated profit	-31	-26
Income tax for previous periods	-11	-59
Tax credits	-32	-17
Tax effect on tax loss carryforwards	5	16
Tax effect of non-deductible expenses/tax-free income/other tax effects	-41	4
Income tax expense according to consolidated income statement	**-637**	**-440**
Tax ratio according to consolidated income statement	**24.2%**	**25.4%**

Income taxes consisted of corporation and trade taxes for the companies domiciled in Germany as well as comparable income taxes for foreign companies. Income taxes relating to other periods recognized in fiscal 2020 resulted mainly from completed tax audits and mutual agreement procedures as well as from additions to liabilities for risks from tax audits.

Deferred taxes according to consolidated income statement

The reconciliation between deferred taxes on the consolidated balance sheet and deferred taxes on the consolidated income statement is presented in the following table:

€ million	**2020**	2019
Change in deferred tax assets (consolidated balance sheet)	121	330
Change in deferred tax liabilities (consolidated balance sheet)[1]	384	-537
Deferred taxes credited/debited to equity	-116	-67
Changes in scope of consolidation/currency translation/other changes[1]	-58	727
Deferred taxes (consolidated income statement)	**333**	**453**

[1] Previous year's figures have been adjusted, see Note (6) "Acquisitions and divestments".

The item "Changes in scope of consolidation/currency translation/other changes" primarily comprised exchange rate effects between the euro and the U.S. dollar. In the previous year, it mainly included deferred taxes recognized in connection with the acquisition of Versum Materials, Inc., United States.

Changes in tax loss carryforwards

Tax loss carryforwards were structured as follows:

	Dec. 31, 2020			Dec. 31, 2019		
€ million	**Germany**	**Outside Germany**	**Total**	Germany	Outside Germany	Total
Tax loss carryforwards	**94**	**1,110**	**1,204**	**57**	**1,168**	**1,225**
Tax loss carryforwards for which a deferred tax asset is recognized	4	161	165	–	198	198
Tax loss carryforwards for which no deferred tax asset is recognized	90	949	1,039	57	970	1,027
Potential deferred tax assets for tax loss carryforwards	**27**	**257**	**284**	**17**	**270**	**287**
Recognized deferred tax assets on tax loss carryforwards	–	20	20	–	27	27
Not recognized deferred tax assets on tax loss carryforwards	27	237	264	17	243	260

The majority of the tax loss carryforwards either has no expiry date or can be utilized for up to 20 years. In 2020, the income tax expense was reduced by € 5 million (December 31, 2019: € 16 million) due to the utilization of tax loss carryforwards from prior years for which no deferred tax asset had been recognized in previous periods.

Unused tax credits amounted to € 31 million as of December 31, 2020 (December 31, 2019: € 42 million). No deferred tax assets were recognized for € 17 million of these unused tax credits (December 31, 2019: € 16 million).

Deferred taxes according to consolidated balance sheet

Deferred tax assets and liabilities corresponded to the following balance sheet items:

	Dec. 31, 2020		Dec. 31, 2019	
€ million	**Assets**	**Liabilities**	Assets	Liabilities
Intangible assets[1]	114	1,600	141	1,965
Property, plant and equipment[1]	27	101	25	119
Current and non-current financial assets	–	26	6	1
Inventories	679	13	657	17
Current and non-current receivables/Other assets	19	6	29	6
Provisions for pensions and other post-employment benefits	697	8	546	6
Current and non-current other provisions	251	27	212	24
Current and non-current liabilities	94	22	93	6
Tax loss carryforwards	20	–	27	–
Tax refund claims/Other	51	48	73	71
Deferred taxes (before offsetting)[1]	**1,951**	**1,849**	**1,811**	**2,215**
Offset deferred tax assets and liabilities	-408	-408	-390	-390
Deferred taxes (consolidated balance sheet)[1]	**1,543**	**1,441**	**1,421**	**1,825**

[1] Previous year's figure have been adjusted, see Note (6) "Acquisitions and divestments".

The changes in deferred tax assets and liabilities are primarily attributable to items recognized in profit or loss. Items not recognized in profit or loss related to deferred tax effects resulting from items recognized through other comprehensive income such as the remeasurement of the net defined benefit obligation and other benefit commitments, changes in the fair value of financial assets and derivatives held for hedging purposes, and currency translation effects. In fiscal 2020, the latter were attributable in particular to deferred tax liabilities recognized for temporary differences on intangible assets. Deferred tax assets and liabilities recognized or derecognized in connection with changes in the scope of consolidation in fiscal 2020 primarily related to deferred tax assets for temporary differences on provisions for pensions and other post-employment benefits.

The reduction in deferred tax liabilities is primarily due to the reversal of deferred tax liabilities in connection with the scheduled amortization of intangible assets identified and recognized in the course of purchase price allocations made in connection with past acquisitions.

An excess of deferred tax assets in the amount of € 34 million (December 31, 2019: € 27 million) was recognized for Group companies that reported losses in the last two years, as these are expected to be realizable on the basis of the positive earnings forecasts.

Deferred tax liabilities from outside basis differences for planned dividend payouts were recorded in the amount of € 46 million (December 31, 2019: € 51 million). Temporary differences relating to the retained earnings of subsidiaries, for which no deferred taxes are recognized, amounted to € 12,609 million as of December 31, 2020 (December 31, 2019: € 10,238 million).

Income tax receivables and income tax liabilities

Income tax receivables amounted to € 530 million (December 31, 2019: € 600 million). Of this figure, € 10 million (December 31, 2019: € 11 million) are disclosed in other non-current non-financial assets. Income tax receivables resulted primarily from tax prepayments that exceeded the actual amount of tax payable for 2020 and prior fiscal years as well as from refund claims for prior years. As of December 31, 2020, income tax liabilities, including liabilities for uncertain tax obligations, amounted to € 1,505 million (December 31, 2019: € 1,402 million). Of this figure, € 45 million related to the non-current income tax liabilities included in other non-current non-financial liabilities (December 31, 2019: € 0 million).

(16) Net cash flows from operating activities

Accounting and measurement policies

Net cash flows from operating activities

The calculation and presentation of cash flows from operating activities are based on the following principles:

- The presentation of cash flows from operating activities is determined using the indirect method based on the profit after taxes.
- The option to recognize interest received and interest payments made is exercised to the extent that such transactions are recognized in cash flow from operating activities.
- Tax payments are generally presented in the cash flow from operating activities. Only significant transactions where the associated tax payments can be practically calculated are recognized in the relevant item of the consolidated cash flow statement.

Tax payments totaled € 1,006 million in fiscal 2020. Tax payments amounted to € 1,018 million in the previous year, of which € 130 million was attributable to cash flows from investing activities in connection with the divestment of the Consumer Health business. Tax refunds amounted to € 140 million (2019: € 160 million).

Interest paid totaled € 340 million (2019: € 316 million). Interest received amounted to € 11 million (2019: € 60 million).

The change in provisions in fiscal 2020 was largely due to the reversal of the provision for the patent dispute with Biogen Inc., United States (see Note (27) “Other provisions”).

The decline in changes in other assets and liabilities was due to the end of the recognition in profit or loss of the initial consideration for the strategic alliance with Pfizer, Inc., United States (see Note (7) “Collaboration agreements”).

(17) Earnings per share

Accounting and measurement policies

Earnings per share

Basic earnings per share is calculated by dividing the profit after taxes attributable to the shareholders of Merck KGaA, Darmstadt, Germany (net income) by the weighted average number of theoretical shares outstanding. The calculation of the theoretical number of shares is based on the fact that the general partner’s equity is not represented by shares. Corresponding to the division of the subscribed capital of € 168 million into 129,242,252 shares (see Note (34) “Equity”), the general partner’s equity of € 397 million equates to 305,535,626 theoretical shares. Overall, equity capital thus amounted to € 565 million or 434,777,878 theoretical shares outstanding.

As in the previous year, equity capital remained unchanged in fiscal 2020. The weighted average (basic) number of shares was 434,777,878 and thus corresponded to the number of theoretical shares outstanding. In fiscal 2020, there were no shares with a potential diluting effect; as a result, the diluted earnings per share were equivalent to basic earnings per share. The earnings per share attributable to discontinued operations in fiscal 2019 resulted from the divestment of the Consumer Health business as of December 1, 2018.

Operating Assets, Liabilities and Contingent Liabilities

(18) Goodwill

Accounting and measurement policies

Goodwill

In the course of business combinations, goodwill is recognized on the acquisition date. The option to measure non-controlling interests at fair value on the date of their acquisition (full goodwill method) is not utilized.

Method for impairment testing

Impairment testing for goodwill takes place at the level of the Healthcare, Life Science and Performance Materials business sectors. These groups of cash-generating units (CGUs) are the lowest level at which goodwill at the Group is monitored for internal management purposes.

Impairment testing is performed annually and on an ad hoc basis where there are indications of impairment. The existence of indications of impairment may be analyzed using various factors, particularly changes in short-term and medium-term planning, sector studies, analyst forecasts, validation multiples based on peer group information, the Group's average market capitalization compared with its balance sheet equity, and the development of its order books.

In the second quarter of 2020, an analysis was conducted to determine the extent of which the impact of the Covid-19 pandemic could indicate potential impairment losses affecting non-financial assets. This analysis found that individual indicators of impairment within the meaning of IAS 36 were considered to have been fulfilled in the Performance Materials CGU (primarily due to negative impacts in the Display Solutions and Surface Solutions business units) and the Healthcare CGU (primarily due to negative impacts in the Fertility and Neurology franchises). This assessment was based in particular on reductions in short-term and medium-term internal earnings and cash flow forecasts as well as published analyst forecasts. The significant assumptions for determining value underlying the impairment tests and the results of the sensitivity analyses are presented below.

For both value in use and fair value, the recoverable amount is calculated less costs of disposal in accordance with the discounted cash flow method (Level 3 in the IFRS 13 fair value hierarchy). The determination of the recoverable amount for the Life Science CGU and Healthcare CGU was based on the value in use in fiscal 2020 and in the previous year. The impairment test of Performance Materials CGU was based on the fair value less costs of disposal in fiscal 2020 and in previous year. The last medium-term plan approved by the Executive Board, with a detailed planning period of four years, served as the basis for planning. The value of the net cash flows was determined on the basis of the following principles:

	Value in use	Fair value less costs of disposal
Sales growth in the detailed planning period	Based on plans approved by the Executive Board, taking into account internal past experience and largely non-observable input factors in the market, for example regarding future market shares, selling prices and volumes, and excluding new products from the development pipeline and other expansion investments	Based on plans approved by the Executive Board, taking into account internal past experience and largely non-observable input factors in the market, for example regarding future market shares, selling prices and volumes, and including new products from the development pipeline and other expansion investments
Profit margins in the detailed planning period	Based on past experiences, adjusted for expected profitability developments	

The discount factor after taxes is derived on the basis of the following input parameters:

Risk-free interest rate	Derived from the returns of long-term government bonds
Beta factor	Derived from the respective peer group
Market risk premium	Based on a combination of different estimating methods; e.g. historical and implied stock yields
Cost of debt and capital structure	Derived from the market data of the respective peer group companies

The long-term growth rate after the detailed planning period is determined taking into account expected long-term growth and long-term inflation expectations.

Significant measurement assumptions

Due to the planning uncertainty concerning the further progress of the Covid-19 pandemic, the planning used in impairment testing in fiscal 2020 is based on two scenarios condensed to form a probability-weighted expected value. In the base scenario (“V” scenario), it is assumed that the sharp downturn in global economic growth in 2020 will be followed by a recovery at a similar speed, with growth rates subsequently returning to the levels recorded prior to the outbreak of the pandemic. In addition to the base scenario, a negative scenario (extended “U” scenario) was included with a probability of occurrence of just under 20%. This scenario assumes a slower recovery from the impact of the Covid-19 pandemic and a prolonged reduction in average global GDP growth across the entire detailed planning period. The planning applied in the previous year was based solely on a base scenario.

As in the previous year, the calculation of the fair value less costs of disposal of the Performance Materials CGU in the base scenario included expected average sales growth in the detailed planning period amounting to a mid single-digit percentage rate. Taking into account Group costs allocated on a pro rata basis, the EBITDA pre margin applied in the detailed planning period in fiscal 2020 was unchanged as against the previous year at around 30%.

In the base scenario, the expected average sales growth used to determine the value in use in the Life Science CGU in the detailed planning period amounted to a high single-digit percentage rate (2019: middle single-digit percentage rate). The EBITDA pre margin in the detailed planning period, taking into account Group costs allocated on a pro rata basis, was around 30% in both fiscal 2020 and the previous year.

In the base scenario, the expected average sales growth in the Healthcare CGU in the detailed planning period amounted to a low single-digit percentage rate as in the previous year. In line with the value-in-use concept, this did not include net sales from the launch of new products.

Compared with the base scenario, the negative scenario for the Performance Materials CGU assumed a reduction in annual net sales of 6-7% (Life Science CGU: 2-3%; Healthcare CGU: 1-7%) and a reduction in annual EBITDA pre of 10-13% (Life Science CGU: 2-3%; Healthcare CGU: 1-10%).

The additional significant assumptions for determining value underlying the goodwill impairment tests are quantified below.

	Long-term growth rate		Discount factor					
			Weighted cost of capital after tax			Weighted cost of capital before tax		
in %	**Q2/Q3 2020**	2019	**Q2 2020**	**Q3 2020**	2019	**Q2 2020**	**Q3 2020**	2019
Healthcare[1]	0.00%	0.00%	5.6%	5.5%	5.8%	7.5%	7.5%	7.8%
Life Science	1.75%	1.75%		6.0%	7.1%		7.4%	8.9%
Performance Materials[1, 2]	1.00%	1.00%	5.8%	5.7%	6.3%	7.2%	7.1%	8.0%

[1] The figures for impairment testing in Q2 2020 relate to the ad hoc tests performed in response to the Covid-19 pandemic.

[2] In 2019 including Versum Materials Inc., United States, on the basis of the preliminary purchase price allocation.

Net cash flows were discounted using cost of capital after tax. The aforementioned cost of capital before tax was subsequently derived iteratively.

Significant discretionary decisions and sources of estimation uncertainty

Goodwill

The determination of the recoverable amount is subject to discretion and significant estimation uncertainty. Assumptions regarding the amount of net cash flows, long-term growth rates, and discount factors are considered a material source of estimation uncertainty due to their inherent uncertainty. This is particularly true in fiscal 2020 due to the uncertainty in connection with the Covid-19 pandemic.

In all the impairment tests performed, the recoverable amount in both 2020 and the previous year was more than 15% higher than the carrying amount of the respective CGU. Regardless of this, the planning data used was checked for plausibility against external analyst assessments and the recoverable amounts determined were validated using validation multiples based on peer group information.

In addition, sensitivity analyses of the key assumptions were performed as part of the impairment tests. As a result, no change of a significant assumption deemed possible by management would have resulted in an impairment. Even an increase in the probability of occurrence of the negative scenario presented above (extended “U” scenario) to 100% would not have resulted in the need to recognize impairment losses for any of the CGUs. The following table presents the minimum amount by which key assumptions would have to change before the impairment test would trigger the recognition of an impairment loss. The figures for fiscal 2020 apply to both the ad hoc and scheduled impairment tests:

	Decrease in net cash flows		**Decrease in long-termgrowth rate**		**Increase in cost of capital after tax**	
	%		percentage points		percentage points	
	2020	2019	**2020**	2019	**2020**	2019
Healthcare	>10	>10	>2	>2	>2	>2
Life Science	>10	>10	>2	>1	>2	>1
Performance Materials[1]	>10	>10	>2	>2	>1.5	>1.5

[1] In 2019 considering Versum Materials Inc., United States, on the basis of the preliminary purchase price allocation.

Goodwill shown below was incurred mainly in the course of the acquisitions of the Versum Materials Inc., United States, the Sigma-Aldrich Corporation, United States, the AZ Electronic Materials S.A., Luxembourg, the Millipore Corporation, United States, and the Serono SA, Switzerland.

	Goodwill			
€ million	Healthcare	Life Science[1]	Performance Materials[1]	**Total[1]**
Cost as at Jan. 1, 2019	**1,534**	**10,896**	**1,334**	**13,764**
Additions due to Versum Materials, Inc.	–	–	3,121	3,121
Other additions	–	36	17	53
Disposals due to divestments/Reclassification to assets held for sale	–	–	–	–
Transfers	–	–	–	–
Impairment losses	–	–	–	–
Currency translation difference	–	199	-23	175
Dec. 31, 2019	**1,534**	**11,130**	**4,449**	**17,114**
Cost as of Jan. 1, 2020	**1,534**	**11,130**	**4,449**	**17,114**
Additions	–	18	–	18
Disposals due to divestments/Reclassification to assets held for sale	-9	–	–	-9
Transfers	–	–	–	–
Impairment losses	–	–	–	–
Currency translation difference	–	-862	-303	-1,165
Dec. 31, 2020	**1,525**	**10,287**	**4,146**	**15,959**

[1] Previous year's figures have been adjusted, see (6) "Acquisitions and divestments".

The changes in goodwill caused by foreign exchange rates resulted almost exclusively from translating the goodwill from the acquisitions of the Sigma-Aldrich Corporation, the Versum Materials, Inc., the AZ Electronic Materials S.A., and the Millipore Corporation, which were partially denominated in U.S. dollars, into the reporting currency.

See Note (6) "Acquisitions and divestments" for further information on the additions.

The recoverable amount exceeded the respective carrying amount in all ad hoc impairment tests in the second quarter of 2020 as well as the scheduled impairment tests on October 31, 2019 and August 31, 2020.

(19) Other intangible assets

Accounting and measurement policies

Recognition and initial measurement of purchased intangible assets

In the course of in-licensing, the portion of the consideration paid by the Group to acquire intellectual property is recognized as an intangible asset. If development services are also acquired from the selling contract party, an appropriate portion of the consideration is recognized as deferred income and allocated to research and development costs in line with the service performance if capitalization is not possible.

Contingent consideration in the form of milestone payments in connection with the purchase of intangible assets arising outside a business combination is capitalized as an intangible asset and recognized as a financial liability once the milestone is reached.

Intangible assets acquired in the course of business combinations are recognized at fair value on the acquisition date. This also includes contingent considerations.

Recognition and initial measurement of internally generated intangible assets

Owing to the high risks until pharmaceutical products are approved, the criteria for the capitalization of development costs in accordance with IAS 38 are not met in the Healthcare business sector for the development of drug candidates. Costs incurred after regulatory approval are insignificant and are therefore not recognized as intangible assets. In the Life Science and Performance Materials business sectors, development expenses are capitalized as soon as the criteria have been met. This includes expenses that arose as part of registration for REACH. Furthermore, development expenses for internally developed software are capitalized provided that the relevant criteria have been fulfilled.

Subsequent measurement

In the course of subsequent measurement, the option to remeasure intangible assets at fair value is not exercised.

Intangible assets with a finite useful life are amortized using the straight-line method. The useful lives of customer relationships, brand names, and trademarks as well as marketing authorizations, acquired patents, licenses and similar rights, and software are between three and 24 years. In determining these useful lives, the Group considers factors including the typical product life cycles for each asset and publicly available information about the estimated useful lives of similar assets.

An impairment test is performed if there are indications of impairment. Indications of impairment and the need to reverse impairment losses are determined once a year and on an ad hoc basis with the involvement of the responsible departments and taking external and internal information into consideration. The Group examines the existence of indications of impairment using various factors, particularly deviations from forecasts and the analysis of changes in medium-term planning. In the event of impairment, an impairment loss is recorded under other operating expenses. Impairment losses are reversed to the amortized cost and presented in other operating income if the original reasons for impairment no longer apply. Intangible assets with indefinite useful lives and intangible assets not yet available for use are tested for impairment when a triggering event arises or at least once a year. Amortization does not begin until the product is ready for economic use and is recognized on a straight-line basis over the shorter of the patent or contract term and the estimated useful life.

Significant discretionary decisions and sources of estimation uncertainty

Purchased intangible assets

The identification and measurement of intangible assets acquired in the course of business combinations are subject to significant discretion and estimation uncertainty.

In connection with in-licensing agreements in the Healthcare business sector, a discretionary estimate is made of the extent to which upfront payments and milestone payments represent remuneration for services received or whether such payments result in an in-licensing of an intangible asset that has to be capitalized.

Determination of the useful life

Substantial assumptions and estimates are required to determine the appropriate level of amortization of other intangible assets. This relates in particular to the determination of the underlying useful life.

If the amortization of intangible assets from customer relationships, brands, trademarks, marketing authorizations, patents, licenses and similar rights and other had been 10% higher, for example due to shortened useful lives, profit before income tax would have been € 86 million lower in fiscal 2020 (2019: € 112 million).

Identification of a need to recognize impairment loss and reverse impairment loss

Discretionary decisions are required in the identification of objective evidence of impairment as well as in identifying the need to reverse impairment of other intangible assets.

€ million	Customer relationships, brands and trademarks[1]	Marketing authorizations, patents, licenses, similar rights, and other items		Software and software in development[1]	Advance payments	Total[1]
		Finite useful life[1]	Not yet available for use			
Cost as of Jan. 1, 2019	**7,402**	**10,739**	**885**	**755**	**–**	**19,780**
Additions due to business combinations	2,401	339	181	23	–	2,944
Other additions	–	46	40	122	–	208
Disposals due to divestments/ Reclassification to assets held for sale	–	–	–	–	–	–
Other disposals	-2	-19	–	-4	–	-26
Transfers	-1	1	-1	5	-1	5
Currency translation difference	94	34	-4	5	–	129
Dec. 31, 2019	**9,893**	**11,141**	**1,101**	**906**	**–**	**23,040**
Accumulated amortization and impairment losses as of Jan. 1, 2019	**-2,326**	**-9,195**	**-596**	**-426**	**–**	**-12,544**
Depreciation, amortization, and write-downs	-466	-654	–	-77	–	-1,197
Impairment losses	–	–	-33	-1	–	-33
Reversals of impairment losses	–	–	–	–	–	–
Disposals due to divestments/ Reclassification to assets held for sale	–	–	–	–	–	–
Other disposals	2	17	–	4	–	23
Transfers	–	6	-5	–	–	–
Currency translation difference	-39	-26	–	-4	–	-69
Dec. 31, 2019	**-2,829**	**-9,853**	**-634**	**-503**	**–**	**-13,820**
Net carrying amounts as of Dec. 31, 2019	**7,064**	**1,287**	**467**	**403**	**–**	**9,221**
Cost as of Jan. 1, 2020	**9,893**	**11,141**	**1,101**	**906**	**–**	**23,040**
Additions due to business combinations	–	4	–	–	–	4
Other additions	–	26	33	97	–	157
Disposals due to divestments/ Reclassification to assets held for sale	-4	-2	–	-6	–	-12
Other disposals	–	-11	-27	-25	–	-63
Transfers	–	5	-5	–	–	–
Currency translation difference	-741	-147	-16	-28	–	-933
Dec. 31, 2020	**9,148**	**11,015**	**1,086**	**944**	**–**	**22,193**
Accumulated depreciation and impairment losses as of Jan. 1, 2020	**-2,829**	**-9,853**	**-634**	**-503**	**–**	**-13,820**
Depreciation, amortization, and write-downs	-577	-281	–	-82	–	-940
Impairment losses	-26	-68	-62	-4	–	-160
Reversals of impairment losses	–	–	–	–	–	–
Disposals due to divestments/ Reclassification to assets held for sale	4	2	–	1	–	7
Other disposals	–	5	–	24	–	29
Transfers	–	–	–	–	–	–
Currency translation difference	217	104	1	21	–	343
Dec. 31, 2020	**-3,211**	**-10,091**	**-695**	**-543**	**–**	**-14,540**
Net carrying amounts as of Dec. 31, 2020	**5,937**	**924**	**391**	**401**	**–**	**7,653**

[1] Previous year's figures have been adjusted, see (6) "Acquisitions and divestments".

Additions/disposals due to company acquisitions and divestments

Additions due to business combinations in fiscal 2019 mainly included additions to intangible assets due to the acquisition of Versum Materials, Inc., United States. The changes in the scope of consolidation in fiscal 2020 resulted from the acquisition of Resolution Spectra Systems S.A.S., France, and the sale of the Allergopharma allergy business to Dermapharm Beteiligungs GmbH, Grünwald. See Note (6) “Acquisitions and divestments” for detailed information on the acquisitions and divestments and the related effects.

The additions to market authorizations, patents, licenses, similar rights, and other items with finite useful lives in fiscal 2020 in the amount of € 26 million (2019: € 46 million) were mainly attributable to the Performance Materials business sector.

The additions to marketing authorizations, patents, licenses, similar rights, and other items not yet available for use amounted to € 33 million in fiscal 2020 (2019: € 40 million) and were mostly attributable to the Healthcare business sector.

The additions to software and software in development in the amount of € 97 million (2019: € 122 million) resulted mainly from development costs in connection with new ERP programs.

Loss allowances

In the second quarter of 2020, an analysis was conducted of the extent to which the impact of the Covid-19 pandemic could also indicate potential impairment losses affecting non-financial assets. This analysis found that individual indicators of impairment within the meaning of IAS 36 were considered to have been fulfilled for intangible assets in the Performance Materials and Healthcare business sectors in the second quarter of 2020. The impairment tests performed as a result identified impairment of intangible assets in the Performance Materials business sector in the amount of € 96 million in the second quarter of 2020. Of this figure, € 68 million was attributable to technology-related intangible assets, the majority of which were acquired as part of the acquisition of AZ Electronic Materials S.A., Luxembourg.

In addition, impairment losses were recognized on an ad hoc basis for market authorizations, patents, licenses, similar rights, and other items not yet available for use in the amount of € 62 million (2019: € 33 million). Of this figure, € 54 million related to the Healthcare business sector, with around € 36 million resulting from the discontinuation of two pre-clinical research projects.

Overview of material other intangible assets

The carrying amounts of customer relationships, brands, and trademarks as well as marketing authorizations, patents, licenses, similar rights, and other items were attributable to the business sectors as follows:

€ million	Remaining useful life in years	Healthcare	Life Science	Performance Materials	**Total Dec. 31, 2020**	Total Dec. 31, 2019[1]
Customer relationships, brands and trademarks		**–**	**3,849**	**2,088**	**5,937**	**7,064**
Customer relationships	0.5-17.8	–	3,279	2,050	5,329	6,291
thereof from the following acquisitions:						
Sigma-Aldrich Corporation	15.9-16.9	–	2,893	129	3,023	3,520
Versum Materials, Inc.	5.8-17.8	–	–	1,921	1,921	2,267
Millipore Corporation	0.5-6.5	–	362	–	362	470
Brands and trademarks	2.5-6.9	–	570	38	608	773
thereof from the following acquisition:						
Sigma-Aldrich Corporation	6.9	–	450	–	450	563
Marketing authorizations, patents, licenses and similar rights and other						
Finite useful life		**62**	**245**	**617**	**924**	**1,287**
Marketing authorizations	–	17	–	–	17	58
Xalkori®	1.0	10	–	–	10	45
Other marketing authorizations		7	–	–	7	13
Patents, licenses and similar rights	0.3-12.3	–	241	599	840	1,151
thereof from the following acquisitions:						
AZ Electronic Materials S.A.	0.3-12.3	–	–	333	333	516
Versum Materials, Inc.	3.8-5.8	–	–	206	206	268
Others		45	4	18	67	78
Not yet available for use		**212**	**18**	**161**	**391**	**467**
thereof from the following acquisition:						
Versum Materials, Inc.	–	–	–	151	151	177

[1] Previous year's figures have been adjusted, see (6) "Acquisitions and divestments".

(20) Property, plant and equipment

Accounting and measurement policies

Recognition and initial measurement

In the course of determining cost, government grants received within the scope of IAS 20 are deducted. Grants receivable for financial support that are no longer linked to future costs are recognized in profit or loss.

Subsequent measurement

Subsequent measurement is based on amortized cost. Property, plant and equipment is depreciated using the straight-line method over the useful life of the asset concerned and depreciation expenses are allocated to the respective functional costs. Depreciation of property, plant and equipment is based on the following useful lives:

	Useful life
Production buildings	No more than 33 years
Administration buildings	No more than 40 years
Plant and machinery	6 to 25 years
Operating and office equipment, other facilities	3 to 10 years

The useful lives of the assets are reviewed regularly and adjusted if necessary.

An impairment test is performed if there are indications of impairment. External and internal information is used in this context. In the event of impairment, an impairment loss is recorded under other operating expenses. Impairment losses are reversed to the amortized cost and presented in other operating income if the original reasons for impairment no longer apply.

Significant discretionary decisions and sources of estimation uncertainty

Determination of the useful life and residual value

Assumptions and estimates are required in determining the appropriate useful life and the expected residual value in order to calculate the level of amortization of property, plant and equipment. This applies in particular to the determination of the underlying remaining useful life. In making these estimates, the Group considers the useful lives of the property, plant and equipment derived from past experience.

Identification of a need to recognize impairment loss and reverse impairment loss

Discretionary decisions are required in the identification of objective evidence of impairment as well as in identifying the need to reverse impairment of property, plant and equipment.

€ million	Land, land rights and buildings[1]	Plant and machinery[1]	Other facilities, operating and office equipment[1]	Construction in progress and advance payments to vendors and contractors	**Total[1]**
Cost at January 1, 2019	**4,222**	**4,330**	**1,372**	**1,096**	**11,019**
Additions due to business combinations	139	270	35	84	529
Other Additions	190	45	57	812	1,104
Disposals due to divestments/Reclassification to assets held for sale	–	–	–	–	–
Other Disposals	-81	-88	-46	-8	-223
Transfers	299	327	100	-713	14
Currency translation difference	47	26	13	8	95
Dec. 31, 2019	**4,816**	**4,910**	**1,532**	**1,278**	**12,537**
Accumulated depreciation and impairment losses as of Jan. 1, 2019	-1,609	-3,150	-977	-4	-5,740
Depreciation	-273	-284	-150	–	-708
Impairment losses	-6	–	–	-1	-8
Reversals of impairment losses	–	–	–	–	–
Disposals due to divestments/Reclassification to assets held for sale	–	–	–	–	–
Disposals	48	85	41	1	176
Transfers	1	-21	–	–	-20
Currency translation difference	-14	-19	-10	–	-44
Dec. 31, 2019	**-1,854**	**-3,390**	**-1,097**	**-4**	**-6,345**
Net carrying amounts as of Dec. 31, 2019	**2,962**	**1,520**	**435**	**1,274**	**6,192**
Cost as of Jan. 1, 2020	**4,816**	**4,910**	**1,532**	**1,278**	**12,537**
Changes in the scope of consolidation	1	1	–	–	2
Additions	363	49	87	1,031	1,530
Reclassification to assets held for sale	-66	-44	-7	-1	-117
Disposals	-217	-62	-53	-4	-336
Transfers	249	510	142	-901	–
Currency translation difference	-177	-119	-52	-39	-386
Dec. 31, 2020	**4,969**	**5,245**	**1,649**	**1,365**	**13,229**
Accumulated depreciation and impairment losses January 1, 2020	-1,854	-3,390	-1,097	-4	-6,345
Depreciation	-297	-346	-175	–	-818
Impairment losses	-5	-5	–	-13	-23
Reversals of impairment losses	–	–	–	–	–
Disposals due to divestments/Reclassification to assets held for sale	17	27	7	–	51
Disposals	85	44	43	1	174
Transfers	1	–	–	-1	–
Currency translation difference	56	65	32	–	153
Dec. 31, 2020	**-1,997**	**-3,605**	**-1,189**	**-17**	**-6,808**
Net carrying amounts as of Dec. 31, 2020	**2,972**	**1,640**	**460**	**1,348**	**6,421**

[1] Previous year's figure have been adjusted, see Note (6) "Acquisitions and divestments".

The changes in the scope of consolidation in fiscal year 2020 primarily related to the sale of the Allergopharma allergy business, the sale of Litec-LLL GmbH, Greifswald, and the acquisition of AmpTec GmbH, Hamburg. Detailed information can be found in Note (6) "Acquisitions and divestments".

The largest individual addition was the acquisition of the previously leased land and buildings of the Life Science Campus in Burlington, United States. Other major individual additions to assets in fiscal year 2020 related to the investment projects shown below:

Business sector	Investment project	Country
Healthcare	Biotech development system	Switzerland
Healthcare	Filling and packaging center	Switzerland
Healthcare	Expansion of research center	United States
Life Science	Production plant	United States
Life Science	Filling and logistics center	Germany
Life Science	Production plant	Germany
Life Science	Production plant	Ireland
Life Science	Production plant	United States
Performance Materials	Laboratory and office building	United States
Performance Materials	Research center	Germany

Impairment losses of € 23 million (2019: € 8 million) were recognized in fiscal year 2020. These primarily related to assets under construction and production facilities in the Performance Materials business sector in Germany and Japan.

(21) Leasing

Accounting and measurement policies

IFRS 16 scope

The Group exercises the option of not recognizing leases of intangible and low-value underlying assets in the context of IFRS 16. Right-of-use assets under leases are reported in the balance sheet item “Property, plant and equipment” (see Note (20) “Property, plant and equipment”).

If the provision of company cars to employees qualifies as an employee benefit within the meaning of IAS 19, IFRS 16 is not applied. In this case, its balance-sheet treatment is governed solely by IAS 19.

Separation of lease and non-lease components

Leases for land, land rights, and buildings are separated into lease and non-lease components. The Group otherwise elects to exercise the option not to separate non-lease components from lease components.

Depreciation of the right-of-use assets arising from leases

Basically, right-of-use assets are depreciated over the lease term. If it is considered sufficiently probable that an existing purchase option will be exercised or ownership will be automatically transferred at the end of the lease term, however, depreciation is applicable over the same period to corresponding assets under property, plant and equipment (see Note (20) “Property, plant and equipment”).

Determining the incremental borrowing rate

If the interest rate for the lease can not be reliably determined, the incremental borrowing rate is applied in measuring the lease liability. At Merck KGaA, Darmstadt, Germany, the incremental borrowing rate is determined on the basis of the risk-free interest rate of the respective Group company over a similar term and in the same currency. This interest rate is adjusted using a risk surcharge specific to the Group. The Group applies the repayment model to determine the current portion of the lease. The current portion of the lease corresponds to the repayment share of the next 12 months.

Determining the lease term

Where renewal or termination options are available, their exercise is assessed on a case-by-case basis, considering factors such as location strategies, leasehold improvements, and the degree of specificity.

Significant discretionary decisions and sources of estimation uncertainty

Identification of a lease

Discretionary decisions can arise during the identification of leases in answering the question of whether a lessor's right of substitution is substantive. The Group classifies rights of substitution as not substantive if the facts and circumstances of the case do not support a different assessment.

Measurement of lease and non-lease components

In the case of leases for land, land rights, and buildings, separating the lease into lease and non-lease components is subject to discretion and estimation uncertainty if observable prices are not available from the contract partner or other potential lessors.

Determining the lease term

When determining the lease term, existing renewal and termination options must be evaluated to determine the probability that such options will be exercised.

These assessments may be discretionary even though they rely on existing and material information on the general economic context, such as location strategies, leasehold improvements, or the degree of specificity. If the available information does not allow a reliable assessment, the Group uses historical experience for comparable situations.

The 30 largest leases accounted for around 50% of total lease liabilities. The subject matter of the leases essentially comprised right-of-use assets for office, warehouse, and laboratory buildings. If options to renew these leases were exercised in future, which is not yet considered likely, this would result in additional potential cash outflows of up to € 200 million (2019: € 279 million).

Where individual contracts include termination options, it was considered unlikely that these would be exercised so that additional lease payments were already considered in the corresponding lease liability.

Determining the incremental borrowing rate

Determining the risk-free interest rate and determining the risk surcharge are both discretionary.

Initial measurement of the lease liability and the right-of-use asset

In measuring the lease liability, there is discretionary scope and significant estimation uncertainty regarding:

- measuring any payments in the course of promised residual value guarantees and
- assessing the probability that existing purchase and termination options and renewal options will be exercised.

In measuring right-of-use assets under leases, the Group is subject to estimation uncertainty regarding any demolition obligations and their resulting payments.

The reconciliation of net carrying amounts of right-of-use assets from leases was as follows:

	Right-of-use assets			
€ million	Land, land rights and buildings	Plant and machinery	Other facilities, operating and office equipment	**Total**
Net carrying amounts as of Jan. 1, 2020	**487**	**13**	**58**	**557**
Changes in the scope of consolidation	-1	–	–	-2
Additions	130	2	55	187
Disposals	-119	-1	-9	-129
Depreciation	-107	-5	-42	-153
Impairment losses	–	–	–	–
Reversal of impairment losses	–	–	–	–
Other	-30	2	-3	-32
Net carrying amounts as of Dec. 31, 2020	**360**	**11**	**58**	**429**

	Right-of-use assets			
€ million	Land, land rights and buildings	Plant and machinery	Other facilities, operating and office equipment	Total
Net carrying amounts as of Jan. 1, 2019	**391**	**17**	**67**	**476**
Changes in the scope of consolidation	36	1	5	42
Additions	175	2	24	200
Disposals	-22	–	-2	-24
Depreciation	-100	-6	-39	-144
Impairment losses	-1	–	–	-1
Reversal of impairment losses	–	–	–	–
Other	9	-1	2	10
Net carrying amounts as of Dec. 31, 2019	**487**	**13**	**58**	**557**

The net carrying amounts of other facilities, operating and office equipment mainly include the right-of-use assets for vehicles.

The disposals under land, land rights, and buildings in fiscal 2020 primarily resulted from the acquisition of the previously leased land and buildings of the Life Science Campus in Burlington, United States.

The expenses and income and the payments under the leases in accordance with IFRS 16 were reported in the consolidated income statement and the consolidated statement of cash flows as follows:

€ million	**2020**	2019
Right-of-use assets		
Depreciation	-153	-144
Impairment losses	–	-1
Reversals of impairment losses	–	–
Expenses for leasing low-value assets	-18	-22
Expenses for leases with variable lease payments	–	–
Income from subleasing right-of-use assets	–	1
Income from sale-and-lease-back transactions	–	21
Interest expenses for lease liabilities	-15	-14
Total	**-186**	**-160**

€ million	**2020**	2019
Net cash flows from operating activities	-34	-33
Net cash flows from financing activities	-144	-136
Total	**-178**	**-169**

Future lease payments will be incurred in the following periods:

Dec. 31, 2020

€ million	Within 1 year	1-5 years	After more than 5 years	**Total**
Future lease payments	118	262	88	468
Interest portion of future payments	-8	-16	-7	-31
Present value of future lease payments	**110**	**246**	**81**	**436**

Dec. 31, 2019

€ million	Within 1 year	1-5 years	After more than 5 years	Total
Future lease payments	119	319	189	627
Interest portion of future payments	-12	-30	-20	-61
Present value of future lease payments	**107**	**289**	**169**	**565**

To date, the Group has taken advantage of reduced lease payments only to the extent that these were prescribed as government assistance for lessees. Their amount was immaterial. Accordingly, the amendment to IFRS 16 regarding rent concessions published by the IASB in May 2020 did not have a significant impact for the Group. None of the options provided were exercised.

(22) Other non-financial assets

Accounting and measurement policies

Other non-financial assets

Other non-financial assets are carried at amortized cost. Impairments are recognized for any credit risks.

Other non-financial assets are broken down as follows:

	Dec. 31, 2020			Dec. 31, 2019		
€ million	Current	Non-current	Total	Current	Non-current	Total
Receivables from non-income related taxes	368	4	372	340	4	344
Prepaid expenses	151	14	164	153	14	167
Non-current income tax receivables		10	10		11	11
Assets from defined benefit plans	2	–	2	4	–	4
Remaining other assets	76	63	139	94	67	161
Other non-financial assets	**597**	**91**	**687**	**591**	**97**	**688**

(23) Net cash flows from investing activities

Net cash outflows from investments in financial assets amounting to € 278 million (2019: € 196 million) mainly resulted from short-term investments in securities not classified as cash and cash equivalents.

In the previous year, net cash outflows from acquisitions less cash and cash equivalents acquired included primarily the payments made for the acquisition of Versum Materials, Inc., United States, in the amount of € 4,928 million.

Net cash inflows from the disposal of other financial assets in the amount of € 340 million (2019: € 140 million) related primarily to the sale of short-term investments in securities not classified as cash and cash equivalents, as well as the sale of the equity interest in Progyny, Inc., United States.

Payments for investments in property, plant and equipment included the payment for the acquisition of the previously leased land and buildings of the Life Science Campus in Burlington, United States.

As in the previous year, the payments made and received in connection with the acquisition and disposal of other non-financial assets resulted from the short-term investment of available funds.

The proceeds from the disposal of assets held for sale less transferred cash and cash equivalents resulted largely from the sale of the Allergopharma allergy business. The payments made in connection with the disposal of assets held for sale reported in the previous year were primarily due to tax payments relating to the divested Consumer Health business.

(24) Inventories

Accounting and measurement policies

Inventories

In addition to directly attributable unit costs, the cost of sales also includes overheads attributable to the production process, which are determined on the basis of normal capacity utilization of the production facilities. Goods for resale are recognized at cost. When determining amortized cost, the “first-in, first-out” (FIFO) and weighted average cost formulas are used.

Inventories are tested for impairment using a business sector-specific method. Under this method, cost is compared to the net realizable values. The net realizable value corresponds to the expected sale proceeds less any costs for completing and distributing the product. If the net realizable value is lower than the amortized cost, the asset is written down by a corresponding amount which is recognized as an expense in the cost of sales.

In addition to the impairment derived from the sales market, impairment losses may also be necessary for quality reasons or due to a lack of usability of the items, or their remaining shelf life. If the reason for impairment no longer applies, the carrying amount is adjusted to the lower of cost and the applicable new net realizable value.

Since inventories are for the most part not manufactured within the scope of long-term production processes, borrowing costs are not included.

Inventory prepayments are recognized under other non-financial assets.

Significant discretionary decisions and sources of estimation uncertainty

Identification of impairment losses or reversal of impairment losses

Discretionary decisions are required in the identification of impairment as well as in identifying the need to reverse impairment of inventories. There are estimation uncertainties with respect to the calculation of the net realizable value. In particular, changes in selling prices and expected costs of completion are considered in calculating this value.

Inventories consisted of the following:

€ million	**Dec. 31, 2020**	Dec. 31, 2019
Raw materials and supplies	633	622
Work in progress	905	943
Finished goods/goods for resale	1,756	1,776
Inventories	**3,294**	**3,342**

The reduction of the inventories versus the previous year was primarily driven by the stock decrease of the unfinished-, as well as finished goods and merchandise. While in the Healthcare business sector a slight build-up occurred to ensure the supply demand, in the Display Solutions business unit of the Performance Materials sector, the changes in the market demand patterns led to a stock decrease.

Impairment losses on inventories amounted to € 545 million as of December 31, 2020 (December 31, 2019: € 526 million). Impairment losses that are included in the cost of sales are shown in Note (10) “Cost of sales”.

As of the balance sheet date, no inventories were pledged as security for liabilities.

(25) Trade and other receivables

Accounting and measurement policies

Trade and other receivables

Trade accounts receivable without significant financing components that are not the subject of a factoring agreement are measured at the amount of the unconditional claim for consideration on initial recognition. For additions to trade accounts receivable, loss allowances are recognized to allow for expected credit losses.

At initial recognition, other receivables are measured at fair value plus the direct transaction costs incurred upon acquisition of the asset.

Trade accounts receivable that are potentially designated to be sold on account of a factoring agreement are measured at fair value through other comprehensive income.

The measurement policies applied in determining loss allowances for trade and other receivables are shown in Note (42) “Management of financial risks” in the “Credit risks” section.

Loss allowances and reversals of loss allowances are presented under the item “Impairment losses and reversals of impairment losses on financial assets (net)” in the consolidated income statement if the asset can be characterized as operational. If the asset can be characterized as financial, it is recognized in financial income or financial expenses.

Further information on the accounting and measurement policies governing financial assets can be found in Note (36) “Other financial assets”.

Significant discretion and sources of estimation uncertainty

Trade and other receivables

Information on the significant discretion and estimation uncertainty concerning trade and other receivables can be found in Note (42) “Management of financial risks”.

Trade and other receivables were measured as follows:

	Dec. 31, 2020			Dec. 31, 2019		
€ million	Subsequently measured at amortized cost	Subsequently measured at fair value through other comprehensive income	**Total**	Subsequently measured at amortized cost	Subsequently measured at fair value through other comprehensive income	Total
Gross trade accounts receivable	3,106	19	3,125	3,227	25	3,251
Gross other receivables	196	–	196	340	–	340
Gross trade and other receivables	**3,302**	**19**	**3,321**	**3,567**	**25**	**3,591**
Loss allowances on trade accounts receivable	-73	–	-73	-77	–	-77
Loss allowances on other receivables	-2	–	-2	-4	–	-4
Net trade and other receivables	**3,227**	**19**	**3,246**	**3,485**	**24**	**3,510**
therof: current	3,202	19	3,221	3,463	24	3,488
therof: non-current	25	–	25	22	–	22

In fiscal 2020, trade accounts receivable in Italy with a nominal value of € 31 million (2019: € 22 million) were sold for € 30 million (2019: € 22 million). These receivables did not involve any further rights of recovery against the Group.

(26) Contract assets

Accounting and measurement policies

Contract assets

Contract assets represent contractual claims to receive payment from customers for whom the contractual performance obligation has already been fulfilled although an unconditional claim to payment has yet to arise.

The following table shows the change in contract assets:

€ million	2020	2019
Jan. 1	**156**	**52**
Additions due to business combinations	**–**	53
Other additions	420	311
thereof: attributable to performance obligations satisfied in prior periods	15	7
Disposals due to divestments/Reclassification to assets held for sale	–	–
Reclassification to trade accounts receivable	-402	-270
Currency effects	-5	10
Other	–	-1
Dec. 31	**169**	**156**

Contract assets resulted in particular from rendering services and manufacturing of customer-specific equipment in the Life Science and Performance Materials business sectors.

(27) Other provisions

Other provisions developed as follows:

€ million	Litigation	Restructuring	Environmental protection	Acceptance and follow-on obligations	Interest and penalties related to income taxes	Other	**Total**
Jan. 1, 2020	**548**	**135**	**143**	**21**	**51**	**179**	**1,077**
Additions	65	128	3	46	40	91	373
Utilizations	-15	-62	-4	-8	–	-34	-123
Release	-451	-31	-1	-12	-10	-83	-589
Interest effect	11	–	8	–	–	–	19
Currency translation difference	-5	-1	–	–	-2	-8	-16
Changes in scope of consolidation/other	–	-1	–	–	–	–	-1
Reclassification to assets held for sale	–	–	–	–	–	–	–
Dec. 31, 2020	**155**	**168**	**148**	**47**	**78**	**146**	**741**
thereof: current	137	86	13	37	78	109	461
thereof: non-current	18	81	134	10	–	37	281

Accounting and measurement policies

Provisions for litigation

To assess a recognition obligation in relation to provisions for litigation and to quantify future outflows of resources, the Group draws on the knowledge of the legal department as well as outside counsel.

Assessing the need for recognizing provisions for litigation is based on the likelihood of possible outcomes for proceedings. In particular, the factors influencing this likelihood are:

- the validity of the arguments brought forward by the opposing party and
- the legal situation and current court rulings in comparable proceedings in the jurisdiction in question.

The following factors are also relevant in measuring provisions for litigation:

- the duration of proceedings in pending legal disputes,
- the applicable license rate plus an expected infringement surcharge,
- the usual damages and fines for comparable legal disputes, and
- the discount factor to be used.

Provisions for restructuring

The Group uses formal restructuring plans to assess recognition obligation for provisions for restructuring projects and the amount of the expected outflow of resources.

The main parameters in determining the amount of the provision are

- the planned implementation date of the restructuring plan, and
- the anticipated expenses arising from the change in or termination of the employment relationships of the affected employees.

Provisions for environmental protection

To assess a recognition obligation in relation to provisions for environmental protection and to quantify future outflows of resources, the Group draws on appraisals by independent external experts and the knowledge of in-house specialists.

The following are key parameters in calculating the present value of the future settlement amount of provisions for environmental protection:

- the future settlement date,
- the extent of environmental damage,
- the applicable remediation methods,
- the associated future costs, and
- the discount factor.

Provisions for acceptance and follow-on obligations

The assessment of the recognition obligation for provisions for acceptance and follow-on obligations and the quantification of future outflows of resources is based on internal project plans as well as on the assessment of the respective matters by in-house and external specialists.

The main parameters in determining the amount of the provision are

- the ability to use or potential for modification of secured manufacturing capacities at third-party providers, particularly for pharmaceutical compounds,
- the number and duration of continued treatments of affected patients in clinical development programs,
- the expected date or period of the outflow of resources, and
- the expectations concerning future events influencing the obligations.

Significant discretion and sources of estimation uncertainty

Provisions for litigation

Like the measurement of provisions, the assessment of a recognition obligation for provisions for litigation is to a particular extent subject to a degree of estimation uncertainty. The uncertainties relate, in particular, to the assessment of the likelihood and the amount of the outflow of resources.

Provisions for restructuring

Estimation uncertainty about the provisions for restructuring primarily relate to determining the amount of the expected outflow of resources. This is largely influenced by the assumptions made concerning the change in or termination of the employment relationships of the affected employees and the planned implementation date of the restructuring plan.

Provisions for environmental protection

The assessment of a recognition obligation and the measurement of the provisions for environmental protection are subject to discretionary decisions and estimation uncertainties to a particular degree.

The estimation uncertainties relate in particular to the assessment of the timing and likelihood of a future outflow of resources and assessment of the extent of necessary remediation measures and the related calculation of the amount of the liability.

Provisions for acceptance and follow-on obligations

Estimation uncertainty regarding the provisions for acceptance and follow-on obligations primarily relates to determining the amount of the expected outflow of resources.

The estimation uncertainties primarily involve assessing future events that will influence the obligation.

The legal matters described below represented the most significant legal risks.

Product-related and patent disputes

Rebif®: The Group is involved in a patent dispute with Biogen Inc., United States (Biogen), in the United States. Biogen claims that the sale of Rebif® in the United States infringes on a Biogen patent. The disputed patent was granted to Biogen in the United States in 2009. Subsequently, Biogen sued the Group and other pharmaceutical companies for damages due to the infringement of this patent. The Group defended itself against all allegations and brought a countersuit against Biogen claiming that the patent was invalid and not infringed by the Group's actions. In the first instance (district court), a jury found the patent to be invalid. This jury verdict was overturned by the judge in the same instance in September 2018. For the time being, the patent was thus deemed to be legally valid and to have been infringed. The Group filed a complaint with the United States Court of Appeals for the Federal Circuit (second instance) against the first-instance ruling in October 2018. On September 28, 2020, this court overturned the verdict of the judge in the first instance, declared Biogen's patent to be invalid, and instructed the District Court to reinstate the original jury verdict. A cash outflow is

considered to be unlikely based on this decision, and the provision of € 365 million recognized at this date for potential compensation payments for damages was reversed. The resulting income was reported in other operating income. Only a remaining low single-digit million euro amount is still recognized for outstanding legal costs.

PS-VA liquid crystals mixtures: In the Performance Materials business sector, the Group is involved in a legal dispute with JNC Corporation, Japan, (JNC). JNC claims that, by manufacturing and marketing certain liquid crystal mixtures, the Group has infringed JNC patents in China, Taiwan, and Korea. The Group maintains that these patents are invalid owing to relevant prior art. At the end of the second quarter of fiscal 2020, the actions in China and Taiwan were concluded with legally binding effect in favor of the Group. The provision was reduced to reflect this development. In Korea, however, the patent infringement action on the part of JNC, the patent nullity action on the part of the Group and an additional "correction trial" are all still pending. In addition, a new statutory provision has come into force in Korea that could have a potentially negative impact on the amount of any damages. The provision was reduced in fiscal 2020 to reflect the remaining litigation risk in Korea. After the adjustment, the remaining provision amounts to a low double-digit million euro sum. A cash outflow within the next 12 months is considered possible at present.

Antitrust and other proceedings

Antitrust review proceedings for the acquisition of Sigma-Aldrich Corporation, United States, (Sigma-Aldrich): On July 6, 2017, the Group received notice from the European Commission (EU Commission) in connection with the antitrust review proceedings for the acquisition of Sigma-Aldrich, in which the EU Commission informed the Group of its preliminary conclusion that the Group and Sigma-Aldrich allegedly transmitted incorrect and/or misleading information within the scope of the acquisition of Sigma-Aldrich. The EU Commission received registration of the merger on April 21, 2015, and granted clearance on June 15, 2015, subject to the condition that the Group and Sigma-Aldrich divest parts of the European solvents and inorganic chemicals businesses of Sigma-Aldrich in order to resolve antitrust concerns. According to the preliminary viewpoint of the EU Commission communicated in a letter dated July 6, 2017, the Group and Sigma-Aldrich withheld related important information about an innovation project. According to the EU Commission, the innovation project should have been included in the remedies package. This resulted in an administrative procedure with the EU Commission. On July 1, 2020, the EU Commission informed the Group that the parts of the procedure relating to the Group were no longer under investigation and that the procedure now related solely to the allegations against Sigma-Aldrich. The procedure could result in the issuance of a fine that would be open to appeal. In the second quarter of 2020, the existing provision in a mid double-digit euro amount was reduced to a low double-digit euro amount. A potential outflow of resources is considered possible for 2021.

Citalopram: In connection with the generics business that was divested in 2007, the Group is accused of breaching EU antitrust law through agreements concluded by its former subsidiary Generics (UK) Ltd., United Kingdom, relating to the antidepressant Citalopram patented by Lundbeck A/S, Denmark. In 2013, the EU Commission imposed a corresponding fine in a double-digit euro amount. The Group filed a lawsuit against the Commission's decision with the European Court in August 2013. The lawsuit was rejected in 2016. The Group subsequently filed an appeal against this decision with the European Court of Justice (CJEU). In the course of these proceedings, the Advocate General of the CJEU recommended that the European Court's verdict be confirmed. In light of the disadvantageous development in this matter, additional accounting measures have been taken for potential additional claims and the existing provision has increased by a double-digit million euro amount as a result. A decision on the fine in the first half of 2021 is considered possible.

Paroxetine: In the United Kingdom, the Group was subject to antitrust investigations by the British Competition and Market Authority (CMA) in connection with the generics business that was divested in 2007. In March 2013, the authorities informed the Group of the assumption that a settlement agreement entered into in 2002 between Generics (UK) Ltd. and several subsidiaries of GlaxoSmithKline plc, United Kingdom, in connection with the antidepressant drug paroxetine, violated British and European competition law. They stated that the Group was liable as the then owner of Generics (UK) Ltd. and because it was involved in the negotiations for the settlement agreement. The investigations into Generics (UK) Ltd. started in 2011, without this being known to the Group. On February 11, 2016, the CMA imposed a fine in this matter. The Group has taken legal action

against this fine. The United Kingdom Competition Appeal Tribunal (CAT) submitted the relevant legal questions to the European Court of Justice (CJEU) for a preliminary ruling. The CJEU confirmed in January 2020 that such settlement agreements may breach European competition law as a matter of principle. The action is now ongoing with the CAT. A decision is still outstanding. The Group has recognized a provision in a low double-digit million euro amount. A cash outflow within the next 12 months is considered possible.

Versum merger agreement: In 2019, some Versum shareholders accused Versum Inc., United States, (Versum) and the Board of Directors of having breached their fiduciary duties in connection with the acquisition negotiations with Entegris, Inc., United States, and of having initiated a shareholder rights agreement. After Versum announced the termination of the shareholder rights agreement on April 2, 2019, the plaintiffs withdrew their claims and requested that the court impose a “mootness fee” on Versum, which would require Versum to pay the legal costs incurred. On July 16, 2020, the court set this fee at US$ 12 million (€ 10 million). Versum appealed this ruling and is awaiting a court decision. A provision in a low double-digit million euro amount was recognized for this matter in fiscal 2020. The provision included the “mootness fee” plus interest and additional legal costs for the appeal and was still recognized as of December 31, 2020. The costs are covered in full by the D&O insurance that has been concluded. A corresponding receivable is recognized in other receivables. A cash outflow within the next 12 months is considered possible.

Restructuring

The restructuring provisions recognized as of December 31, 2020 primarily relate to obligations for workforce reduction measures in connection with communicated restructuring projects.

The additions to the restructuring provisions in the amount of € 128 million resulted in particular from the reorganization of the global distribution structures, research and development activities and individual production areas in the Healthcare business sector that began in fiscal 2020. The addition is also due to the ongoing reorganization measures in the Performance Materials business sector.

The restructuring provisions also included obligations from the Life Science business sector, which will carry out relocations and gradually close operations at various German sites by 2022; further additions were made to provisions in fiscal 2020 for this purpose. Furthermore, they contained obligations for the ongoing expansion of shared service activities and the related relocation of activities. These provisions were already recognized in previous years.

Outflows of resources under the restructuring provisions are expected within the next five years.

Environmental protection

Provisions for environmental protection resulted in particular from obligations for soil remediation and groundwater protection in connection with the crop protection business in Germany and Latin America that was discontinued in 1987.

Acceptance and follow-on obligations

Provisions for acceptance and follow-on obligations primarily considered costs in connection with discontinued development projects as well as obligation surpluses from onerous contracts. Utilizations and releases were mainly attributable to development projects discontinued in previous years.

Additions mainly resulted from the termination of a clinical trial in the Healthcare business sector.

Interest and penalties related to income taxes

Provisions for interest and penalties related to income taxes mainly comprised interest payables associated with or resulting from tax payables.

Miscellaneous other provisions

Miscellaneous other provisions mainly comprised provisions related to remaining risks from the divestment of the Consumer Health business, for warranty obligations, and for uncertain commitments from contributions, fees, and other duties.

(28) Contingent liabilities

Accounting and measurement policies

Contingent liabilities

To identify contingent liabilities from litigation and tax matters, the Group draws on the knowledge of the legal department and the tax department as well as the opinions of external consultants and attorneys.

The key factors in the assessment to identify contingent liabilities are:

- the validity of the arguments brought forward by the opposing party or the tax authority and
- the legal situation and current court rulings in comparable proceedings in the jurisdiction in question.

The amount of the contingent liability is based on the best possible estimate which in turn is based on likelihood of possible outcomes of proceedings and on the applicable license rate in patent disputes.

Significant discretionary decisions and sources of estimation uncertainty

Contingent liabilities

The identification and the measurement of contingent liabilities are both subject to considerable uncertainty.

This applies with regard to assessing the likelihood of an outflow of resources as well as determining its amount.

Contingent liabilities were composed as follows:

€ million	Dec. 31, 2020	Dec. 31, 2019
Contingent liabilities from litigation and tax matters	87	128
Other contingent liabilities	–	1

Contingent liabilities from litigation mainly related to obligations under labor law and tort law. In addition to exchange rate effects, the decline compared with the previous year is primarily due to changes in estimates of potential civil law obligations. The Group now believes it is more likely that a fine imposed in legal proceedings under antitrust law will ultimately be confirmed in court. The assertion of additional claims by third parties is therefore expected. These potential claims, which were previously reported as contingent liabilities, are now included in the measurement of the provision for the corresponding proceedings.

In addition, there are contingent liabilities from various legal disputes with Merck & Co., Inc., United States, of the United States (outside the United States and Canada: MSD), among other things due to breach of the co-existence agreement entered into between the two companies and/or trademark/name right infringement regarding the use of the designation “Merck”. In this context, the Group has sued MSD in various countries and

has been sued by MSD in the United States. An outflow of resources – except costs for legal defense – was not deemed sufficiently probable as of the balance sheet date to justify the recognition of a provision. Since the contingent liability from these legal disputes could not be reliably quantified as of the balance sheet date, this matter was not considered in the table presented above.

Contingent liabilities from tax matters primarily related to the determination of earnings under tax law, customs regulations, and excise tax matters.

(29) Other non-financial liabilities

Accounting and measurement policies

Other non-financial liabilities

Accruals for personnel expenses included in other non-financial liabilities comprise, in particular, liabilities resulting from vacation entitlements, bonuses, and social security contributions.

Contract liabilities include payments received by the Group prior to completion of contractual performance. In addition to consideration received within the scope of collaboration agreements, this applies particularly to service agreements.

Other non-financial liabilities comprise the following:

	Dec. 31, 2020			Dec. 31, 2019		
€ million	**Current**	**Non-current**	**Total**	Current	Non-current	Total
Accruals for personnel expenses	823	–	823	681	–	681
Contract liabilities	304	47	351	291	87	379
Liabilities from non-income related taxes	157	1	158	207	5	212
Non-current income tax liabilities	–	45	45	–	–	–
Other accruals	76	7	82	32	1	33
Other non-financial liabilities	**1,360**	**100**	**1,460**	**1,211**	**93**	**1,304**

The following table shows the development of contract liabilities in the period under review:

	2020			2019		
€ million	**Current**	**Non-current**	**Total**	Current	Non-current	Total
Jan. 1	**291**	**87**	**379**	**332**	**4**	**336**
Additions due to business combinations	1	–	1	4	–	4
Other additions	849	1	850	693	209	902
Disposals due to divestments/Reclassification to assets held for sale	–	–	–	–	–	–
Recognition of income/reversal	-888	–	-888	-861	-3	-864
Cumulative catch-up adjustments to revenue	21	-2	19	–	–	–
Reclassification from non-current to current	39	-39	–	122	-122	–
Currency translation	-9	–	-9	2	–	2
Other	–	–	–	-1	–	-1
Dec. 31	**304**	**47**	**351**	**291**	**87**	**379**

As of January 1, 2020, contract liabilities amounted to € 379 million (January 1, 2019: € 336 million), of which a total of € 232 million (2019: € 328 million) was recognized through profit or loss in fiscal 2020.

(30) Trade and other payables

Accounting and measurement policies

Trade and other payables

Trade and other payables are subsequently measured at amortized cost.

Trade and other payables amounted to € 1,768 million (December 31, 2019: € 2,054 million). This item included accrued amounts of € 673 million (December 31, 2019: € 673 million) from outstanding invoices.

Employees

(31) Number of employees

As of December 31, 2020, the number of employees at Group was 58,096 (December 31, 2019: 57,036 employees).

The following table shows the average number of employees broken down by function.

	2020	2019
Production	17,624	16,455
Administration	11,338	10,338
Research and development	7,503	7,559
Supply chain	4,298	4,109
Marketing and sales	14,101	13,939
Other	2,716	1,207
Average number of employees	**57,580**	**53,607**

(32) Personnel expenses

Personnel expenses comprised the following:

€ million	**2020**	2019
Wages and salaries	4,669	4,293
Compulsory social security contributions and other costs	694	631
Pension expenses	408	357
Personnel expenses	**5,771**	**5,281**

Personnel expenses comprised expenses of € 162 million (2019: € 152 million) for defined contribution plans which are funded exclusively using external funds and therefore do not represent any obligation for the Group other than making contribution payments. In addition, employer contributions amounting to € 85 million (2019: € 86 million) were transferred to the German statutory pension insurance system and € 77 million (2019: € 68 million) to statutory pension insurance systems abroad.

(33) Provisions for employee benefits

Provisions for employee benefits are composed as follows:

€ million	Dec. 31, 2020	Dec. 31, 2019
Provisions for pensions and other post-employment benefits	3,594	2,957
Non-current other employee benefit provisions	286	237
Non-current provisions for employee benefits	**3,880**	**3,194**
Current provisions for employee benefits	**152**	**110**
Provisions for employee benefits	**4,032**	**3,303**

Provisions for other employee benefits include provisions for share-based payments, which are discussed in greater detail in the section on share-based payments in this note.

Provisions for pensions and other post-employment benefits

Accounting and measurement policies

Provisions for pensions and other post-employment benefits

In addition to retirement benefit obligations, provisions for pensions and other post-employment benefits include obligations for other post-employment benefits, such as medical care.

The present value of the defined benefit obligation is determined by expert third parties according to the actuarial projected unit credit method. The discount rates are generally determined on the basis of the yields of high-quality corporate bonds with similar maturities and currencies.

As of December 31, 2020, the Group changed the way in which it determines the discount factor for defined benefit pension plans in the eurozone. This constitutes a change in an accounting estimate within the meaning of IAS 8. The discount factor was previously determined internally by Group Treasury by reference to external rating information on the yields of high-quality bonds with similar maturities. As of December 31, 2020, the discount factor was determined by reference to the discount rates for similar maturities calculated by a globally active external actuary. As previously, this was based on bonds with ratings of at least “AA” or a comparable rating from one of the leading rating agencies as of the reporting date.

If the discount rate had still been determined using the previous method as of December 31, 2020, the discount rate for the eurozone would have been 23 basis points lower. Without the change in the accounting estimate, the present value of the defined benefit obligation would have been € 270 million higher, current service cost in 2021 would have been a low double-digit million euro amount higher, and interest expenses in 2021 would have been a single-digit million euro amount lower.

The other actuarial assumptions used as the basis for calculating the defined benefit obligation, such as rates of salary increases and pension trends, were determined on a country-by-country basis in line with the economic conditions prevailing in each country. The latest country-specific mortality tables are also applied (Germany: Heubeck 2018G, Switzerland: BVG 2015G, United Kingdom: S3PA and S2PA). The potential effects of the Covid-19 pandemic were not taken into account.

Apart from the net balance of interest expense on the defined benefit obligations and interest income from the plan assets, which is reported in financial income and financial expenses, the expenses for defined benefit pension systems are allocated to the individual functional areas in the consolidated income statement.

The calculation of the defined benefit obligations was based on the following actuarial parameters and durations:

	Germany		Switzerland		United Kingdom		Other countries	
	2020	2019	**2020**	2019	**2020**	2019	**2020**	2019
Discount rate	0.70%	1.30%	0.06%	0.17%	1.43%	2.06%	1.75%	2.36%
Future salary increases	2.51%	2.50%	1.57%	1.74%	–	–	2.92%	3.22%
Future pension increases	1.75%	1.74%	–	–	2.77%	2.65%	1.48%	1.56%
Duration	24	23	19	19	20	20	14	16

These were average values weighted by the present value of the respective defined benefit obligation.

Significant discretionary decisions and sources of estimation uncertainty

Provisions for pensions and other post-employment benefits

The determination of the present value of the obligation from defined benefit pension plans primarily requires discretionary judgment as regards the selection of methods to determine the discount rate and to select suitable mortality tables, as well as estimates of future salary and pension increases.

The following overview shows how the present value of all defined benefit obligations would have been impacted by changes to relevant actuarial assumptions.

Dec. 31, 2020

€ million	**Germany**	**Switzerland**	**United Kingdom**	**Other countries**	**Total**
Increase (+)/decrease (–) in present value of all defined benefit obligations if					
the discount rate were 50 basis points higher	-480	-88	-54	-25	-647
the discount rate were 50 basis points lower	569	102	62	30	763
the expected rate of future salary increase were 50 basis points higher	180	7	–	14	201
the expected rate of future salary increase were 50 basis points lower	-163	-6	–	-12	-181
the expected rate of future pension increase were 50 basis points higher	272	50	21	7	350
the expected rate of future pension increase were 50 basis points lower	-245	–	-20	-7	-272

Dec. 31, 2019

€ million	Germany	Switzerland	United Kingdom	Other countries	**Total**
Increase (+)/decrease (–) in present value of all defined benefit obligations if					
the discount rate were 50 basis points higher	-391	-85	-49	-25	-550
the discount rate were 50 basis points lower	460	96	56	28	640
the expected rate of future salary increase were 50 basis points higher	155	6	–	14	175
the expected rate of future salary increase were 50 basis points lower	-142	-7	–	-11	-160
the expected rate of future pension increase were 50 basis points higher	232	47	18	8	305
the expected rate of future pension increase were 50 basis points lower	-210	–	-16	-8	-234

Sensitivities are determined on the basis of the respective parameters in question, with all other measurement assumptions remaining unchanged.

Both the benefit obligations as well as the plan assets are subject to fluctuations over time. The reasons for such fluctuations could include changes in market interest rates and thus the discount rate, as well as adjustments to other actuarial assumptions (such as life expectancy or expected future increases in pension). This could lead to – or cause an increase in – underfunding. Depending on statutory regulations, it may become necessary in some countries to reduce underfunding through additions of liquid assets.

In order to minimize fluctuations of the net defined benefit liability, in managing its plan assets, the Group also pays attention to potential fluctuations in liabilities. The portfolio is structured in such a way that, in the ideal scenario, plan assets and defined benefit obligations develop in opposing directions when exposed to exogenous factors. This applies in particular to interest rate fluctuations.

Depending on the legal, economic, and fiscal circumstances prevailing in each country, different retirement benefit systems are provided for the employees. Generally, these systems are based on the years of service and salaries of the employees. Pension obligations comprise both obligations from current pensions and accrued benefits for pensions payable in the future.

In order to limit the risks of changing capital market conditions and other developments, for the past number of years newly hired employees have been offered plans that are not based on final salary.

The value recognized in the consolidated balance sheet for pensions and other post-employment benefits was derived as follows:

€ million	**Dec. 31, 2020**	Dec. 31, 2019
Present value of all defined benefit obligations	**6,352**	**5,644**
Fair value of the plan assets	-2,760	-2,692
Funded status	**3,592**	**2,952**
Effects of the asset ceilings	–	1
Net defined benefit liability	**3,592**	**2,953**
Assets from defined benefit plans	2	4
Provisions for pensions and other post-employment benefits	**3,594**	**2,957**

The defined benefit obligations were based on the following types of benefits provided by the respective plan:

	Dec. 31, 2020				
€ million	Germany	Switzerland	United Kingdom	Other countries	**Total**
Benefit based on final salary					
Annuity	3,313	1	571	108	3,993
Lump sum	–	–	–	141	141
Installments	1	–	–	–	1
Benefit not based on final salary					
Annuity	1,054	1,002	–	83	2,139
Lump sum	–	–	6	33	39
Installments	7	–	–	–	7
Other	–	–	–	5	5
Medical plan	–	–	–	27	27
Present value of defined benefit obligations	**4,375**	**1,003**	**577**	**397**	**6,352**
Fair value of the plan assets	**1,250**	**820**	**516**	**174**	**2,760**

	Dec. 31, 2019				
€ million	Germany	Switzerland	United Kingdom	Other countries	Total
Benefit based on final salary					
Annuity	3,081	1	530	99	3,711
Lump sum	–	–	–	139	139
Installments	1	–	–	–	1
Benefit not based on final salary					
Annuity	677	942	–	85	1,704
Lump sum	–	–	6	38	44
Installments	6	–	–	–	6
Other	–	–	–	10	10
Medical plan	–	–	–	29	29
Present value of defined benefit obligations	**3,765**	**943**	**536**	**400**	**5,644**
Fair value of the plan assets	**1,222**	**778**	**518**	**174**	**2,692**

The vast majority of defined benefit obligations of German entities were attributable to plans that encompass old-age, disability, and surviving dependent pensions. These obligations were based on benefit rules comprising benefit commitments dependent on years of service and final salary, as well as a direct commitment for employees newly hired since January 1, 2005 that is not based on the final salary. The benefit entitlement resulted from the cumulative total of annually determined pension components that were calculated based on a defined benefit expense and an age-dependent annuity table. Statutory minimum funding obligations did not exist.

Pension obligations in Switzerland mainly comprised old-age, disability, and surviving dependent benefits regulated by law. The employer and the employees made contributions to the plans. The Group had to observe the existing statutory minimum funding obligations.

Pension obligations in the United Kingdom resulted primarily from benefit plans which are based on years of service and final salary and were closed to newly hired employees in 2006. The agreed benefits comprised old-age, disability, and surviving dependent benefits. The employer and the employees made contributions to the plans. The Group had to observe the existing statutory minimum funding obligations.

The following table shows the development of the net defined benefit liability:

2020

€ million	Present value of the defined benefit obligations	Fair value of the plan assets	Effects of the asset ceilings	**Net defined benefit liability**
January 1, 2020	**-5,644**	**2,692**	**-1**	**-2,953**
Current service cost	-197	–	–	-197
Interest expense	-69		–	-69
Interest income	–	30	–	30
Plan administration costs recognized in income	–	-3	–	-3
Past service cost	-1	–	–	-1
Gains (+) or losses (-) on settlement	-1	–	–	-1
Currency effects recognized in income	-1	–	–	-1
Other effects recognized in income	–	–	–	–
Items recognized in income	**-269**	**27**	**–**	**-242**
Remeasurements of defined benefit obligations				
Actuarial gains (+)/losses (-) arising from changes in demographic assumptions	-4	–	–	-4
Actuarial gains (+)/losses (-) arising from changes in financial assumptions	-678	–	–	-678
Actuarial gains (+)/losses (-) arising from experience adjustments	–	–	–	–
Remeasurements of plan assets				
Actuarial gains (+)/losses (-) arising from experience adjustments	–	78	–	78
Changes in the effects of the asset ceilings				
Actuarial gains (+)/losses (-)	–	–	1	1
Actuarial gains (+)/losses (-)	**-682**	**78**	**1**	**-602**
Pension payments	134	-53	–	81
Employer contributions	–	38	–	38
Employee contributions	-16	16	–	–
Payment transactions	**118**	**1**	**–**	**119**
Changes in the scope of consolidation	72	–	–	72
Reclassification to liabilities directly related to assets held for sale	–	–	–	–
Currency translation recognized in equity	49	-34	–	15
Other changes	4	-4	–	–
Other	**125**	**-38**	**–**	**87**
December 31, 2020	**-6,352**	**2,760**	**–**	**-3,592**

2019

€ million	Present value of the defined benefit obligations	Fair value of the plan assets	Effects of the asset ceilings	Net defined benefit liability
January 1, 2019	**-4,719**	**2,391**	**-1**	**-2,329**
Current service cost	-162	–	–	-162
Interest expense	-93	–	–	-93
Interest income	–	46	–	46
Plan administration costs recognized in income	–	-2	–	-2
Past service cost	-3	–	–	-3
Gains (+) or losses (-) on settlement	–	–	–	–
Currency effects recognized in income	-21	17	–	-4
Other effects recognized in income	-2	–	–	-2
Items recognized in income	**-281**	**61**	**–**	**-220**
Remeasurements of defined benefit obligations				
Actuarial gains (+)/losses (-) arising from changes in demographic assumptions	5	–	–	5
Actuarial gains (+)/losses (-) arising from changes in financial assumptions	-727	–	–	-727
Actuarial gains (+)/losses (-) arising from experience adjustments	35	–	–	35
Remeasurements of plan assets				
Actuarial gains (+)/losses (-) arising from experience adjustments	–	199	–	199
Changes in the effects of the asset ceilings				
Actuarial gains (+)/losses (-)	–	–	–	–
Actuarial gains (+)/losses (-)	**-687**	**199**	**–**	**-488**
Pension payments	125	-49	–	76
Employer contributions	–	37	–	37
Employee contributions	-15	15	–	–
Payment transactions	**110**	**3**	**–**	**113**
Changes in the scope of consolidation	-30	6	–	-24
Reclassification to liabilities directly related to assets held for sale	–	–	–	–
Currency translation recognized in equity	-42	37	–	-5
Other changes	5	-5	–	–
Other	**-67**	**38**	**–**	**-29**
December 31, 2019	**-5,644**	**2,692**	**-1**	**-2,953**

The actual income from plan assets amounted to € 108 million in the year under review (2019: € 245 million).

Covering the benefit obligations with financial assets represents a means of providing for future cash outflows, which are required in some countries (for example Switzerland and the United Kingdom) on the basis of legal requirements and in other countries (for example Germany) on a voluntary basis.

The fair value of the plan assets can be allocated to the following categories:

	Dec. 31, 2020			Dec. 31, 2019		
€ million	Quoted market price in an active market	No quoted market price in an active market	**Total**	Quoted market price in an active market	No quoted market price in an active market	**Total**
Cash and cash equivalents	80	–	80	191	–	191
Equity instruments	645	–	645	609	–	609
Debt instruments	1,317	–	1,317	1,273	–	1,273
Direct investments in real estate	–	125	125	–	121	121
Investment funds	285	208	493	395	1	396
Insurance contracts	–	72	72	–	77	77
Other	23	5	28	19	6	25
Fair value of the plan assets	**2,350**	**410**	**2,760**	**2,487**	**205**	**2,692**

Plan assets did not directly include financial instruments issued by Group companies or real estate used by Group companies.

Employer contributions to plan assets and direct payments to plan beneficiaries are expected to amount to € 32 million (2019: € 37 million) and € 81 million (2019: € 79 million) respectively, next year.

The expected payments of undiscounted benefits are as follows:

Dec. 31, 2020

	Expected payments of undiscounted benefits				
€ million	**Germany**	**Switzerland**	**United Kingdom**	**Other countries**	**Total**
2021	72	19	18	23	132
2022	78	19	18	27	142
2023	79	19	18	19	135
2024	82	20	19	19	140
2025	86	19	19	25	149
2026-2030	485	95	106	121	807

Dec. 31, 2019

	Expected payments of undiscounted benefits				
€ million	Germany	Switzerland	United Kingdom	Other countries	**Total**
2020	71	19	22	23	135
2021	77	19	21	16	133
2022	79	19	22	29	149
2023	82	19	22	21	144
2024	85	19	23	20	147
2025-2029	476	92	125	128	821

The weighted duration of defined benefit obligations amounted to 22 years (2019: 22 years).

Other employee benefit provisions

Accounting and measurement policies

Other employee benefit provisions

Other employee benefit provisions include obligations from share-based compensation programs. More information on these compensation programs can be found below.

Obligations for partial retirement programs and other severance payments not recognized in connection with restructuring programs as well as obligations in connection with long-term working hour accounts and anniversary bonuses are also included in other employee benefit provisions.

Other employee benefit provisions developed as follows:

€ million	Jan. 1, 2020	Additions	Utilizations	Release	Interest effect	Currency translation difference	Changes in scope of consolidation /other	**Dec. 31, 2020**
Non-current other employee benefit provisions	237	176	-30	-32	1	-12	-53	286
Current other employee benefit provisions	110	138	-79	-66	–	-5	53	152
Total	**347**	**314**	**-108**	**-98**	**1**	**-17**	**–**	**438**

Share-based payments

Accounting and measurement policies

Share-based payments

Provisions are recognized for the share-based compensation program with cash settlement at the Group ("Long-Term Incentive Plan of Merck KGaA, Darmstadt, Germany") and reported in other employee benefit provisions.

The fair value of the obligations is calculated by an external expert using a Monte Carlo simulation on each balance sheet date. The main parameters in the measurement of the share-based compensation programs with cash-settlement are long-term indicators of company performance and the price movement of the shares of Merck KGaA, Darmstadt, Germany, in relation to the DAX®.

The expected volatilities are based on the implicit volatility of shares of Merck KGaA, Darmstadt, Germany, and the DAX® in accordance with the remaining term of the respective tranche. The dividend payments incorporated into the valuation model are based on medium-term dividend expectations.

Changes to the intrinsic value of share-based compensation programs are allocated to the respective functional costs according to the causation principle. Time value changes are recognized in financial income or finance costs.

Significant discretionary decisions and sources of estimation uncertainty

Share-based payments

The measurement of long-term share-based compensation programs implies extensive estimation uncertainty. The following overview shows the amounts by which the non-current provisions (carrying amount as of December 31, 2020: € 99 million/carrying amount as of December 31, 2019: € 63 million) would have been impacted by changes in the DAX® or the closing price of the share of Merck KGaA, Darmstadt, Germany, on the balance sheet date. The amounts stated would have led to a corresponding reduction or increase in profit before income tax.

		Increase (+)/decrease (−) of the provision	
€ million		**Dec. 31, 2020**	Dec. 31, 2019
Variation of share price of Merck KGaA, Darmstadt, Germany	10%	17	16
	-10%	-16	-16
Change in the DAX®	10%	-6	-9
	-10%	6	9

Sensitivities were determined on the basis of the respective parameters in question, with all other measurement assumptions remaining unchanged. The 2018 tranche reported under current provisions will not be subject to any value fluctuations between December 31, 2020, and the payout date and was therefore excluded from the sensitivity analysis (December 31, 2019: exclusion of 2017 tranche).

These share-based compensation programs with cash settlement in place at the Group are aligned with target achievement based on key performance indicators as well as the long-term performance of the shares of Merck KGaA, Darmstadt, Germany. Certain employees are eligible to receive a certain number of virtual shares – Share Units of Merck KGaA, Darmstadt, Germany (MSUs) – at the end of a three-year performance cycle. The number of MSUs that could be received depends on the individual grant defined for the respective person and the average closing price of the shares of Merck KGaA, Darmstadt, Germany in Xetra® trading during the last 60 trading days prior to January 1 of the respective performance cycle (reference price). When the three-year performance cycle ends, the number of MSUs to then be granted is determined based on the development of defined key performance indicators (KPIs).

These KPIs are the performance of the share price of of Merck KGaA, Darmstadt, Germany, compared to the performance of the DAX® with a weighting of 50%, the development of the EBITDA pre margin during the performance cycle as a proportion of a defined target value with a weighting of 25%, and the development of organic sales growth as a proportion of a defined target value, also with a weighting of 25%.

Depending on the development of the KPIs, at the end of the respective performance cycle the eligible participants are granted between 0% and 150% of the MSUs they could be eligible to receive. A cash payment is made based on the MSUs granted after the three-year performance cycle has ended. The value of a granted MSU, which is relevant for payment, corresponds to the average closing price of the shares of Merck KGaA, Darmstadt, Germany in Xetra® trading during the last 60 trading days prior to the end of the performance cycle. The payout amounts of the respective tranches are limited to two and a half times the individual grant.

The Executive Board members have their own Long-Term Incentive Plan, the conditions of which largely correspond to the Long-Term Incentive Plan described here. A description of the plan for the Executive Board can be found in the compensation report, which is part of the Combined Management Report.

The following table presents the key parameters as well as the development of the potential number of Share Units of Merck KGaA, Darmstadt, Germany (MSUs) for the individual tranches.

	2018 tranche	2019 tranche	2020 tranche
Performance cycle	Jan. 1, 2018 – Dec. 31, 2020	Jan. 1, 2019 – Dec. 31, 2021	Jan. 1, 2020 – Dec. 31, 2022
Term	3 Years	3 Years	3 Years
Reference price of shares of Merck KGaA, Darmstadt, Germany, in € (60-day average share price of Merck KGaA, Darmstadt, Germany, prior to the start of the performance cycle)	91.73	93.75	105.52
DAX® value (60-day average of the DAX® prior to the start of the performance cycle)	13,089.39	11,304.33	12,971.22
Potential number of MSUs			
Potential number offered for the first time in 2018	891,345	–	–
Forfeited	37,953	–	–
Transferred as part of the divestment of the Consumer Health business	23,760	–	–
Dec. 31, 2018	829,632	–	–
Potential number offered for the first time in 2019	–	876,061	–
Forfeited	52,957	37,122	–
Dec. 31, 2019	776,675	838,939	–
Potential number offered for the first time in 2020	–	–	871,700
Forfeited	39,996	47,622	33,825
Paid out	832	1,417	217
Dec. 31, 2020	**735,847**	**789,900**	**837,658**

The value of the provisions as of December 31, 2020, was € 213 million (December 31, 2019: € 113 million). Net expenses of € 149 million were incurred in fiscal 2020 (2019: net expenses of € 60 million). The three-year tranche issued in 2017 ended at the end of 2019; an amount of € 48 million was paid out in 2020. The three-year tranche issued in fiscal 2018 ended at the end of 2020; a payout of € 112 million is expected for 2021.

Capital Structure, Investments and Financing Activities

(34) Equity

Accounting and measurement policies

Accounting treatment of the general partner's equity

As a partnership limited by shares, Merck KGaA, Darmstadt, Germany, has two different shareholder groups who have contributed to the company: The general partner E. Merck KG, Darmstadt, Germany, as the personally liable partner and the shareholders.

From an accounting perspective, the contributions of both shareholder groups are treated as equity, regardless of the general partner's option to terminate its capital share. This treatment is based on the provision in the Articles of Association of Merck KGaA, Darmstadt, Germany, stating that the limited liability shareholders may decide on the conversion of the company into a stock corporation and thus limit the general partner's settlement claim to fulfillment in equity instruments.

Measurement of non-controlling interests within the scope of a company acquisition

In cases where a company was not acquired in full, non-controlling interests are measured using the fair value of the proportionate share of net assets.

Equity capital/capital reserves

The equity capital of the company consists of the subscribed capital composed of shares and the equity interest held by the general partner E. Merck KG, Darmstadt, Germany (general partner's equity). As of the balance sheet date, the company's subscribed capital amounting to € 168 million was divided into 129,242,251 no-par value bearer shares plus one registered share. Each share therefore corresponds to € 1.30 of the subscribed capital. The amount resulting from the issue of shares by Merck KGaA, Darmstadt, Germany, exceeding the nominal amount was recognized in the capital reserves. The equity interest held by the general partner amounted to € 397 million. As in the previous year, there were no changes in subscribed capital in the year under review.

Share of net profit of E. Merck KG, Darmstadt, Germany

E. Merck KG, Darmstadt, Germany, and Merck KGaA, Darmstadt, Germany, engage in reciprocal net profit transfers. This makes it possible for E. Merck KG, Darmstadt, Germany, the general partner of Merck KGaA, Darmstadt, Germany, and the shareholders to participate in the net profit/loss of Merck KGaA, Darmstadt, Germany, in accordance with the ratio of the general partner's equity interest and the subscribed capital (70.274% or 29.726% of the equity capital).

The allocation of net profit/loss is based on the net income of both E. Merck KG, Darmstadt, Germany, and Merck KGaA, Darmstadt, Germany, determined in accordance with the provisions of the German Commercial Code. These results are adjusted for trade tax and/or corporation tax and create the basis for the allocation of net profit/loss. The adjustment for corporation tax is made to compensate for the difference in the tax treatment between the general partner and the limited liability shareholders. Corporation tax is only calculated on the income received by the limited liability shareholders. Its equivalent is the income tax applicable to the partners of E. Merck KG, Darmstadt, Germany, which must be paid by them directly. The adjustment thus ensures that the share in net profit corresponds to the respective interests held by the two shareholder groups.

Appropriation of profits

The profit distribution to be resolved upon by shareholders also defines the amount of that portion of net profit/loss freely available to E. Merck KG, Darmstadt, Germany. If the shareholders resolve to carry forward or to allocate to retained earnings a portion of the net retained profit of Merck KGaA, Darmstadt, Germany, to which they are entitled, E. Merck KG, Darmstadt, Germany, shall be obliged to allocate to the profit brought forward/retained earnings of Merck KGaA, Darmstadt, Germany, a comparable sum determined according to the ratio of subscribed capital to general partner's equity. This ensures that the retained earnings and the profit carried forward of Merck KGaA, Darmstadt, Germany, correspond to the ownership ratios of the shareholders on the one hand, and E. Merck KG, Darmstadt, Germany, on the other hand. Consequently, for distributions to E. Merck KG, Darmstadt, Germany, the available amount is the amount that results from netting the profit transfer of Merck KGaA, Darmstadt, Germany, with the amount either allocated or withdrawn by E. Merck KG, Darmstadt, Germany, from retained earnings/profit carried forward. This amount corresponds to the sum paid as a dividend to the shareholders and reflects their pro rata shareholding in the company.

The reciprocal net profit/loss transfer between E. Merck KG, Darmstadt, Germany, and Merck KGaA, Darmstadt, Germany, as stipulated by the Articles of Association was as follows:

		2020		2019	
€ million		**E. Merck KG, Darmstadt, Germany**	**Merck KGaA, Darmstadt, Germany**	E. Merck KG, Darmstadt, Germany	Merck KGaA, Darmstadt, Germany
Result of E. Merck KG, Darmstadt, Germany, before reciprocal profit transfer, adjusted for trade tax		-44	–	-25	–
Net income of Merck KGaA, Darmstadt, Germany, before reciprocal profit transfer		–	701	–	625
Corporation tax		–	20	–	14
Basis for appropriation of profits	**(100%)**	**-44**	**721**	**-25**	**639**
Profit transfer to E. Merck KG, Darmstadt, Germany (ratio of general partner's equity to equity capital)	(70.274%)	506	-506	449	-449
Profit/loss transfer to Merck KGaA, Darmstadt, Germany (ratio of subscribed capital to equity capital)	(29.726%)	13	-13	7	-7
Corporation tax		–	-20	–	-14
Net income		**475**	**181**	**431**	**169**

The result of E. Merck KG, Darmstadt, Germany, on which the appropriation of profits adjusted for trade tax is based amounted to € -44 million (2019: € -25 million). This resulted in a profit/loss transfer to Merck KGaA, Darmstadt, Germany, of € -13 million (2019: € -7 million). Net income adjusted of Merck KGaA, Darmstadt, Germany, for corporation tax, on which the appropriation of its profit is based, amounted to € 721 million (2019: € 639 million). Merck KGaA, Darmstadt, Germany, transferred a profit in the amount of € 506 million to E. Merck KG, Darmstadt, Germany (2019: € 449 million). In addition, an expense from corporation tax charges amounting to € 20 million resulted (2019: expense of € 14 million).

€ million	2020 E. Merck KG, Darmstadt, Germany	2020 Merck KGaA, Darmstadt, Germany	2019 E. Merck KG, Darmstadt, Germany	2019 Merck KGaA, Darmstadt, Germany
Net income	475	181	431	169
Profit carried forward previous year	63	26	61	26
Withdrawal from revenue reserves	–	–	–	–
Transfer to revenue reserves	–	–	–	–
Retained earnings Merck KGaA, Darmstadt, Germany		**208**		**194**
Withdrawal by E. Merck KG, Darmstadt, Germany	-474		-430	
Dividend proposal		-181		-168
Profit carried forward	**63**	**27**	**63**	**26**

A dividend of € 1.30 per share was distributed for fiscal 2019. The dividend proposal for fiscal 2020 will be € 1.40 per share. The proposed dividend payment to shareholders amounts to € 181 million (2019: € 168 million). The amount withdrawn by E. Merck KG, Darmstadt, Germany, would amount to € 474 million (2019: € 430 million).

Appropriation of profits and changes in reserves

€ million	2020 Merck & Cie, Altdorf, Switzerland, a subsidiary of Merck KGaA, Darmstadt, Germany	2020 Merck KGaA, Darmstadt, Germany	2020 Total	2019 Merck & Cie, Altdorf, Switzerland, a subsidiary of Merck KGaA, Darmstadt, Germany	2019 Merck KGaA, Darmstadt, Germany	2019 Total
Profit transfer to E. Merck KG, Darmstadt, Germany	-48	-506	-555	-56	-449	-505
Profit/loss transfer from E. Merck KG, Darmstadt, Germany	–	-13	-13	–	-7	-7
Transfer to revenue reserves	–	–	–	–	2	2
Profit transfer to E. Merck KG, Darmstadt, Germany, including changes in reserves	**-48**	**-519**	**-567**	**-56**	**-455**	**-510**
Result of E. Merck KG, Darmstadt, Germany, before reciprocal profit transfer, adjusted for trade tax		-44			-25	
Profit transfer to E. Merck KG, Darmstadt, Germany/withdrawal by E. Merck KG, Darmstadt, Germany	**-48**	**-474**		**-56**	**-430**	

Based on the assumed appropriation of profits, the profit/loss transfer to E. Merck KG, Darmstadt, Germany, for 2020, including changes in reserves, amounted to € -567 million. This consisted of the profit transfer to E. Merck KG, Darmstadt, Germany (€ -506 million), the profit/loss transfer from to Merck KGaA, Darmstadt, Germany (€ -13 million) and the profit transfer from Merck & Cie, Altdorf, Switzerland, a subsidiary of Merck KGaA, Darmstadt, Germany to E. Merck KG, Darmstadt, Germany (€ -48 million). In the previous year, the profit/loss transfer to E. Merck KG, Darmstadt, Germany, including changes in reserves amounted to € -510 million. This consisted of the profit transfer to E. Merck KG, Darmstadt, Germany (€ -449 million), the profit/loss transfer from E. Merck KG, Darmstadt, Germany, to Merck KGaA, Darmstadt, Germany (€ -7 million), the change in profit carried forward of E. Merck KG, Darmstadt, Germany (€ 2 million) as well as the profit transfer from Merck & Cie, Altdorf, Switzerland, a subsidiary of Merck KGaA, Darmstadt, Germany, to E. Merck KG, Darmstadt, Germany (€ -56 million).

Merck & Cie, a subsidiary of Merck KGaA, Darmstadt, Germany, is a partnership under Swiss law that is controlled by Merck KGaA, Darmstadt, Germany, but distributes its operating result directly to E. Merck KG, Darmstadt, Germany. This distribution is a payment to shareholders and is therefore also presented under changes in equity.

The proposed withdrawal of E. Merck KG, Darmstadt, Germany, in the amount of € 474 million (2019: € 430 million) results from the total amount of the profit/loss transfer to E. Merck KG, Darmstadt, Germany, including changes in reserves, and the profit/loss of E. Merck KG, Darmstadt, Germany, before reciprocal profit transfer.

Non-controlling interests

The calculation of non-controlling interests was based on the reported equity of the subsidiaries concerned.

The consolidated equity and the profit attributable to non-controlling interests mainly related to the minority interests in the publicly traded company P.T. Merck Tbk., Indonesia, a subsidiary of Merck KGaA, Darmstadt, Germany as well as in Versum Materials Taiwan Co., Ltd., Taiwan, and in Merck Ltd., Thailand, a subsidiary of Merck KGaA, Darmstadt, Germany.

(35) Cash and cash equivalents

Accounting and measurement policies

Cash and cash equivalents

Cash and cash equivalents include short term investments with a maximum remaining term of up to three months which can be readily converted to a determined amount of cash.

Cash and cash equivalents comprised the following items:

€ million	Dec. 31, 2020	Dec. 31, 2019
Cash, bank balances and cheques	910	618
Short-term cash investments (up to 3 months)	446	162
Cash and cash equivalents	**1,355**	**781**

Changes in cash and cash equivalents as defined by IAS 7 are presented in the consolidated cash flow statement.

Cash and cash equivalents included restricted cash amounting to € 246 million (December 31, 2019: € 240 million). This mainly related to cash and cash equivalents at subsidiaries that are subject to foreign exchange restrictions.

The maximum default risk was equivalent to the carrying amount of cash and cash equivalents.

(36) Other financial assets

Accounting and measurement policies

Other financial assets

This section does not cover the accounting and measurement policies for derivative financial instruments. They are presented in Note (39) “Derivative financial instruments”.

Recognition and initial measurement

Financial assets are initially measured at fair value and recognized as of the settlement date. For financial assets not subsequently measured at fair value through profit or loss in subsequent periods, initial measurement also includes directly attributable transaction costs.

Detailed information on the measurement methods for financial assets measured at fair value are presented in Note (43) “Information on fair value measurement”.

Classification and subsequent measurement

At initial recognition, financial assets are assigned to one of the following measurement categories which also correspond to the financial instrument classes as defined in IFRS 9:

- Subsequent measurement at amortized cost
- Subsequent measurement at fair value through other comprehensive income
- Subsequent measurement at fair value through profit or loss.

This classification is based on the business model and the structure of contractual payment flows. Financial assets subsequently measured at amortized cost are accounted for using the effective interest method and considering any impairment losses. The procedure for calculating impairment losses is described in Note (42) “Management of financial risks”. Financial assets of this class are held in order to collect their contractual cash flows, which are exclusively principal repayments and interest payments on the outstanding capital amount.

Except for derivative financial instruments with positive market value, the Group only applies subsequent measurement at fair value through profit or loss for debt instruments with contractual properties resulting in cash flows that do not exclusively represent principal repayments and interest payments on the outstanding capital amount. In particular, this includes contingent consideration that was contractually agreed with the acquirer within the context of the disposal of businesses within the meaning of IFRS 3 (see Note (43) “Information on fair value measurement”). The Group does not utilize the option of the subsequent measurement of debt instruments at fair value through profit or loss.

Equity instruments not subject to mandatory subsequent measurement at fair value through profit or loss are measured at fair value through other comprehensive income in subsequent periods if they are intended to be held for the longer term. Further details on the measurement of financial assets at fair value are presented in Note (43) “Information on fair value measurement”.

Financial assets are only reclassified in rare cases in which the Group changes its business model in managing financial assets.

Derecognition

Financial assets are derecognized if there is no reasonable expectation that the contract party will fulfill its contractual obligations or if the Group transfers the contractual rights including all material risks and rewards of the financial asset to a contract partner.

Recognition

The following table provides details on the measurement effects of debt instruments on the consolidated balance sheet and the consolidated income statement:

Category	Asset type	Impairment losses/reversals of impairment losses	Net gain and net loss on disposal/value adjustments	Foreign currency gains or losses	Interest income or expenses
Subsequent measurement at amortized cost	Operational	Impairment losses, and reversals of impairment losses on financial assets (net)	Other operating income or other operating expenses	Other operating income or other operating expenses	Financial income and expenses (applying the effective interest method)
	Financial	Financial income and expenses	Financial income and expenses	Financial income and expenses	
Subsequent measurement at fair value through other comprehensive income	Operational	Impairment losses, and reversals of impairment losses on financial assets (net)	Group equity (upon derecognition: reclassification to other operating income or other operating expenses)	Other operating income or other operating expenses	Financial income and expenses
	Financial	Financial income and expenses	Group equity (upon derecognition: reclassification to financial income and expenses)	Financial income and expenses	
Subsequent measurement at fair value through profit or loss	Operational		Other operating income or other operating expenses	Other operating income or other operating expenses	Financial income and expenses
	Financial		Financial income and expenses	Financial income and expenses	

The following table provides details on the measurement effects of equity instruments on the consolidated balance sheet and the consolidated income statement:

Category	Asset type	Value adjustments	Foreign currency gains or losses	Dividend income
Subsequent measurement at fair value through other comprehensive income	Operational	Results recognized directly in equity (value adjustments)	Foreign currency gains and losses recognized directly in equity	Other operating income
		Reclass of the cumulative results previously recognized directly in equity in the retained earnings when asset is disposed		
	Financial	Results recognized directly in equity (value adjustments)	Foreign currency gains and losses recognized directly in equity	Financial income
		Reclass of the cumulative results previously recognized directly in equity in the retained earnings when asset is disposed		
Subsequent measurement at fair value through profit or loss	Operational	Other operating income or other operating expenses	Other operating income or other operating expenses	Other operating income
	Financial	Financial income and expenses	Financial income and expenses	Financial income

Other financial assets were composed as follows:

	Dec. 31, 2020			Dec. 31, 2019		
€ million	current	non-current	Total	current	non-current	Total
Subsequent measurement at amortized cost	**1**	**7**	**7**	**1**	**8**	**9**
Loans against third parties	–	7	7	1	8	9
Other	–	–	–	–	–	–
Subsequent measurement at fair value through other comprehensive income	**5**	**504**	**509**	**29**	**408**	**438**
Equity instruments	–	499	499	–	399	399
Debt instruments	5	4	9	29	9	39
Subsequent measurement at fair value through profit and loss	**23**	**312**	**335**	**20**	**322**	**342**
Equity instruments	–	–	–	–	–	–
Contingent consideration	–	260	260	–	258	258
Other debt instruments	7	34	41	–	50	50
Derivatives without a hedging relationship (financial transactions)	16	10	26	20	14	33
Derivatives without a hedging relationship (operational)	–	8	8	–	–	–
Derivatives with a hedging relationship (operational)	**96**	**–**	**96**	**7**	**–**	**7**
Financial assets	**125**	**822**	**947**	**57**	**738**	**795**

As in the previous year, contingent consideration included claims arising from the divestments of the biosimilars business to Fresenius SE & Co. KGaA, Bad Homburg vor der Höhe, in 2017 and the Kuvan® business to BioMarin Pharmaceuticals Inc., United States, in 2015.

Equity instruments with subsequent measurement at fair value through other comprehensive income included the shares held in Precigen Inc., United States, and M Ventures portfolio companies in particular. Please refer to Note (50) “List of shareholdings” for a detailed list of all investments made in equity instruments with subsequent measurement at fair value through other comprehensive income.

(37) Financial debt/Capital management

Accounting and measurement policies

Financial debt/capital management

Except for lease liabilities and derivatives with negative market values, financial debt is initially recognized at fair value and subsequently measured at amortized cost using the effective interest method.

The accounting and measurement policies for lease liabilities and derivatives are presented in Notes (21) “Leasing” and (39) “Derivative financial instruments”.

The composition of financial debt as well as a reconciliation to net financial debt are presented in the following table:

	Dec. 31, 2020 € million	Dec. 31, 2019 € million	Maturity	Interest rate %	Nominal value € million	Nominal value Currency
USD bond 2015/2020	–	669	March 2020	2.400	750	USD
Eurobond 2010/2020	–	1,350	March 2020	4.500	1,350	€
Hybrid bond 2014/2074	315	–	Dec. 2074[1]	2.625	317	€
Bonds (current)	**315**	**2,019**				
Commercial paper	200	205				
Bank loans	835	1,337				
Liabilities to related parties	817	809				
Loans from third parties and other financial debt	15	53				
Liabilities from derivatives (financial transactions)	62	19				
Lease liabilities (IFRS 16)	112	109				
Current financial debt	**2,357**	**4,550**				
USD bond 2015/2022	812	891	March 2022	2.950	1,000	USD
Eurobond 2015/2022	549	549	Sept. 2022	1.375	550	€
Eurobond 2019/2023	600	600	Dec. 2023	0.005	600	€
USD bond 2015/2025	1,295	1,419	March 2025	3.250	1,600	USD
Eurobond 2020/2025	745	–	July 2025	0.125	750	€
Eurobond 2019/2027	597	596	July 2027	0.375	600	€
Eurobond 2020/2028	746	–	July 2028	0.500	750	€
Eurobond 2019/2031	796	796	July 2031	0.875	800	€
Hybrid bond 2014/2074	–	997	Dec. 2074[1]	2.625	1,000	€
Hybrid bond 2014/2074	499	498	Dec. 2074[2]	3.375	500	€
Hybrid bond 2019/2079	496	495	June 2079[3]	1.625	500	€
Hybrid bond 2019/2079	996	995	June 2079[4]	2.875	1,000	€
Hybrid bond 2020/2080	996	–	Sept. 2080[5]	1.625	1,000	€
Bonds (non-current)	**9,126**	**7,835**				
Bank loans	250	250				
Loans from third parties and other financial debt	42	44				
Liabilities from derivatives (financial transactions)	40	56				
Lease liabilities (IFRS 16)	327	458				
Non-current financial debt	**9,785**	**8,644**				
Financial debt	**12,142**	**13,194**				
less:						
Cash and cash equivalents	1,355	781				
Current financial assets	28	50				
Net financial debt[6]	**10,758**	**12,363**				

[1] The Group has the right to prematurely repay this tranche of the hybrid bond issued in December 2014 for the first time in June 2021.

[2] The Group has the right to prematurely repay this tranche of the hybrid bond issued in December 2014 for the first time in December 2024.

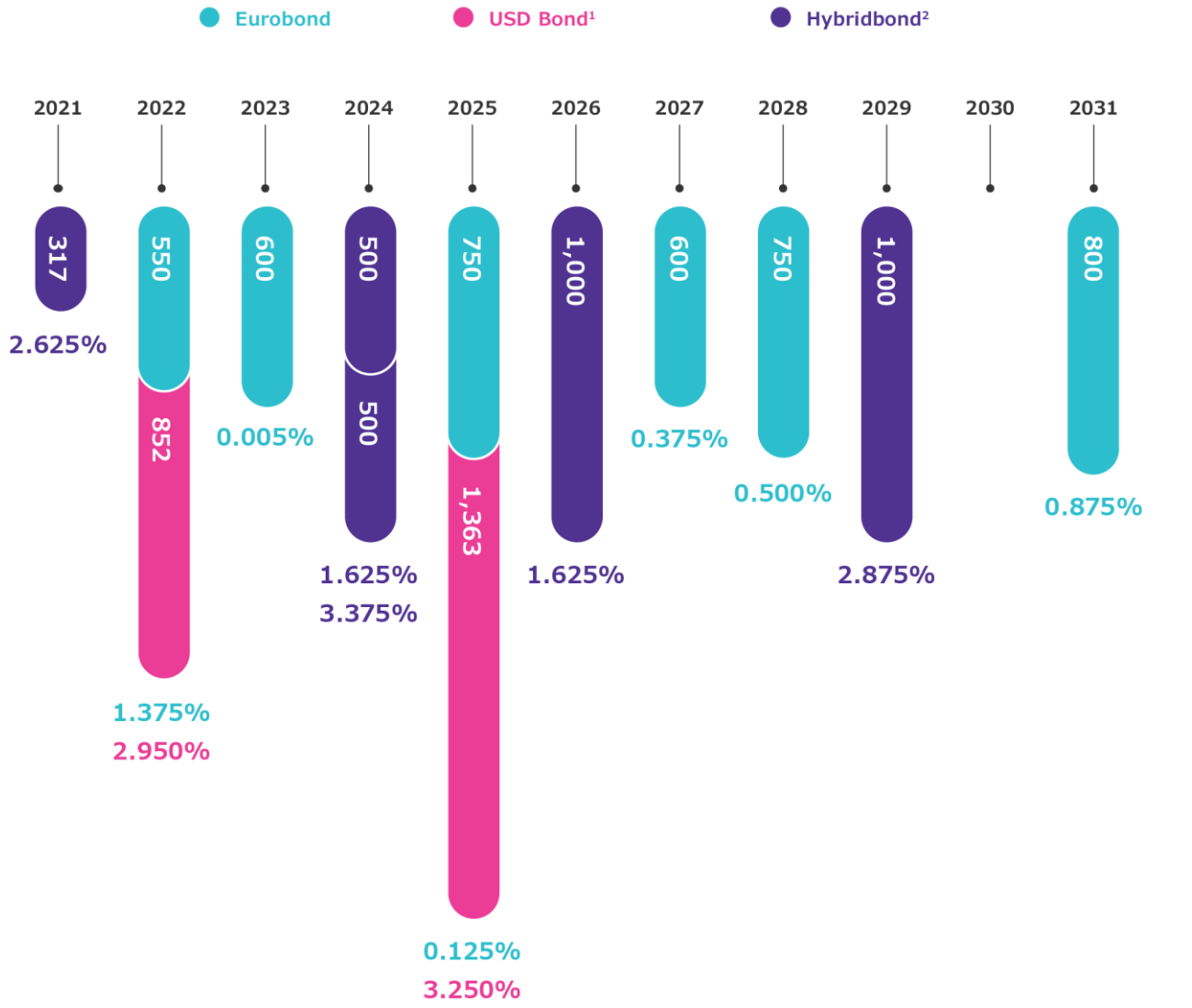
[3] The Group has the right to prematurely repay this tranche of the hybrid bond issued in June 2019 for the first time in December 2024.

[4] The Group has the right to prematurely repay this tranche of the hybrid bond issued in June 2019 for the first time in December 2029.

[5] The Group has the right to prematurely repay this hybrid bond issued in September 2020 for the first time in September 2026.

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

The repayment profile of the bonds was as follows:



[1] The nominal volumes of bonds denominated in U.S. dollars were converted into euros at the closing rate on December 31, 2020.
[2] For the hybrid bonds repayment is assumed at the earliest possible date.

The hybrid bonds issued by Merck KGaA, Darmstadt, Germany, are bonds for which the rating agencies Standard & Poor's, Moody's, and Scope have given equity credit treatment to half of the issuances, thus making the issuances more favorable to the Group's credit rating than traditional bond issues. The bonds are recognized in full as financial liabilities in the balance sheet.

68.3% of the tranche of the hybrid bond 2014/2074 with an original nominal value of € 1 billion with a first optional redemption date in June 2021 was repaid ahead of schedule in the fiscal year.

The financial debt was not secured by liens or similar forms of collateral. The loan agreements do not contain any financial covenants. The average borrowing cost as of the balance sheet date was 1.6% (December 31, 2019: 2.5%).

Information on liabilities to related parties can be found in Note (45) "Related party disclosures".

Capital management

The objective of capital management is to ensure the necessary financial flexibility in order to maintain long-term business operations and realize strategic options. Maintaining a stable investment grade rating, ensuring liquidity, limiting financial risks, as well as optimizing the cost of capital are the objectives of our financial policy and set important framework conditions for capital management. The responsible committees decide on the target capital structure of the balance sheet, the appropriation of net retained profit, and the dividend level. In this context, net financial debt is one of the leading capital management indicators.

Traditionally, the capital market represents a major source of financing for the Group, for instance via bond issues. As of December 31, 2020, there were liabilities of € 4.05 billion from a debt issuance program most recently renewed in 2020 (December 31, 2019: € 3.90 billion). In addition, the Group had access to a commercial paper program to meet short-term capital requirements with a volume of € 2 billion, of which € 200 million had been utilized as of December 31, 2020 (December 31, 2019: € 205 million).

Loan agreements represent a further source of financing for the Group. At the balance sheet date, the bank financing commitments vis-à-vis the Group were as follows:

	Dec. 31, 2020		Dec. 31, 2019			
€ million	**Financing commitments from banks**	**Utilization**	Financing commitments from banks	Utilization	Interest	Maturity of financing commitments
Syndicated loan	2,000	–	2,000	–	variable	2025
Loan agreement with banking syndicate for acquisition financing	569	569	1,017	1,017	variable	2022
Bilateral credit agreement with banks	250	250	250	250	variable	2022
Various bank credit lines	1,266	266	552	320	variable	<1 year
	4,085	**1,085**	**3,820**	**1,587**		

There are no indications that the availability of extended credit lines was restricted.

(38) Other financial liabilities

Accounting and measurement policies

Other financial liabilities

With the exception of liabilities from derivatives and contingent considerations, which are recognized in the context of business combinations according to IFRS 3, other financial liabilities are initially measured at fair value and in subsequent periods at amortized cost, applying the effective interest method. The accounting and measurement policies of derivatives are presented in Note (39) “Derivative financial instruments”.

Other financial liabilities comprised the following:

	Dec. 31, 2020			Dec. 31, 2019		
in Mio. €	**Current**	**Non-current**	**Total**	Current	Non-current	Total
Miscellaneous other financial liabilities	963	60	1,023	1,081	43	1,124
thereof: liabilities to related parties	558	–	558	512	–	512
thereof: interest accruals	55	–	55	119	–	119
Liabilities from derivatives (operational)	45	2	47	46	–	46
Other financial liabilities	**1,008**	**62**	**1,070**	**1,127**	**43**	**1,170**

The liabilities to related parties primarily consist of liabilities to E. Merck KG, Darmstadt, Germany.

(39) Derivative financial instruments

Accounting and measurement policies

Derivative financial instruments

The IFRS 9 provisions are applied for hedge accounting. Hedging transactions are entered into for highly probable forecast transactions in foreign currencies and for hedging fair values of assets on the balance sheet. Cash flow hedge accounting for forecast transactions in foreign currency mean the hedged item is recognized at a fixed exchange rate on a net basis instead of being recognized at the spot exchange rate at the transaction date. As a result of hedging fair values of assets on the balance sheet, the compensating changes in value of the corresponding hedged item and hedging instrument offset each other.

The Group only uses derivatives as hedging instruments. The Group uses the dollar offset method as well as regression analyses to measure hedge effectiveness.

Hedging ineffectiveness may occur in the timing of forecasted cash flows or if hedged items are dissolved. Derivatives that do not or no longer meet the documentation or effectiveness requirements for hedge accounting, whose hedged item no longer exists, or for which hedge accounting rules are not applied are classified as “financial assets or liabilities at fair value through profit or loss” depending on their balance.

In the case of hedging relationships where the Group uses options as hedging instruments, only the intrinsic value of options is designated as the hedging instrument. Changes in the fair value of the time value component of options that are used for hedge accounting are recognized in other comprehensive income and in the cost of cash flow hedge reserve within equity. The subsequent accounting of these amounts depends on the type of hedged transaction.

In the case of hedging relationships where the Group uses forward contracts as hedging instruments, only the spot element is designated as the hedging instrument. Changes in the fair value of the forward element in forward contracts are initially recognized in the cost of cash flow hedge reserve within equity. The subsequent accounting of these amounts depends on the type of hedged transaction.

Reclassifications of the cash flow hedge reserve to profit or loss are recognized in the operating result, while reclassifications of the cost of cash flow hedge reserve are recognized in financial income and expenses.

Derivative financial instruments are recognized in the consolidated balance sheet, the consolidated income statement, and the consolidated statement of comprehensive income – with the exception of the balance sheet treatment of amounts included directly from the reserve in the initial cost or in the other carrying amount of a non-financial asset or liability – as follows:

					Changes in fair value in the consolidated income statement and the consolidated statement of comprehensive income	
Hedging relationship	**Type of collateral**	**Type of hedged item**	**Market value**	**Presentation on the balance sheet**	**during the term**	**At maturity**
Derivatives with a cash flow hedging relationship	Interest rate	Financial transactions	Positive market values	Other financial assets	Fair value adjustments (in equity)	Financial income and expenses
			Negative market values	Financial debt	Fair value adjustments (in equity)	
	Currency	Transactions in operating business	Positive market values	Other financial assets	Fair value adjustments (in equity)	Other operating income
			Negative market values	Other financial liabilities	Fair value adjustments (in equity)	Other operating expenses
Derivatives without a hedging relationship	Interest rate	Financial transactions	Positive market values	Other financial assets	Financial income and expenses	Financial income and expenses
			Negative market values	Financial debt		
	Currency	Financial transactions	Positive market values	Other financial assets	Financial income and expenses	Financial income and expenses
			Negative market values	Financial debt		
	Virtual power purchase agreement	Transactions in operating business	Positive market values	Other financial assets	Other operating income	Other operating income
			Negative market values	Other financial liabilities	Other operating expenses	Other operating expenses

The nominal amounts of the Group's derivative exposures were as follows:

	Dec. 31, 2020		Dec. 31, 2019	
€ million	**current**	**non-current**	current	non-current
Cash flow hedge	5,285	–	2,765	2
Interest rate	569	–	–	–
Currency	4,716	–	2,765	2
No hedge accounting	4,451	1,100	5,147	1,100
Interest rate	–	1,100	–	1,100
Currency	4,451	–	5,147	–
Virtual power purchase agreement				
	9,736	**1,100**	**7,912**	**1,102**

The fair values of the derivatives were as follows:

December 31, 2020

	Positive market values				Negative market values			
	Financial transactions		Transactions in operating business		Financial transactions		Transactions in operating business	
€ million	**current**	**non-current**	**current**	**non-current**	**current**	**non-current**	**current**	**non-current**
Cash flow hedge	**–**	**–**	**96**	**–**	**–**	**–**	**45**	**–**
Interest	–	–	–	–	–	–	–	–
Currency	–	–	96	–	–	–	45	–
No hedge accounting	**16**	**10**	**–**	**8**	**62**	**40**	**–**	**2**
Interest	–	10	–	–	–	40	–	–
Currency	16	–	–	–	62	–	–	–
Virtual power purchase agreement	–	–	–	8	–	–	–	2
	16	**10**	**96**	**8**	**62**	**40**	**45**	**2**

December 31, 2019

	Positive market values				Negative market values			
	Financial transactions		Transactions in operating business		Financial transactions		Transactions in operating business	
€ million	current	non-current	current	non-current	current	non-current	current	non-current
Cash flow hedge	**–**	**–**	**7**	**–**	**–**	**–**	**46**	**–**
Interest	–	–	–	–	–	–	–	–
Currency	–	–	7	–	–	–	46	–
No hedge accounting	**20**	**14**	**–**	**–**	**19**	**56**	**–**	**–**
Interest	–	14	–	–	–	56	–	–
Currency	20	–	–	–	19	–	–	–
Virtual power purchase agreement	–	–	–	–	–	–	–	–
	20	**14**	**7**	**–**	**19**	**56**	**46**	**–**

As in the previous year, all hedging relationships were transaction related. Netting of derivatives from an economic perspective was possible due to the existing framework agreements on derivatives trading that the Group had entered into with commercial banks. Actual netting only takes place in the case of insolvency of the contract partner. Derivatives were not offset on the face of the balance sheet.

The following table presents the potential netting volume of the reported derivative assets and liabilities:

December 31, 2020

				Potential netting volume		
€ million	**Gross presentation**	**Netting**	**Net presentation**	**due to master netting agreements**	**due to financial collateral**	**Potential net amount**
Derivative assets	130	–	130	74	–	56
Derivative liabilities	-149	–	-149	-74	–	-75

December 31, 2019

				Potential netting volume		
€ million	Gross presentation	Netting	Net presentation	due to master netting agreements	due to financial collateral	Potential net amount
Derivative assets	40	–	40	32	–	7
Derivative liabilities	-122	–	-122	-32	–	-89

The reserves for cash flow hedges and the cost of cash flow hedging of the Group applied to the following hedging instruments:

	Cost of hedging cash flows		Cash flow hedging		
€ million	Time value of options	Forward component of currency forwards	Intrinsic value of options	Spot component of currency forwards	Interest rate swaps
Jan. 1, 2019	**–**	**-33**	**1**	**-81**	**-47**
Fair value adjustment (directly recognized in equity)	-1	12	13	-29	–
Reclassification to profit or loss	-22	14	-52	17	14
Reclassification to assets	22	-1	35	26	–
Tax effect	-6	-18	-10	-3	-3
Dec. 31, 2019	**-8**	**-25**	**-13**	**-70**	**-36**
Jan. 1, 2020	**-8**	**-25**	**-13**	**-70**	**-36**
Fair value adjustment (directly recognized in equity)	-2	-11	31	23	–
Reclassification to profit or loss	–	12	-5	34	15
Reclassification to assets	–	–	–	–	–
Tax effect	1	–	-9	-18	-3
Dec. 31, 2020	**-9**	**-25**	**5**	**-31**	**-23**

(40) Finance income and expenses/Net gains and losses from financial instruments

Finance income and expenses were as follows:

€ million	**2020**	2019
Interest income and similar income	39	66
Income from fair value changes from debt instruments with subsequent measurement at fair value through profit or loss	4	5
Income from the change of the fair value of share-based compensation programs	–	14
Currency differences from financing activities	–	12
Finance income	**44**	**97**
Interest expenses and similar expenses	-387	-430
Capital loss from disposal of debt instruments with subsequent measurement at amortized cost	–	-1
Expenses from fair value changes from debt instruments with subsequent measurement at fair value through profit or loss	-3	-5
Expenses from fair value changes of share-based compensation programs	-5	–
Currency differences from financing activities	-3	–
Other interest expenses	–	-46
Finance costs	**-398**	**-481**
Financial result	**-354**	**-385**

Interest income and expenses and similar income and expenses were as follows:

	2020		2019	
€ million	**Interest income**	**Interest expenses**	Interest income	Interest expenses
Financial instruments	26	-246	27	-270
Leases	–	-15	–	-14
Pension provisions	–	-39	–	-47
Other non-current provisions	–	-20	–	-26
Other interest income/expenses and similar income and expenses	13	-75	39	-86
Capitalized borrowing costs for	–	8	–	13
Property, plant and equipment	–	4	–	11
Other intangible assets	–	4	–	2
Interest income/expenses and similar income and expenses	**39**	**-387**	**66**	**-430**

The decrease in interest expenses due to financial instruments compared with the previous year is primarily attributable to lower interest payments on bonds.

The following table shows the development of net gains and losses, interest income and expenses, currency differences as well as dividend income from financial instruments (excluding items recognized in other comprehensive income) by measurement category in the period under review:

2020

			Interest result		Net gains and losses			
€ million	**Currency differences**	**Dividends**	**Interest income**	**Interest expenses**	**Impairment losses**	**Reversals of impairment losses**	**Fair value adjustments**	**Disposal gains/losses**
Financial assets								
Subsequent measurement at amortized cost	-10		5		-81	75		–
Subsequent measurement at fair value through other comprehensive income								
Equity Instruments		1						
Subsequent measurement at fair value through profit or loss	-1	–	21	–			-884	
Financial debt								
Subsequent measurement at amortized cost	1			-244				–
Subsequent measurement at fair value through profit or loss	–		–	-2			822	
Total	**-10**	**1**	**26**	**-246**	**-81**	**75**	**-62**	**–**

2019

			Interest result		Net gains and losses			
€ million	Currency differences	Dividends	Interest income	Interest expenses	Impairment losses	Reversals of impairment losses	Fair value adjustments	Disposal gains/losses
Financial assets								
Subsequent measurement at amortized cost	-31		7		-95	87		-1
Subsequent measuremen at fair value through other comprehensive income								
Equity Instruments		–						
Subsequent measuremen at fair value through profit or loss	1	–	20	–			-714	
Financial debt								
Subsequent measurement at amortized cost	24			-270				–
Subsequent measurement at fair value through profit or loss	–		–	–			782	
Total	**-7**	**–**	**27**	**-270**	**-95**	**87**	**67**	**-1**

In the table above, interest income or expenses related to derivatives without a hedging relationship are recognized within fair value adjustments. The currency result from equity instruments with subsequent measurement at fair value through other comprehensive income was recognized in other comprehensive income.

(41) Net cash flows from financing activities

Accounting and measurement policies

Net cash flows from financing activities

The option to recognize dividend payments and profit withdrawals in the cash flows from financing activities is exercised in determining the cash flows from financing activities.

The change in financial debt was as follows:

2020

		Cash			Non-cash					
€ million	**Jan. 1, 2020**	Cash inflows	Repay-ments	Other	Change in lease liabilities	Ex-change rate effects	Fair value adjust-ment	Other	Changes in scope of consoli-dation	**Dec. 31, 2020**
Bonds	9,854	2,486	-2,724	–	–	-184	–	9	–	9,442
Financial liabilities to E. Merck KG, Darmstadt, Germany	808	390	-382	–	–	–	–	–	–	816
Other current and non-current financial liabilities	2,531	3,561	-4,687	-15	65	33	398	–	-1	1,885
Financial debt	**13,194**	**6,436**	**-7,793**	**-15**	**65**	**-151**	**398**	**9**	**-1**	**12,142**
Derivative assets (current and non-current)	-33	521	–	–	–	–	-514	–	–	**-26**

2019

		Cash			Non-cash					
€ million	**Jan. 1, 2019**	Cash inflows	Repay-ments	Other	Change in lease liabilities	Ex-change rate effects	Fair value adjust-ment	Other	Changes in scope of consoli-dation	**Dec. 31, 2019**
Bonds	7,173	3,482	-1,290	–	–	59	–	9	420	9,854
Financial liabilities to E. Merck KG, Darmstadt, Germany	821	406	-418	–	–	–	–	–	–	808
Other current and non-current financial liabilities	1,367	1,193	-1,281	-11	198	24	495	–	546	2,531
Financial debt	**9,361**	**5,080**	**-2,989**	**-11**	**198**	**84**	**495**	**9**	**966**	**13,194**
Derivative assets (current and non-current)	-30	499	–	–	–	–	-502	–	–	-33

Other cash changes show interest payments for lease liabilities that are recognized in the net cash flow from operating activities. Changes in lease liabilities include additions and retirements of right-of-use from leases and the effects from unwinding of the discount on lease liabilities. Other non-cash changes resulted from the application of the effective interest method.

Fair value adjustments of other current and non-current financial liabilities are attributable to liabilities from derivatives. In the consolidated cash flow statement, cash changes of assets from derivatives were recognized together with repayments of other current and non-current financial liabilities. In the above reconciliation, changes of assets from derivatives were recognized separately because they did not form part of financial liabilities.

The amount of undrawn borrowing facilities that could be employed for future operating activities and to meet obligations and information on changes in financial debt can be found in Note (37) “Financial debt/Capital management”.

(42) Management of financial risks

Market fluctuations with respect to foreign exchange and interest rates represent significant profit and cash flow risks for the Group. The Group aggregates these Group-wide risks and steers them centrally, partly by using derivatives. To estimate existing risks of foreign exchange and interest rate fluctuations, the Group uses scenario analyses. The Group is not subject to any material risk concentration from financial transactions.

The Group uses marketable forward exchange contracts, options, and interest swaps as hedging instruments. The strategy to hedge interest rate and foreign exchange rate fluctuations arising from forecast transactions and transactions already recognized in the balance sheet is set by a risk committee, which meets on a regular basis. The use of derivatives is regulated by extensive guidelines and subject to ongoing risk controls by Group Treasury. Speculation is prohibited. The strict separation of functions between trading, settlement, and control functions is ensured. Derivatives are only entered into with banks that have a good credit rating. Related default risks are continuously monitored.

The Report on Risks and Opportunities included in the combined management report provides further information on the management of financial risks.

Foreign exchange risks

Owing to the international nature of its business, the Group is exposed to transactional foreign exchange risks within the scope of both its business activities and financing activities. Foreign exchange risks are continuously analyzed and different hedging strategies used to limit or eliminate these risks.

A more rule-based hedging approach was gradually introduced for hedging foreign exchange risks as of the beginning of fiscal 2019. The entire foreign exchange exposure is divided into several defined risk levels and systematically hedged using suitable hedging instruments. The number of currencies included in hedging was also expanded. Hedging is performed based on a regularly reviewed basket of currencies. As part of the new hedging concept, the time horizon for hedging was reduced from a maximum of 36 months to 12 months. The new hedging concept aims to ensure a consistent hedging quality at lower costs.

Foreign exchange risks from the following transactions are hedged using foreign exchange contracts and currency options applying hedge accounting:

- Forecast transactions in non-functional currency, the expected probability of which is very high for the next 12 months,
- Firm purchase commitments over the next 12 months in non-functional currency.

Foreign exchange risks from the following transactions are economically hedged through the use of foreign exchange contracts and currency options:

- Intragroup financing in non-functional currency,
- Receivables from and liabilities to third parties in non-functional currency.

The following table shows the net exposure and the effects of transactional exchange rate movements of the key currencies against the euro in relation to the net income and equity of the Group on the balance sheet date:

December 31, 2020

€ million		USD	CHF	CNY	TWD	JPY	KRW
Net exposure		**457**	**-280**	**407**	**65**	**98**	**73**
Exchange rate -10% (appreciation vs. €)	Consolidated income statement	46	-28	41	7	10	7
	Equity (other comprehensive income)	-119	40	-62	-18	-9	-21
Exchange rate +10% (depreciation vs. €)	Consolidated income statement	-46	28	-41	-7	-10	-7
	Equity (other comprehensive income)	115	-33	64	17	8	17

December 31, 2019

€ million		USD	CHF	CNY	TWD	JPY	KRW
Net exposure		**802**	**-493**	**933**	**200**	**39**	**284**
Exchange rate -10% (appreciation vs. €)	Consolidated income statement	80	-49	93	20	4	28
	Equity (other comprehensive income)	-114	6	-8	-12	-10	-10
Exchange rate +10% (depreciation vs. €)	Consolidated income statement	-80	49	-93	-20	-4	-28
	Equity (other comprehensive income)	83	-5	14	8	7	7

In this presentation, effects of cash flow hedges are taken into consideration in the equity of the Group. The net exposure of each of the above currencies consisted of the following components:

- Planned cash flows in the next 12 months in the respective currency less
- The nominal values of hedging instruments of these planned cash flows.

The planned cash flows in the next 12 months are usually hedged at a ratio of 25% to 90% in line with the risk management strategy and depending on market development. As in the previous year, balance sheet items in the above currencies were economically hedged by derivatives in full if they did not correspond to the functional currency of the respective subsidiary. Accordingly, they do not affect the net exposure presented above.

The impact of cash flow hedge accounting for forecast transactions in foreign currency was as follows for the major currencies:

December 31, 2020

€ million	USD	CHF	CNY	TWD	JPY	KRW
Notional amount	1,802	358	1,071	257	97	295
thereof: current	1,802	358	1,071	257	97	295
thereof: non-current	–	–	–	–	–	–
Fair Value of the hedging instrument	65	-2	-9	3	2	-5
thereof: positive market values	71	–	6	3	2	3
thereof: negative market values	-7	-2	-15	–	–	-8
Maturity profile	January 2021 – December 2021	January 2021 – December 2021	January 2021 – December 2021	January 2021 – December 2021	January 2021 – December 2021	January 2021 – December 2021
Hedge ratio[1]	1:1	1:1	1:1	1:1	1:1	1:1
Change in value of outstanding hedging instruments since January 1, 2020	65	-2	-9	3	2	-5
Change in value of hedged item used to determine hedge effectiveness since January 1, 2020	-65	2	9	-3	-2	5
Weighted average hedging rate	1.17	1.08	8.25	33.55	124.20	1,379.00

[1] The hedging instruments and the corresponding hedged items were denominated in the same currency, therefore the hedge ratio was 1:1.

December 31, 2019

€ million	USD	CHF	CNY	TWD	JPY	KRW
Notional amount	1,794	55	392	151	139	165
thereof: current	1,794	55	392	151	139	163
thereof: non-current	–	–	–	–	–	2
Fair value of the hedging instrument	-28	2	–	-6	-2	-4
thereof: positive market values	2	2	–	–	–	–
thereof: negative market values	-31	–	–	-6	-3	-4
Maturity profile	January 2020 – December 2020	January 2020 – December 2020	January 2020 – December 2020	January 2020 – December 2020	January 2020 – December 2020	January 2020 – January 2021
Hedge ratio[1]	1:1	1:1	1:1	1:1	1:1	1:1
Change in value of outstanding hedging instruments since January 1, 2019	-11	2	–	-2	-1	–
Change in value of hedged item used to determine hedge effectiveness since January 1, 2019	11	-2	–	2	1	–
Weighted average hedging rate	1.19	1.12	8.08	36.24	127.40	1,378.90

[1] The hedging instruments and the corresponding hedged items were denominated in the same currency, therefore the hedge ratio was 1:1.

In addition to the transactional foreign exchange risks described previously, the Group was exposed to currency translation risks since many of the Group's subsidiaries are located outside the eurozone and have functional currencies other than the reporting currency. Exchange differences resulting from translation of the assets and liabilities of these companies into euros, the reporting currency, are recognized in equity.

Interest rate risks

The Group's net exposure to interest rate changes comprised the following:

€ million	**Dec. 31, 2020**	Dec. 31, 2019
Short-term or variable interest rate monetary deposits	1,368	811
Short-term or variable interest rate monetary borrowings	-2,607	-4,761
Net interest rate exposure	**-1,240**	**-3,950**

The effects of a parallel shift in the yield curve by +100 or -100 basis points on the consolidated income statement as well as on equity relative to all short-term or variable monetary deposits and monetary borrowings within the scope of IAS 32, except contingent considerations, are presented in the following table. In the event of a downward shift, the interest rate for instruments subject to a contractual interest rate floor of zero percent was limited accordingly.

€ million	**2020**		2019	
Change in market interest rate	**+ 100 basis points**	**– 100 basis points**	**+ 100 basis points**	**– 100 basis points**
Effects on consolidated income statement	-21	11	-23	11
Effects on equity (other comprehensive income)	–	–	–	–

The Group does not expect the IBOR reform to have a significant impact neither on interest rate risk nor net assets, financial position or results of operations.

Share price risks

The shares in publicly listed companies amounting to € 244 million (December 31, 2019: € 209 million) are generally exposed to a risk of fluctuations in fair value. A 10% change in the price of these financial instruments would impact Group equity by € 24 million (2019: € 21 million). This change in value would be recognized in Group equity.

Electricity price risks

On October 15, 2020, the Group concluded a virtual power purchase agreement with a wind energy project developer in the United States for an expected project capacity of 50 megawatts. The wind farm is scheduled to be commissioned in 2022. The Group will receive renewable energy certificates (RECs) for the quantities of electricity produced. As the agreement is designed as a contract for difference, it fulfills the definition of a derivative financial instrument and is measured at fair value through profit or loss in accordance with IFRS 9. The agreement had a carrying amount of € 8 million at the reporting date. A change in the significant valuation parameters would have had the following effect on fair value:

December 31, 2020

	Change in expected future electricity prices		Change in expected annual production volume		Change in cost of capital after tax	
	percentage points		percentage points		percentage points	
€ million	**+10**	-10	**+10**	-10	**+1**	-1
Change in the fair value of the virtual power purchase agreement	3	-3	1	-1	-1	1

Around 40% of the expected production volume under the virtual power purchase agreement is hedged via a separate hedging instrument.

Liquidity risks

The risk that the Group cannot meet its payment obligations resulting from financial liabilities, is limited by establishing the required financial flexibility and by Group-wide cash management. Information on issued bonds and other sources of financing can be found in Note (37) “Financial debt/capital management”.

Liquidity risks are monitored and reported to management on a regular basis.

The following liquidity risk analysis presents the contractual cash flows such as repayments and interest on financial liabilities and the net cash flows of derivatives with a negative fair value:

December 31, 2020

		Cash flows < 1 year		Cash flows 1 – 5 years		Cash flows > 5 years	
€ million	**Carrying amount**	**Interest**	**Repayment**	**Interest**	**Repayment**	**Interest**	**Repayment**
Subsequent measurement at amortized cost							
Bonds and commercial paper	9,642	-167	-517	-478	-5,014	-189	-4,150
Bank loans	1,085	-5	-835	-1	-250	–	–
Trade accounts payable	1,768	–	-1,768	–	–	–	–
Liabilities to related parties	1,375	–	-1,375	–	–	–	–
Other financial liabilities	439	–	-405	–	-34	–	–
Loans from third parties and other financial debt	58	-4	-15	-16	-42	–	–
Subsequent measurement at fair value through profit or loss							
Contingent considerations	26	–	–	–	-26	–	–
Derivatives without a hedging relationship	104	-15	-62	-15	–	–	–
Derivatives with a hedging relationship	**45**	**–**	**-46**	**–**	**–**	**–**	**–**
Refund liabilities	**666**	**–**	**-666**	**–**	**–**	**–**	**–**
Lease liabilities	**438**	**-8**	**-110**	**-16**	**-246**	**-7**	**-81**
	15,646	**-199**	**-5,799**	**-526**	**-5,612**	**-196**	**-4,231**

December 31, 2019

€ million	Carrying amount	Cash flows <1 year Interest	Cash flows <1 year Repayment	Cash flows 1 – 5 years Interest	Cash flows 1 – 5 years Repayment	Cash flows >5 years Interest	Cash flows >5 years Repayment
Subsequent measurement at amortized cost							
Bonds and commercial paper	10,059	-120	-2,224	-519	-4,042	-223	-3,828
Bank loans	1,587	-25	-1,337	-1	-250	–	–
Trade accounts payable	2,054	–	-2,054	–	–	–	–
Liabilities to related parties	1,320	–	-1,320	–	–	–	–
Other financial liabilities	596	–	-569	–	-27	–	–
Loans from third parties and other financial debt	97	-1	-53	-8	-44	–	–
Subsequent measurement at fair value through profit or loss							
Contingent considerations	16	–	–	–	-16	–	–
Derivatives without a hedging relationship	76	-15	-19	-29	–	–	–
Derivatives with a hedging relationship	**46**	**–**	**-46**	**–**	**–**	**–**	**–**
Refund liabilities	**565**	**–**	**-565**	**–**	**–**	**–**	**–**
Finance lease liabilities	**567**	**-12**	**-119**	**-30**	**-319**	**-20**	**-189**
	16,982	**-174**	**-8,305**	**-587**	**-4,698**	**-243**	**-4,017**

Credit risks

Credit risk for the Group means the risk of a financial loss if a customer or other contract partner is not able to meet its contractual payment obligations. The Group is exposed to credit risks mainly due to existing trade accounts receivable, other receivables, other debt instruments, derivatives, and contract assets.

Credit risks are continuously monitored by credit management. It additionally carries out the management of risks arising from extending credit to customers, suppliers, and in the course of other business relationships.

The Group analyzes all financial assets that are more than 90 days past due and examines whether the credit risk has risen significantly and, as a result, there is objective evidence of impairment requiring the recognition of additional risk provisions.

Accounting and measurement policies

Credit risks

Impairment of trade accounts receivable and contract assets

The Group uses the simplified impairment model for trade accounts receivable subsequently measured at amortized cost and contract assets, pursuant to which any credit losses expected to occur over the entire lifetime of an asset are taken into account. In order to measure expected credit risks, the assets are grouped based of the existing credit risk structure and the respective maturity structure.

The customer groups with comparable default risks to be considered are determined according to the specific business sector and the place of business of the respective customers.

The expected credit loss rates used in the simplified impairment model are derived on the basis of past experience and current macroeconomic expectations. In doing so, country-specific ratings are taken into consideration since many of the Group’s customers depend directly or indirectly on the economic trends in the country where their place of business is located (public and private healthcare systems, universities and research companies from within the pharmaceutical industry as well as industries subsidized under

development plans, particularly in Asia). These country ratings are aggregated into three separate rating groups. Under the impairment model, past default rates and country ratings are used as an approximation of the defaults to be expected in the future.

Accordingly, when a country's rating changes, the historical default rates of the rating group to which the respective country has been re-allocated have to be applied, rather than the historical default rates of the previous rating group.

The expected default rates used in the simplified impairment model for trade accounts receivable were analyzed and adjusted in the second quarter of fiscal 2020 in response to the impact of the Covid-19 pandemic. The adjustment was performed by updating the minimum default probabilities per aging category derived from market data based on the development of credit default swap prices. As part of the continuous monitoring of financial market data, credit default swap prices no longer indicated an increased credit risk in the fourth quarter of 2020; as a result, the adjustment made during the year was retracted.

If there is objective evidence that certain trade accounts receivable are fully or partially impaired, additional loss allowances are recognized to provide for expected credit losses.

A default generally exists when the debtor cannot fully meet its liabilities.

A debtor's creditworthiness is assumed to be impaired if there are objective indications that the debtor is in financial difficulties, such as the disappearance of an active market for its products or impending insolvency. On initial recognition, the lifetime expected credit losses are deducted from the nominal amount of trade accounts receivable considered as originated credit-impaired financial assets.

Impairment of other receivables

The general three-stage impairment model and the simplified approach are used to recognize loss allowances of financial instruments included in other receivables. The individual credit rating of the contract partner is used to determine the impairment loss of other receivables.

Individual cases are also analyzed to ascertain whether objective findings suggest that the value of other receivables is impaired. Such suggestions may include, for example, economic difficulties of the debtor, contractual breaches or the renegotiation of contractual payment obligations. If the analysis concludes there is a substantially increased risk of default, the expected credit loss is calculated over the entire lifetime.

Impairment of other financial assets

Investments in debt instruments subsequently measured either at amortized cost or at fair value through other comprehensive income are primarily considered to be investments with low risk, meaning that the expected credit loss in the upcoming 12 months is used to determine the impairment loss.

For financial assets with only a minimal default risk, the rules concerning the mandatory recognition of a risk provision for the lifetime expected credit loss are not applied at initial recognition or during subsequent measurement. Therefore, no assessment of whether there has been a significant increase in the credit risk is carried out for such assets. The Group does not presume an increased credit risk as of the balance sheet date if the contract partner has an investment grade rating.

If there are indications that the debtor's creditworthiness had worsened but that this was not yet reflected in its existing credit rating, the credit risk assessment is adjusted and the impairment allowances recognized for expected credit losses are increased. In all other cases, there are no new risk assessments as of the balance sheet date and the risk profile initially assumed is maintained.

Wherever a considerable increase in the default risk is assumed, the lifetime expected credit loss of the financial asset is considered.

On the balance sheet date, the theoretical maximum default risk for all items referenced above corresponds to the net carrying amounts less any compensation from credit insurance.

Significant discretionary decisions and sources of estimation uncertainty

Credit risks

Impairment of trade accounts receivable and contract assets

In terms of the impairment of trade accounts receivable and of contract assets, there is significant discretion and estimation uncertainty when it comes to

- the identification of customer groups with identical default risks,
- the identification of a substantial increase in the credit risk, and
- the calculation of the expected credit losses.

As of December 31, 2020, trade accounts receivable were impaired by 2.3% (December 31, 2019: 2.4%). If it had been necessary to recognize impairment on trade accounts receivable and contract assets at 10% higher as of the reporting date, this would have caused a € 7 million reduction in profit before tax (2019: € 8 million).

Impairment of other financial assets

Discretionary judgment is applied in determining individual impairment allowances.

The following table shows impairments for financial assets from operative transactions and contract assets as well as gains from their reversals recognized in the consolidated income statement:

€ million	2020	2019
Impairment losses	**-81**	**-95**
of trade accounts receivable	-78	-89
of contract assets	–	–
of debt instruments subsequently measured at amortized cost	-3	-5
of debt instruments subsequently measured at fair value through other comprehensive income	–	–
Reversals of impairment losses	**75**	**87**
of trade accounts receivable	71	85
of contract assets	–	–
of other debt instruments subsequently measured at amortized cost	4	2
of other debt instruments subsequently measured at fair value through other comprehensive income	–	–
Net impairment on financial assets	**-6**	**-8**

The loss allowances and reversals recognized for trade accounts receivable as shown above applied entirely to receivables resulting from contracts with customers.

Credit risks from trade accounts receivable

The credit risk from trade accounts receivable is largely impacted by the specific circumstances of individual customers. The Group also considers additional factors such as the general default risk in the respective industry and country in which the customer operates.

The credit risk of customers is assessed using established credit management processes that take individual customer risks into account. This is done in particular by analyzing the aging structure of trade accounts receivable.

The Group continuously reviews and monitors open positions of all its customers in the corresponding countries and takes steps to-mitigate risks if necessary.

The table below contains an overview of the credit risk by business sector and country rating established by leading rating agencies as of December 31, 2020:

December 31, 2020

€ million	Healthcare	Life Science	Performance Materials	**Group**
External credit rating of at least AA- or comparable	781	996	481	2,257
External credit rating of at least BBB- or comparable	260	136	13	410
External credit rating lower than BBB- or comparable	425	31	2	458
Trade accounts receivable before loss allowances	**1,466**	**1,163**	**496**	**3,125**

December 31, 2019

€ million	Healthcare	Life Science	Performance Materials	Group
External credit rating of at least AA- or comparable	763	883	526	2,172
External credit rating of at least BBB- or comparable	278	164	20	463
External credit rating lower than BBB- or comparable	573	42	2	617
Trade accounts receivable before loss allowances	**1,614**	**1,089**	**548**	**3,251**

Goods were generally sold under retention of title so that a reimbursement claim exists in the event of default. Other guarantees generally were not demanded. The scope of credit-insured receivables was immaterial for the Group.

Loss allowances based on expected credit losses for trade accounts receivable as of December 31, 2020, were as follows:

December 31, 2020

€ million	**Not yet due**	**Up to 90 days past due**	**Up to 180 days past due**	**Up to 360 days past due**	**More than 360 days past due**	**Total**
Expected loss rate	0.4%	2.2%	3.7%	17.7%	62.9%	
Trade accounts receivable before loss allowances	2,633	312	56	57	68	3,125
thereof: credit impaired	7	6	–	5	42	59
Loss allowances	**-11**	**-7**	**-2**	**-10**	**-43**	**-73**
thereof: credit impaired	-3	-3	–	-3	-39	-49

Prior to the recognition of additional impairment losses, purchased or originated credit impaired (POCI) trade accounts receivable totaled € 4 million as of December 31, 2020 (December 31, 2019: € 3 million). Additional impairment losses amounting to € 1 million were recognized after initial recognition (December 31, 2019: € 0 million). These POCI receivables are included in the credit impaired trade accounts receivable shown in the provision matrices.

The POCI receivables were measured at fair value on initial recognition by deducting the expected credit losses from their nominal amounts. The undiscounted expected credit losses deducted in fiscal 2020 amounted to € 17 million (2019: € 3 million). This amount related to all trade accounts receivable classified as credit impaired on initial recognition and recognized for the first time in the fiscal year, some of which have already been settled.

Loss allowances based on expected credit losses for trade accounts receivable as of December 31, 2019, were as follows:

December 31, 2019

€ million	Not yet due	Up to 90 days past due	Up to 180 days past due	Up to 360 days past due	More than 360 days past due	Total
Expected loss rate	0.6%	1.9%	6.1%	11.1%	41.3%	
Trade accounts receivable before loss allowances	2,669	367	59	43	112	3,251
thereof: credit impaired	5	1	2	3	42	53
Loss allowances	**-16**	**-7**	**-4**	**-5**	**-46**	**-77**
thereof: credit impaired	-2	-1	-1	-2	-41	-47

Credit risks from other receivables

Gross other receivables amounted to € 196 million as of December 31, 2020 (December 31, 2019: € 340 million). Other receivables in the amount of € 194 million were allocated to Level 1 of the general three-level impairment model (December 31, 2019: € 339 million), meaning that the credit loss expected in the next twelve months was used to determine the amount of impairment when examining the individual credit risk of the respective contract partner. The following table shows the impairment losses recognized for other receivables.

In fiscal 2020, the nominal amount of one other receivable classified as credit impaired on initial recognition was reduced in full by expected credit losses in the amount of € 4 million (2019: € 0 million). This meant that the balance sheet as of December 31, 2020 did not include any other receivables that were already classified as credit impaired on initial recognition.

Credit risks from other financial assets

The Group limits credit risks from other financial assets by concluding contracts almost exclusively with contract partners whose creditworthiness is good. The credit risk from financial contracts is monitored daily on the basis of market information on credit default swap rates and fortnightly on the basis of rating information.

Impairment losses on financial assets developed as follows:

2020

€ million	Jan. 1	Additions	Derecog-nition	Utilizations	Reclassifica-tion within levels	Effects of currency translation	Changes in scope of consolidation	Dec. 31
Subsequent measurement at amortized cost	**-81**	**-81**	**75**	**7**	**–**	**5**	**–**	**-76**
Trade and other receivables (including current leasing receivables)	-77	-78	71	6	–	5	–	-73
thereof: Level 1/2	-30	-64	66	–	2	2	–	-24
thereof: Level 3	-47	-13	5	6	-2	3	–	-48
thereof: POCI	–	-1	–	–	–	–	–	-1
Contract Assets	–	–	–	–	–	–	–	-1
thereof: Level 1/2	–	–	–	–	–	–	–	-1
thereof: Level 3	–	–	–	–	–	–	–	–
Other Receivables (including non-current leasing receivables)	-4	-3	4	–	–	–	–	-2
thereof: Level 1	-3	-2	4	–	–	–	–	-1
thereof: Level 2	–	–	–	–	–	–	–	–
thereof: Level 3	-1	-1	–	–	–	–	–	-2
Loss allowances for financial assets	**-81**	**-81**	**75**	**7**	**–**	**5**	**–**	**-76**

2019

€ million	Jan. 1	Additions	Derecog-nition	Utilizations	Reclassifica-tion within levels	Effects of currency translation	Changes in scope of consolidation	Dec. 31
Subsequent measurement at amortized cost	**-76**	**-95**	**87**	**7**	**–**	**-1**	**-3**	**-81**
Trade and other receivables (including current leasing receivables)	-73	-89	85	7	–	-3	-3	-77
thereof: Level 1/2	-28	-82	80	–	3	-1	-2	-30
thereof: Level 3	-45	-8	5	7	-3	-2	-1	-47
thereof: POCI	–	–	–	–	–	–	–	–
Other Receivables (including non-current leasing receivables)	-3	-5	1	–	–	2	–	-4
thereof: Level 1	-2	-4	1	–	–	2	–	-3
thereof: Level 2	–	–	–	–	–	–	–	–
thereof: Level 3	–	-1	–	–	–	–	–	-1
Loss allowances for financial assets	**-76**	**-95**	**87**	**7**	**–**	**-1**	**-3**	**-81**

(43) Information on fair value measurement

Accounting and Measurements Policies

Information on fair value measurement

The measurement techniques and main input factors used to determine the fair value of financial instruments are as follows:

Fair value determined by official prices and quoted market values (Level 1)

	Financial instruments concerned	Description of the measurement technique	Main input factors used to determine fair values
Financial assets			
Subsequent measurement at fair value through other comprehensive income			
Equity instruments	Shares	Derived from active market	Quoted prices in an active market
Other debt instruments	Bonds		
Subsequent measurement at fair value through profit or loss			
Other debt instruments	Publicly-traded funds	Derived from active market	Quoted prices in an active market
	Other short-term cash investments		
Financial liabilities			
Subsequent measurement at amortized cost			
Financial debt	Bonds	Derived from active market	Quoted prices in an active market

Fair value determined using input factors observable in the market (Level 2)

	Financial instruments concerned	Description of the measurement technique	Main input factors used to determine fair values
Financial assets			
Subsequent measurement at fair value through other comprehensive income			
Equity instruments	Shares	Derived from active market including a liquidity discount	Quoted prices in an active market and volatilities observable on the market
Subsequent measurement at fair value through profit or loss			
Other debt instruments	Convertible note/bond with embedded settlement option for equity in companies	Nominal value considering a liquidity discount	Volatilities observable on the market
Derivatives (without a hedging relationship)	Forward exchange contracts and currency options	Use of recognized actuarial methods	Spot and forward rates observable on the market as well as exchange rate volatilities
	Interest rate swaps		Interest rate curves available on the market
Derivatives (with a hedging relationship)			
	Forward exchange contracts and currency options	Use of recognized actuarial methods	Spot and forward rates observable on the market as well as exchange rate volatilities
Financial liabilities			
Subsequent measurement at fair value through profit or loss			
Derivatives (without a hedging relationship)	Forward exchange contracts and currency options	Use of recognized actuarial methods	Spot and forward rates observable on the market as well as exchange rate volatilities
	Interest rate swaps		Interest rate curves available on the market
Derivatives (with a hedging relationship)			
	Forward exchange contracts and currency options	Use of recognized actuarial methods	Spot and forward rates observable on the market as well as exchange rate volatilities
Subsequent measurement at amortized cost			
Financial liabilities	Liabilities to banks and other loan liabilities	Discounting of future cash flows	Interest rates observable on the market

Fair value determined using input factors unobservable in the market (Level 3)

	Financial instruments concerned	Description of the measurement technique	Main input factors used to determine fair values
Financial assets			
Subsequent measurement at fair value through other comprehensive income			
Equity instruments	Equity investments in unlisted companies	Discounting of expected future cash flows	Expected cash flows from recent business planning, average cost of capital, expected long-term growth rate
		Derived from observable prices within the scope of equity refinancing sufficiently close to the balance sheet date, considered risk allowances	Observable prices derived from equity refinancing
		Cost-based determination	Acquisition cost
Trade and other receivables	Trade accounts receivable that are intended for sale due to a factoring agreement	Nominal value less factoring fees	Nominal value of potentially sold trade accounts receivable, average fees for sales of trade accounts receivable
Subsequent measurement at fair value through profit or loss			
Derivatives (without a hedging relationship)	Virtual power purchase agreement	Discounting of expected future cash flows	Electricity future price curves, expected electricity production volumes, discount factors
Contingent consideration	Contingent considerations from the sale of businesses or shares in corporations	Discounting of probability-weighted future milestone payments and license fees	Sales planning, milestone payments, probabilities of regulatory and commercial events, discount rates
Other debt instruments	Interests in unlisted funds	Consideration of the fair value of companies in which the funds are invested	Net asset values of the fund interests
	Bonds with embedded settlement option for equity in an unlisted company	Use of recognized actuarial methods	Interest rates observable on the market
Financial liabilities			
Subsequent measurement at fair value through profit or loss			
Derivatives (without a hedging relationship)	Hedging instrument for the virtual power purchase agreement	Use of recognized actuarial methods	Electricity future price curves, expected electricity production volumes, discount factors
Contingent consideration	Contingent considerations from the purchase of businesses	Discounting of probability-weighted future milestone payments and license fees	Sales planning, milestone payments, probabilities of regulatory and commercial events, discount rates

Counterparty credit risk was taken into consideration for measurements of financial instruments at fair value. In the case of non-derivative financial instruments, such as other liabilities or interest-bearing securities, this was reflected using risk premiums on the discount rate, while discounts on market value (so-called credit valuation adjustments and debit valuation adjustments) were used for derivatives.

Equity investments in unlisted companies (Level 3)

The planning periods used to determine the fair value of equity investments in unlisted companies ranged from 3 to 9 years (December 31, 2019: 1 to 9 years). Cash flows for periods in excess of this are included in the terminal value calculation using long-term growth rates of between 1.0% and 2.0% (December 31, 2019: 1.0% and 2.0%). The applied average cost of capital (after tax) was 7.0% on December 31, 2020 (December 31, 2019: 7.0%).

Assets from contingent considerations (Level 3)

The fair values of assets from contingent considerations are calculated by weighting the expected future milestone payments and royalties using their probability of occurrence and discounting them. The main parameters when determining contingent considerations are

- the estimated probability of reaching the individual milestone events,
- the underlying sales planning used to derive royalties,
- and the discount factor used.

When determining the probability of occurrence of the individual milestones events in connection with the development of drug candidates, the focus is on empirically available probabilities of success of development programs in comparable phases of clinical development in the relevant therapeutic areas. To determine the sales planning, internal sales plans and sales plans of external industry services are used. The discount rate (after tax) as of December 31, 2020, of between 5.4% and 6.5% (December 31, 2019: 5.9% to 6.9%) was calculated using the weighted average cost of capital.

Significant discretionary decisions and sources of estimation uncertainty

Equity investments in unlisted companies

Determining the parameters that are to be included in discounted cash-flow-methods and deriving the fair value from observable prices within the scope of equity refinancing are both subject to discretionary decisions and estimation uncertainty.

Assets from contingent consideration

The calculation of the fair value of assets from contingent considerations is subject to significant discretionary judgment.

The most significant contingent consideration was the future purchase price claim from the disposal of the Biosimilars business to a subsidiary of Fresenius SE & Co. KGaA, Bad Homburg vor der Höhe, on August 31, 2017. It was calculated by an external valuation expert on initial recognition in 2017 and continued on this basis. As of December 31, 2020, the carrying amount was € 208 million (December 31, 2019: € 198 million).

If, in the context of determining the fair value of this contingent consideration at the date of transaction, the probability of approval as well as the discount factor of the three major development programs had been estimated to be lower or higher, this would have led to the following changes in the measurement and the corresponding effects on the profit before income tax:

December 31, 2020

		Change in probability of regulatory approval		
€ million		-10%	unchanged	10%
Change of discount rate	5.0%	-22	6	33
	5.5% (unchanged)	-27	–	27
	6.0%	-32	-5	21

December 31, 2019

		Change in probability of regulatory approval		
€ million		-10%	unchanged	10%
Change of discount rate	5.4%	-28	6	40
	5.9% (unchanged)	-33	–	33
	6.4%	-37	-6	26

The following table presents the carrying amounts and the fair values of the individual financial assets and liabilities as of December 31, 2020, for each individual financial instrument class pursuant to IFRS 9:

		Carrying amount			Fair value[1]			
€ million	Consolidated notes	Current	Non-current	Total	Fair value determined by official prices and quoted market values (Level 1)	Fair value determined using input factors observable in the market (Level 2)	Fair value determined using input factors not observable in the market (Level 3)	Total
Financial assets								
Subsequent measurement at amortized cost								
Cash and cash equivalents	35	1,355	–	1,355				
Trade and other receivables (excluding leasing receivables)	25	3,199	24	3,223				
Other debt instruments	36	1	7	7				
Subsequent measurement at fair value through other comprehensive income								
Equity instruments	36	–	499	499	18	226	255	499
Trade and other receivables	25	19	–	19	–	–	19	19
Other debt instruments	36	5	4	9	9	–	–	9
Subsequent measurement at fair value through profit or loss								–
Equity instruments	36	–	–	–	–	–	–	–
Contingent considerations	36	–	260	260	–	–	260	260
Other debt instruments	36	7	34	41	8	–	33	41
Derivatives without a hedging relationship	36, 39	16	18	34	–	26	8	34
Derivatives with a hedging relationship	36, 39	96	–	96	–	96	–	96
Lease receivables (measured in accordance with IFRS 16)[2]	25	3	1	4				
Total		**4,701**	**848**	**5,548**	**36**	**348**	**575**	**958**
Financial debt								
Subsequent measurement at amortized cost								
Trade payables and other liabilities	30	1,768	–	1,768				
Financial debt	37	2,183	9,419	11,602	9,970	2,180	–	12,150
Other financial liabilities	38	963	34	997				
Subsequent measurement at fair value through profit or loss								–
Contingent considerations	38	–	26	26	–	–	26	26
Derivatives without a hedging relationship	37, 38, 39	62	42	104	–	102	2	104
Derivatives with a hedging relationship	38, 39	45	–	45	–	45	–	45
Refund liabilities	9	666	–	666				
Lease liabilities (measured in accordance with IFRS 16)[2]	37	112	327	438				
Total		**5,799**	**9,847**	**15,646**	**9,970**	**2,327**	**28**	**12,325**

[1] The simplification option under IFRS 7.29(a) was used for disclosures of certain fair values.

[2] Measurements within the scope of IFRS 16 are exempted from the requirements of IFRS 13 (IFRS 13.6(b)).

The following table presents the carrying amounts and the fair values of the individual financial assets and liabilities as of December 31, 2019, for each individual financial instrument class pursuant to IFRS 9:

		Carrying amount			Fair value[1]			
€ million	Consolidated notes	Current	Non-current	**Total**	Fair value determined by official prices and quoted market values (Level 1)	Fair value determined using input factors observable in the market (Level 2)	Fair value determined using input factors not observable in the market (Level 3)	**Total**
Financial assets								
Subsequent measurement at amortized cost								
Cash and cash equivalents	35	781	–	781				
Trade and other receivables (excluding leasing receivables)	25	3,458	22	3,480				
Other debt instruments	36	1	8	9				
Subsequent measurement at fair value through other comprehensive income								
Equity instruments	36	–	399	399	209	–	190	399
Trade and other receivables	25	24	–	24	–	–	24	24
Other debt instruments	36	29	9	39	39	–	–	39
Subsequent measurement at fair value through profit or loss								
Equity instruments	36	–	–	–	–	–	–	–
Contingent considerations	36	–	258	258	–	–	258	258
Other debt instruments	36	–	50	50	2	22	26	50
Derivatives without a hedging relationship	36, 39	20	14	33	–	33	–	33
Derivatives with a hedging relationship	36, 39	7	–	7	–	7	–	7
Lease receivables (measured in accordance with IFRS 16)[2]	25	5	–	5				
Total		**4,325**	**761**	**5,086**	**250**	**62**	**499**	**810**
Financial debt								
Subsequent measurement at amortized cost								
Trade payables and other liabilities	30	2,054	–	2,054				
Financial debt	37	4,422	8,129	12,551	10,183	2,706	–	12,889
Other financial liabilities	38	1,081	27	1,108				
Subsequent measurement at fair value through profit or loss								
Contingent considerations	37	–	16	16	–	–	16	16
Derivatives without a hedging relationship	37, 39	19	56	76	–	76	–	76
Derivatives with a hedging relationship	38, 39	46	–	46	–	46	–	46
Refund liabilities	9	565	–	565				
Lease liabilities (measured in accordance with IFRS 16)[2]	37	109	458	567				
Total		**8,295**	**8,687**	**16,982**	**10,183**	**2,828**	**16**	**13,027**

[1]The simplification option under IFRS 7.29(a) was used for disclosures of certain fair values.

[2]Measurements within the scope of IFRS 16 are exempted from the requirements of IFRS 13 (IFRS 13.6(b)).

The changes in financial assets and liabilities for each of the individual classes of financial instruments allocated to Level 3 and measured at fair value were as follows:

2020

		Financial assets					Financial liabilities	
		Subsequent measurement at fair value through profit or loss			Subsequent measurement at fair value through other comprehensive income		Subsequent measurement at fair value through profit or loss	
€ million	**Total**	Other debt instruments	Contingent consideration	Derivatives without a hedging relationship	Equity instruments	Trade and other receivables	Contingent consideration	Derivatives without a hedging relationship
Net carrying amounts, Jan. 1, 2020	**483**	**26**	**258**	**–**	**190**	**24**	**-16**	–
Additions due to acquisitions/divestments/ conclusion of factoring agreements	94	19	–	8	51	25	-9	–
Transfers into Level 3 from Level 1/Level 2	–	–	–	–	–	–	–	–
Fair value changes								
Gains (+)/losses (–) recognized in the consolidated income statement	-1	–	2	–		–	-1	-2
thereof: other operating result	-20	-1	-18	–		–	1	-2
thereof: attributable to assets/liabilities held as of the balance sheet date	-20	-1	-18	–		–	1	-2
thereof: financial income and expenses	19	2	20	–		–	-2	–
thereof: attributable to assets/liabilities held as of the balance sheet date	19	2	20	–		–	-2	–
Gains (+)/losses (–) recognized in other comprehensive income	22				22	–		
Currency translation difference	-1	-2	–	–	–	–	–	–
Disposals due to divestments/payments received/payments made	-33	-3	–	–	–	-31	–	–
Transfers out of Level 3 into Level 1/Level 2	-16	–	–	–	-16	–	–	–
Other	–	-9	–	–	9	–	–	–
Net carrying amounts as of Dec. 31, 2020	**547**	**33**	**260**	**8**	**255**	**19**	**-26**	**-2**

Additions during the reporting period primarily comprised acquisitions of equity instruments and trade accounts receivable that are designated to be sold on account of a factoring agreement, as well as acquisitions of convertible notes. Disposals during the reporting period related in particular to advance payments received in connection with trade accounts receivable under factoring agreements. The transfers from Level 3 to Level 1 related to the M Ventures portfolio companies F-star Therapeutics, Inc., United States, and Galecto, Inc., United States, which are now listed. The gains and losses from Level 3 assets recognized in other comprehensive income were reported in the consolidated statement of comprehensive income under the item “fair value adjustments”.

The changes in financial assets and liabilities for each of the individual classes of financial instruments allocated to Level 3 and measured at fair value were as follows in 2019:

2019

		Financial assets					Financial liabilities
		Subsequent measurement at fair value through profit or loss			Subsequent measurement at fair value through other comprehensive income		Subseqent measurement at fair value through profit or loss
€ million	**Total**	Other debt instruments	Contingent consideration	Derivatives without a hedging relationship	Equity instruments	Trade and other receivables	Contingent consideration
Net carrying amounts, Jan. 1, 2019	**487**	**27**	**259**	**45**	**140**	**21**	**-5**
Additions due to acquisitions/divestments/conclusion of factoring agreements	73	9	–	–	53	26	-13
Transfers into Level 3 from Level 1/Level 2	–	–	–	–	–	–	–
Fair value changes							
Gains (+)/losses (–) recognized in the consolidated income statement	-22	3	19	-45		–	1
thereof: other operating result	3	2	-1	–		–	2
thereof: attributable to assets/liabilities held as of the balance sheet date	-11	2	-15	–		–	2
thereof: financial income and expenses	-25	1	20	-45		–	–
thereof: attributable to assets/liabilities held as of the balance sheet date	20	1	20	–		–	–
Gains (+)/losses (–) recognized in other comprehensive income	98				98	–	
Currency translation difference	–	–	–	–	–	–	–
Disposals due to divestments/payments received/payments made	-50	-2	-20	–	-6	-22	1
Transfers out of Level 3 into Level 1/Level 2	-104	–	–	–	-104	–	–
Other	–	-10	–	–	10	–	–
Net carrying amounts as of Dec. 31, 2019	**483**	**26**	**258**	**–**	**190**	**24**	**-16**

The following equity instruments measured at fair value through other comprehensive income were disposed of in 2020 and 2019:

€ million	Reasons for the disposal	Fair value on the date of derecognition	The cumulative gain (+) or loss (–) on disposal recognized in other comprehensive income	Transfer of the cumulative gains (+) or losses (–) within group equity to retained earnings
2020[1]				
M Ventures portfolio companies	Portfolio adjustment/restructuring and full acquisition by third parties	100	91	91
2019[1]				
M Ventures portfolio companies	Portfolio adjustment/restructuring and full acquisition by third parties	13	5	5

[1] Disposals due to liquidations are not included.

The M Ventures portfolio companies disposed of in fiscal 2020 related to ObsEva SA, Switzerland (fair value as of December 31, 2019: € 3 million) and shares in Progyny, Inc., United States (2019: Translate Bio, Inc., USA, Canbex Therapeutics Ltd., United Kingdom, and shares in Progyny, Inc., United States).

M Ventures portfolio companies mainly include minority interests in listed and unlisted companies. The mandate of M Ventures is to invest in innovative technologies and products that are related to the Group's three business sectors.

(44) Other financial obligations

Other financial obligations comprised the following:

€ million	**Dec. 31, 2020**	Dec. 31, 2019
Acquisition of intangible assets	850	984
Acquisition of property, plant, and equipment	135	159
Other financial obligations	**985**	**1,143**

Obligations to acquire intangible assets existed in particular owing to contingent considerations within the scope of in-licensing and research and development collaborations. In these agreements, the Group has entered into an obligation to make milestone payments once specific targets have been reached. In the not very likely event that all contract partners achieve all of their milestones, the Group would be obligated to pay up to € 850 million (December 31, 2019: € 984 million) for the acquisition of intangible assets. The decrease compared with the previous year is primarily attributable to out-licensing and clinical results in the portfolio of the in-licensing agreements concluded in the Healthcare business sector (see Note (7) "Collaboration agreements"). The table above does not contain any other financial obligations from possible future sales-based license fees and milestone payments.

The expected maturities of the obligations to acquire intangible assets were as follows:

€ million	**Dec. 31, 2020**	Dec. 31, 2019
Within 1 year	33	55
In 1-5 years	152	159
After more than 5 years	665	770
Obligations to acquire intangible assets	**850**	**984**

Other financial obligations were recognized at nominal value.

Other Disclosures

(45) Related party disclosures

Accounting and Measurement Policies

Related party disclosures

Related parties in respect of the Group are E. Merck KG, Darmstadt, Germany, Emanuel-Merck-Vermögens-KG, Darmstadt, Germany, a related party of E. Merck KG, Darmstadt, Germany, and E. Merck Beteiligungen KG, Darmstadt, Germany, a related party of E. Merck KG, Darmstadt, Germany. Furthermore, direct or indirect subsidiaries of Merck KGaA, Darmstadt, Germany, associates of the Group, joint ventures of the Group, as well as pension funds that are classified as defined benefit plans in accordance with IAS 19 are also related parties within the meaning of IAS 24. Members of the Executive Board and the Supervisory Board of Merck KGaA, Darmstadt, Germany, the Executive Board and the Board of Partners of E. Merck KG, Darmstadt, Germany, as well as close members of their families are also related parties, as are companies controlled or jointly controlled by this group of persons or over which this group of persons can exercise significant influence.

Transactions were conducted with related parties as follows:

	Income		Expenses		Receivables		Liabilities	
€ million	**2020**	2019	**2020**	2019	**Dec. 31, 2020**	Dec. 31, 2019	**Dec. 31, 2020**	Dec. 31, 2019
E. Merck KG, Darmstadt, Germany	1.3	1.2	0.5	0.5	0.1	14.3	1,373.7	1,320.0
E. Merck Beteiligungen KG, Darmstadt, Germany, a related party of E. Merck KG, Darmstadt, Germany	0.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Emanuel-Merck-Vermögens-KG, Darmstadt, Germany, a related party of E. Merck KG, Darmstadt, Germany	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Joint ventures	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Non-consolidated subsidiaries	0.1	0.1	0.5	0.3	3.4	5.4	5.2	5.9

As in the previous year, the liabilities of Group companies in respect of E. Merck KG, Darmstadt, Germany, primarily resulted from mutual profit transfers between Merck KGaA, Darmstadt, Germany, and E. Merck KG, Darmstadt, Germany, as well as the profit transfer by Merck & Cie, Altdorf, Switzerland, a subsidiary of Merck KGaA, Darmstadt, Germany, to E. Merck KG, Darmstadt, Germany. They included financial liabilities of € 815.9 million (December 31, 2019: € 808.4 million), subject to standard market interest rates. Neither collateral nor guarantees existed for any of the balances either in favor or to the disadvantage of the Group.

Between January and December 2020, expenses of € 0.7 million (April 26 to December 31, 2019: € 0.1 million) for supplies of goods resulted from transactions with Engel-Apotheke, Darmstadt, whose owner has been a member of the Supervisory Board of Merck KGaA, Darmstadt, Germany, since April 26, 2019.

Information on pension funds that are classified as defined benefit plans in accordance with IAS 19 can be found in Note (33) “Provisions for employee benefits”.

Information on Executive Board and Supervisory Board compensation can be found in Note (46) “Executive Board and Supervisory Board compensation”. Activities above and beyond those described therein, such as the provision of services or the granting of loans, between companies of the Group and members of the Executive Board or the Supervisory Board of Merck KGaA, Darmstadt, Germany, the Executive Board or the Board of Partners of E. Merck KG, Darmstadt, Germany, or members of their immediate families did not take place in either fiscal 2020 or the previous year.

(46) Executive Board and Supervisory Board compensation

As a matter of principle, the compensation of the Executive Board of Merck KGaA, Darmstadt, Germany, is paid by the general partner, E. Merck KG, Darmstadt, Germany, and recognized in its income statement. From January to December 2020, companies included in these consolidated financial statements also recognized expenses of € 2.4 million (2019: € 3.8 million) for services rendered by members of the Executive Board of Merck KGaA, Darmstadt, Germany, at these companies.

From January to December 2020, for members of the Executive Board of Merck KGaA, Darmstadt, Germany, salaries amounting to € 27.4 million (2019: € 27.6 million) were recorded by E. Merck KG, Darmstadt, Germany, and by companies included in these consolidated financial statements, thereof fixed salaries of € 5.3 million (2019: € 5.6 million), variable compensation of € 14.0 million (2019: € 15.3 million), and additional benefits of € 0.4 million (2019: € 0.8 million); as part of the Long-Term Incentive Plan, the members of the Executive Board were eligible to receive 83,210 virtual shares – Share Units of Merck KGaA, Darmstadt, Germany (MSUs) – subject to target achievement (December 31, 2019: 92,588 MSUs). The fair value of these MSUs at the grant date was € 7.7 million (December 31, 2019: € 5.9 million). The grant value was € 8.8 million (December 31, 2019: € 8.7 million).

Furthermore, in fiscal 2020, for members of the Executive Board additions to provisions included expenses of € 17.5 million (2019: € 7.1 million) for the long-term incentive plan, and additions to pension provisions included current service costs of € 3.0 million (2019: € 3.0 million).

Payments to former members of the Executive Board or their surviving dependents are made for a limited period of time and represent continued payment of fixed compensation in the event of death, as well as pension payments. In fiscal 2020, these amounted to € 13.8 million (2019: € 13.4 million). The pension provisions for 2020 amounted to € 177.0 million (December 31, 2019: € 163.6 million).

The compensation of the Supervisory Board in fiscal 2020 amounting to € 870.5 thousand (2019: € 880.8 thousand) consisted of a fixed portion of € 822.5 thousand (2019: € 823.8 thousand) and meeting attendance compensation of € 48.0 thousand (2019: € 57.0 thousand).

As in the previous year, no compensation was paid to former members of the Supervisory Board in fiscal 2020.

As in the previous year, in fiscal 2020, members of the Executive Board and the Supervisory Board received no advance payments or loans; the Group did not enter into contingent liability relationships in favor of these persons.

Further individualized information and disclosures, as well as a presentation of the compensation system for the members of the Executive Board and the Supervisory Board, can be found in the compensation report in the combined management report.

(47) Auditor’s fees

The costs for the auditors (KPMG) of the financial statements of the Group consisted of the following:

€ million	**2020** Group	**2020** thereof: KPMG AG Wirtschafts-prüfungs-gesellschaft, Germany	2019 Group	2019 thereof: KPMG AG Wirtschafts-prüfungs-gesellschaft, Germany
Audits of financial statements	9.3	2.6	9.6	2.8
Other audit-related services	0.5	0.4	0.7	0.3
Tax consultancy services	0.3	–	0.4	0.1
Other services	0.3	0.1	0.3	0.1
Total	**10.4**	**3.1**	**11.0**	**3.3**

Other audit-related services pertained to various statutory or contractually agreed audits. Tax consultancy services encompassed services in connection with the preparation of tax returns for employees delegated abroad. Other services included other consultancy services in regulatory and business matters.

(48) Corporate governance

The Statement of Compliance in accordance with section 161 of the German Stock Corporation Act (Aktiengesetz) was updated and published in the corporate governance section of the website **www.emdgroup.com/investors > Corporate governance** in March 2020 and thus made permanently available.

(49) Information on preparation and approval

The Executive Board of Merck KGaA, Darmstadt, Germany, prepared the consolidated financial statements on February 16, 2021, and approved them for forwarding to the Supervisory Board. The Supervisory Board is responsible for examining the consolidated financial statements and declaring whether it approves them.

Scope of Consolidation

(50) List of shareholdings

The shareholdings of Merck KGaA, Darmstadt, Germany, as of December 31, 2020, are presented below, along with a list of the fair values for equity instruments subsequently measured at fair value through other comprehensive income.

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA, Darmstadt, Germany (%)
I. Fully consolidated companies				
Germany				
Germany	Merck KGaA, Darmstadt, Germany	Darmstadt	Parent company	
Germany	AmpTec GmbH	Hamburg	100.00	
Germany	AZ Electronic Materials GmbH	Darmstadt	100.00	
Germany	Biochrom GmbH A)	Berlin	100.00	
Germany	BSSN Software GmbH A)	Darmstadt	100.00	
Germany	BSSN UG (haftungsbeschränkt) A)	Darmstadt	100.00	100.00
Germany	Chemitra GmbH A)	Darmstadt	100.00	100.00
Germany	Emedia Export Company mbH	Gernsheim	100.00	
Germany	Merck 12. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany A)	Darmstadt	100.00	100.00
Germany	Merck 13. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	
Germany	Merck 15. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	
Germany	Merck 16. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany A)	Darmstadt	100.00	
Germany	Merck 20. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany A)	Darmstadt	100.00	
Germany	Merck 21. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	
Germany	Merck 24. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany A)	Darmstadt	100.00	100.00
Germany	Merck Accounting Solutions & Services Europe GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany A)	Weiterstadt	100.00	100.00
Germany	Merck Chemicals GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany A)	Darmstadt	100.00	
Germany	Merck Consumer Health Holding Germany GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck Export GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany A)	Darmstadt	100.00	100.00
Germany	Merck Financial Services GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck Financial Trading GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Gernsheim	100.00	
Germany	Merck Healthcare Holding GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck Healthcare KGaA, a subsidiary of Merck KGaA, Darmstadt, Germany A)	Darmstadt	100.00	
Germany	Merck Holding GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Gernsheim	100.00	100.00
Germany	Merck International GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00

Footnotes follow at the end of the table

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA, Darmstadt, Germany (%)
Germany	Merck Internationale Beteiligungen GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	
Germany	Merck Life Science Germany GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany A)	Darmstadt	100.00	
Germany	Merck Life Science GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany A)	Eppelheim	100.00	100.00
Germany	Merck Life Science Holding GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck Patent GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany A)	Darmstadt	100.00	
Germany	Merck Performance Materials Germany GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany A)	Darmstadt	100.00	
Germany	Merck Performance Materials GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Wiesbaden	100.00	
Germany	Merck Performance Materials Holding GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Merck Real Estate GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany A)	Darmstadt	100.00	100.00
Germany	Merck Schuchardt OHG, a subsidiary of Merck KGaA, Darmstadt, Germany	Hohenbrunn	100.00	100.00
Germany	Merck Serono GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany A)	Darmstadt	100.00	100.00
Germany	Merck Vierte Allgemeine Beteiligungsgesellschaft mbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Gernsheim	100.00	
Germany	Merck Wohnungs- und Grundstücksverwaltungsgesellschaft mbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00
Germany	Sigma-Aldrich Biochemie GmbH	Steinheim	100.00	
Germany	Sigma-Aldrich Chemie GmbH	Steinheim	100.00	
Germany	Sigma-Aldrich Chemie Holding GmbH	Taufkirchen	100.00	
Germany	Sigma-Aldrich Grundstücks GmbH & Co. KG	Steinheim	100.00	
Germany	Sigma-Aldrich Logistik GmbH	Steinheim	100.00	
Germany	Sigma-Aldrich Produktions GmbH	Steinheim	100.00	
Germany	Sigma-Aldrich Verwaltungs GmbH	Steinheim	100.00	100.00
Germany	Versum Materials Germany GmbH	Frankfurt am Main	100.00	
Other European countries				
Austria	Merck Chemicals and Life Science GesmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Vienna	100.00	
Austria	Merck Gesellschaft mbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Vienna	100.00	
Austria	Sigma-Aldrich Handels GmbH	Vienna	100.00	

Footnotes follow at the end of the table

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA, Darmstadt, Germany (%)
Belgium	Merck Chemicals N.V./S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Overijse	100.00	
Belgium	Merck N.V.-S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Overijse	100.00	
Belgium	Sigma-Aldrich BVBA/SPRL	Overijse	100.00	
Bulgaria	Merck Bulgaria EAD, a subsidiary of Merck KGaA, Darmstadt, Germany	Sofia	100.00	
Croatia	Merck d.o.o., a subsidiary of Merck KGaA, Darmstadt, Germany	Zagreb	100.00	
Czech Republic	Merck spol. s r.o., a subsidiary of Merck KGaA, Darmstadt, Germany	Prague	100.00	
Czech Republic	Sigma-Aldrich spol s r.o.	Prague	100.00	
Denmark	Merck A/S, a subsidiary of Merck KGaA, Darmstadt, Germany	Soborg	100.00	
Denmark	Merck Life Science A/S, a subsidiary of Merck KGaA, Darmstadt, Germany	Soborg	100.00	
Denmark	Survac ApS	Frederiksberg	100.00	100.00
Estonia	Merck Serono OÜ, a subsidiary of Merck KGaA, Darmstadt, Germany	Tallinn	100.00	
Finland	Merck Life Science OY, a subsidiary of Merck KGaA, Darmstadt, Germany	Espoo	100.00	
Finland	Merck OY, a subsidiary of Merck KGaA, Darmstadt, Germany	Espoo	100.00	
France	Gonnon S.A.S.	Lyon	100.00	
France	Merck Biodevelopment S.A.S., a subsidiary of Merck KGaA, Darmstadt, Germany	Lyon	100.00	
France	Merck Chimie S.A.S., a subsidiary of Merck KGaA, Darmstadt, Germany	Fontenay s/Bois	100.00	
France	Merck Performance Materials S.A.S., a subsidiary of Merck KGaA, Darmstadt, Germany	Trosly Breuil	100.00	
France	Merck S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Lyon	99.86	
France	Merck Santé S.A.S., a subsidiary of Merck KGaA, Darmstadt, Germany	Lyon	100.00	
France	Merck Serono S.A.S., a subsidiary of Merck KGaA, Darmstadt, Germany	Lyon	100.00	
France	Millipore S.A.S.	Molsheim	100.00	
France	Resolution Spectra Systems S.A.S.	Meylan	100.00	
France	Sigma-Aldrich Chimie S.a.r.l.	Saint Quentin Fallavier	100.00	
France	Sigma-Aldrich Chimie SNC	Saint Quentin Fallavier	100.00	
France	Sigma-Aldrich Holding S.a.r.l.	Saint Quentin Fallavier	100.00	
Greece	Merck A.E., a subsidiary of Merck KGaA, Darmstadt, Germany	Maroussi, Athens	100.00	
Hungary	Merck Kft., a subsidiary of Merck KGaA, Darmstadt, Germany	Budapest	100.00	
Hungary	Sigma-Aldrich Kft.	Budapest	100.00	
Ireland	Merck Finance Limited, a subsidiary of Merck KGaA, Darmstadt, Germany	Carrigtwohill	100.00	
Ireland	Merck Millipore Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Carrigtwohill	100.00	

Footnotes follow at the end of the table

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA, Darmstadt, Germany (%)
Ireland	Merck Serono (Ireland) Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Dublin	100.00	
Ireland	Millipore Cork Unlimited Company	Carrigtwohill	100.00	
Ireland	Shrawdine Limited	Arklow	100.00	
Ireland	Sigma-Aldrich Ireland Ltd.	Arklow	100.00	
Ireland	Silverberry Limited	Arklow	100.00	
Ireland	Versum Materials Ireland Limited	Dublin	100.00	
Italy	Allergopharma S.r.l.	Rome	100.00	
Italy	Istituto di Ricerche Biomediche Antoine Marxer RBM S.p.A.	Colleretto Giacosa	100.00	
Italy	Merck Life Science S.r.l., a subsidiary of Merck KGaA, Darmstadt, Germany	Milan	100.00	
Italy	Merck S.p.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Milan	100.00	
Italy	Merck Serono S.p.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Rome	99.74	
Italy	Versum Materials Italia S.r.l.	Milan	100.00	
Lativa	Merck Serono SIA, a subsidiary of Merck KGaA, Darmstadt, Germany	Riga	100.00	
Lithuania	Merck Serono, UAB, a subsidiary of Merck KGaA, Darmstadt, Germany	Vilnius	100.00	
Luxembourg	Mats Finance S.a.r.l.	Luxembourg	100.00	
Luxembourg	Merck Chemicals Holding S.a.r.l., a subsidiary of Merck KGaA, Darmstadt, Germany	Luxembourg	100.00	
Luxembourg	Merck Finance S.a.r.l., a subsidiary of Merck KGaA, Darmstadt, Germany	Luxembourg	100.00	
Luxembourg	Merck Finanz S.a.r.l., a subsidiary of Merck KGaA, Darmstadt, Germany	Luxembourg	100.00	
Luxembourg	Merck Holding S.a.r.l., a subsidiary of Merck KGaA, Darmstadt, Germany	Luxembourg	100.00	
Luxembourg	Merck Invest SCS, a subsidiary of Merck KGaA, Darmstadt, Germany	Luxembourg	100.00	
Luxembourg	Merck Re S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Luxembourg	100.00	100.00
Luxembourg	Millipore International Holdings, S.a.r.l.	Luxembourg	100.00	
Luxembourg	Sigma-Aldrich Global S.a.r.l.	Luxembourg	100.00	
Luxembourg	Sigma-Aldrich S.a.r.l.	Luxembourg	100.00	
Malta	Merck Capital Holding Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Pietà	100.00	50.29
Malta	Merck Capital Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Pietà	100.00	

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA, Darmstadt, Germany (%)
Netherlands	eyrise B.V.	Veldhoven	100.00	100.00
Netherlands	Merck B.V., a subsidiary of Merck KGaA, Darmstadt, Germany	Schiphol-Rijk	100.00	
Netherlands	Merck Chemicals B.V., a subsidiary of Merck KGaA, Darmstadt, Germany	Amsterdam Zuidoost	100.00	
Netherlands	Merck Europe B.V., a subsidiary of Merck KGaA, Darmstadt, Germany	Amsterdam	100.00	
Netherlands	Merck Holding Netherlands B.V., a subsidiary of Merck KGaA, Darmstadt, Germany	Schiphol-Rijk	100.00	
Netherlands	Merck Ventures B.V., a subsidiary of Merck KGaA, Darmstadt, Germany	Amsterdam	100.00	
Netherlands	Serono Tri Holdings B.V.	Schiphol-Rijk	100.00	
Netherlands	Sigma-Aldrich B.V.	Zwijndrecht	100.00	
Netherlands	Sigma-Aldrich Chemie N.V.	Zwijndrecht	100.00	
Netherlands	Versum Materials Asia B.V.	Utrecht	100.00	
Netherlands	Versum Materials Holdings Nederland B.V.	Utrecht	100.00	
Netherlands	Versum Materials International B.V.	Utrecht	100.00	
Netherlands	Versum Materials Netherlands B.V.	Utrecht	100.00	
Netherlands	Versum Materials Netherlands International B.V.	Utrecht	100.00	
Netherlands	Versum Materials Pacific B.V.	Utrecht	100.00	
Norway	Merck Life Science AS, a subsidiary of Merck KGaA, Darmstadt, Germany	Oslo	100.00	
Poland	Merck Business Solutions Europe Sp.z.o.o., a subsidiary of Merck KGaA, Darmstadt, Germany	Wroclaw	100.00	
Poland	Merck Sp.z.o.o., a subsidiary of Merck KGaA, Darmstadt, Germany	Warsaw	100.00	
Poland	Sigma-Aldrich Sp.z.o.o.	Poznan	100.00	
Portugal	Merck, S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Algés	100.00	
Romania	Merck Romania S.R.L., a subsidiary of Merck KGaA, Darmstadt, Germany	Bucharest	100.00	
Russia	Merck LLC, a subsidiary of Merck KGaA, Darmstadt, Germany	Moscow	100.00	
Russia	Sigma-Aldrich Rus LLC	Moscow	100.00	
Serbia	Merck d.o.o. Beograd, a subsidiary of Merck KGaA, Darmstadt, Germany	Belgrade	100.00	

Footnotes follow at the end of the table

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA, Darmstadt, Germany (%)
Slovakia	Merck spol. s r.o., a subsidiary of Merck KGaA, Darmstadt, Germany	Bratislava	100.00	
Slovakia	Sigma-Aldrich, spol. s r.o.	Bratislava	100.00	
Slovenia	Merck d.o.o., a subsidiary of Merck KGaA, Darmstadt, Germany	Ljubljana	100.00	
Spain	Merck Chemicals and Life Science S.A.U., a subsidiary of Merck KGaA, Darmstadt, Germany	Madrid	100.00	
Spain	Merck Life Science S.L.U., a subsidiary of Merck KGaA, Darmstadt, Germany	Madrid	100.00	
Spain	Merck, S.L.U., a subsidiary of Merck KGaA, Darmstadt, Germany	Madrid	100.00	
Sweden	Merck AB, a subsidiary of Merck KGaA, Darmstadt, Germany	Solna	100.00	
Sweden	Merck Chemicals and Life Science AB, a subsidiary of Merck KGaA, Darmstadt, Germany	Solna	100.00	
Sweden	Sigma-Aldrich Sweden AB	Stockholm	100.00	
Switzerland	Ares Trading SA	Aubonne	100.00	
Switzerland	Merck & Cie, a subsidiary of Merck KGaA, Darmstadt, Germany	Altdorf	51.63	51.63
Switzerland	Merck (Schweiz) AG, a subsidiary of Merck KGaA, Darmstadt, Germany	Zug	100.00	
Switzerland	Merck Performance Materials (Schweiz) AG, a subsidiary of Merck KGaA, Darmstadt, Germany	Schaffhausen	100.00	
Switzerland	Merck Serono SA, a subsidiary of Merck KGaA, Darmstadt, Germany	Aubonne	100.00	
Switzerland	SeroMer Holding SA	Coinsins	100.00	
Switzerland	Sigma-Aldrich (Switzerland) Holding AG	Buchs	100.00	
Switzerland	Sigma-Aldrich Chemie GmbH	Buchs	100.00	
Switzerland	Sigma-Aldrich International GmbH	Buchs	100.00	
Switzerland	Sigma-Aldrich Production GmbH	Buchs	100.00	
Turkey	Merck Ilac Ecza ve Kimya Ticaret AS, a subsidiary of Merck KGaA, Darmstadt, Germany	Istanbul	100.00	
United Kingdom	BioReliance Limited	Aberdeen	100.00	
United Kingdom	BioReliance U.K. Acquisition Limited	London	100.00	
United Kingdom	Epichem Group Limited	Gillingham	100.00	
United Kingdom	Merck Holding Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Feltham	100.00	
United Kingdom	Merck Investments Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Feltham	100.00	
United Kingdom	Merck Life Science UK Limited, a subsidiary of Merck KGaA, Darmstadt, Germany	Gillingham	100.00	
United Kingdom	Merck Performance Materials Limited, a subsidiary of Merck KGaA, Darmstadt, Germany	Feltham	100.00	
United Kingdom	Merck Serono Europe Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Feltham	100.00	
United Kingdom	Merck Serono Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Feltham	100.00	
United Kingdom	Millipore (U.K.) Limited	Feltham	100.00	
United Kingdom	Millipore UK Holdings LLP	Feltham	100.00	
United Kingdom	SAFC Biosciences Limited	Gillingham	100.00	
United Kingdom	SAFC Hitech Limited	Gillingham	100.00	
United Kingdom	Sigma-Aldrich Company Limited	Gillingham	100.00	
United Kingdom	Versum Materials UK Limited	London	100.00	

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA, Darmstadt, Germany (%)
North America				
Canada	EMD Chemicals Canada Inc.	Oakville	100.00	
Canada	EMD Crop BioScience Canada Inc.	Toronto	100.00	
Canada	EMD Inc.	Mississauga	100.00	
Canada	Millipore (Canada) Ltd.	Oakville	100.00	
Canada	Natrix Separations, Inc.	Burlington	100.00	
Canada	Sigma-Aldrich Canada Co.	Oakville	100.00	
United States	Aldrich Chemical Co. LLC	Milwaukee	100.00	
United States	Aldrich Chemical Foreign Holding LLC	St. Louis	100.00	
United States	Aldrich-APL, LLC	Urbana	100.00	
United States	BioControl Systems, Inc.	Wilmington	100.00	
United States	BioReliance Corporation	Rockville	100.00	
United States	Cell Marque Corporation	Rocklin	100.00	
United States	Cerilliant Corporation	Round Rock	100.00	
United States	Electron Transfer Technologies, Inc.	West Trenton	100.00	
United States	EMD Accounting Solutions & Services America, Inc.	Rockland	100.00	
United States	EMD Digital Inc.	Burlington	100.00	
United States	EMD Finance LLC	Wilmington	100.00	
United States	EMD Group Holding, Inc.	Wilmington	100.00	
United States	EMD Holding Corp.	Rockland	100.00	
United States	EMD Millipore Corporation	Burlington	100.00	
United States	EMD Performance Materials Corp.	Philadelphia	100.00	
United States	EMD Serono Holding, Inc.	Rockland	100.00	
United States	EMD Serono Research & Development Institute, Inc.	Billerica	100.00	
United States	EMD Serono, Inc.	Rockland	100.00	
United States	FloDesign Sonics, Inc.	Wilbraham	100.00	
United States	Grzybowski Scientific Inventions Ltd.	Evanston	100.00	
United States	Intermolecular, Inc.	Wilmington	100.00	
United States	J.C. Schumacher Company	Los Angeles	100.00	
United States	Millipore Asia Ltd.	Wilmington	100.00	
United States	Millipore UK Holdings I, LLC	Wilmington	100.00	
United States	Millipore UK Holdings II, LLC	Wilmington	100.00	
United States	Ormet Circuits, Inc.	San Diego	100.00	
United States	Research Organics, LLC	Cleveland	100.00	
United States	SAFC Biosciences, Inc.	Lenexa	100.00	
United States	SAFC Carlsbad, Inc.	Carlsbad	100.00	
United States	SAFC, Inc.	Madison	100.00	
United States	Serono Laboratories, Inc.	Rockland	100.00	
United States	Sigma Chemical Foreign Holding LLC	St. Louis	100.00	
United States	Sigma Redevelopment Corporation	St. Louis	100.00	
United States	Sigma-Aldrich Co. LLC	St. Louis	100.00	
United States	Sigma-Aldrich Corporation	St. Louis	100.00	
United States	Sigma-Aldrich Foreign Holding Co.	St. Louis	100.00	
United States	Sigma-Aldrich Manufacturing LLC	St. Louis	100.00	
United States	Sigma-Aldrich Missouri Insurance Company	St. Louis	100.00	
United States	Sigma-Aldrich Research Biochemicals, Inc.	Natick	100.00	
United States	Sigma-Aldrich RTC, Inc.	Laramie	100.00	
United States	Sigma-Aldrich, Inc.	Milwaukee	100.00	
United States	Sigma-Genosys of Texas LLC	The Woodlands	100.00	
United States	Supelco, Inc.	Bellefonte	100.00	

Footnotes follow at the end of the table

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA, Darmstadt, Germany (%)
United States	Versum Materials Formulations and Technology, LLC	Wilmington	100.00	
United States	Versum Materials Manufacturing Company, LLC	Wilmington	100.00	
United States	Versum Materials Technology LLC	Wilmington	100.00	
United States	Versum Materials US International, Inc.	Wilmington	100.00	
United States	Versum Materials US LLC	Wilmington	100.00	
United States	Versum Materials, Inc.	Wilmington	100.00	
Asia-Pacific (APAC)				
Australia	Merck Healthcare Pty. Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Macquarie Park	100.00	
Australia	Merck Pty. Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Bayswater	100.00	
Australia	SAFC Biociences Pty. Ltd.	Macquarie Park	100.00	
Australia	Sigma-Aldrich Oceania Pty. Ltd.	Macquarie Park	100.00	
Australia	Sigma-Aldrich Pty. Ltd.	Macquarie Park	100.00	
China	Beijing Skywing Technology Co., Ltd.	Beijing	100.00	
China	Merck Chemicals (Shanghai) Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Shanghai	100.00	
China	Merck Display Materials (Shanghai) Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Shanghai	100.00	
China	Merck Electronic Materials (Suzhou) Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Suzhou	100.00	
China	Merck Holding (China) Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Shanghai	100.00	
China	Merck Innovation Hub (Guangdong) Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Guangzhou	100.00	
China	Merck Life Science Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Hong Kong	100.00	
China	Merck Life Science Technologies (Nantong) Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Nantong	100.00	
China	Merck Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Hong Kong	100.00	
China	Merck Management Consulting (Shanghai) Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Shanghai	100.00	
China	Merck Performance Materials Hong Kong Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Hong Kong	100.00	
China	Merck Pharmaceutical (HK) Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Hong Kong	100.00	
China	Merck Pharmaceutical Distribution (Jiangsu) Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Nantong	100.00	
China	Merck Pharmaceutical Manufacturing (Jiangsu) Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Nantong	100.00	

Footnotes follow at the end of the table

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA, Darmstadt, Germany (%)
China	Merck Serono (Beijing) Pharmaceutical Distribution Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Beijing	100.00	
China	Merck Serono (Beijing) Pharmaceutical R&D Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Beijing	100.00	
China	Merck Serono Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Beijing	100.00	
China	SAFC Hitech (Shanghai) Co., Ltd.	Shanghai	100.00	
China	Sigma-Aldrich (Shanghai) Trading Co., Ltd.	Shanghai	100.00	
China	Sigma-Aldrich (Wuxi) Life Science & Technology Co., Ltd.	Wuxi	100.00	
China	Versum Materials (Dalian) Co., Ltd.	Dalian	100.00	
China	Versum Materials (Shanghai) Co., Ltd.	Shanghai	100.00	
India	Merck Life Science Pvt. Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Mumbai	100.00	
India	Merck Performance Materials Pvt. Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Mumbai	100.00	
India	Merck Specialities Pvt. Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Mumbai	100.00	
India	Sigma-Aldrich Chemicals Private Limited	Bangalore	100.00	
Indonesia	P.T. Merck Chemicals and Life Sciences, a subsidiary of Merck KGaA, Darmstadt, Germany	Jakarta	100.00	
Indonesia	P.T. Merck Tbk., a subsidiary of Merck KGaA, Darmstadt, Germany	Jakarta	86.65	
Japan	BioReliance K.K.	Tokyo	100.00	
Japan	Merck Biopharma Co., Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Tokyo	100.00	
Japan	Merck Electronics Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Tokyo	100.00	
Japan	Merck Holdings G.K., a subsidiary of Merck KGaA, Darmstadt, Germany	Tokyo	100.00	
Japan	Merck Limited, a subsidiary of Merck KGaA, Darmstadt, Germany	Tokyo	100.00	
Japan	Merck Performance Materials G.K., a subsidiary of Merck KGaA, Darmstadt, Germany	Tokyo	100.00	
Japan	Sigma-Aldrich Japan G.K.	Tokyo	100.00	
Japan	Versum Materials Japan Inc.	Tokyo	100.00	
Malaysia	Merck Sdn Bhd, a subsidiary of Merck KGaA, Darmstadt, Germany	Petaling Jaya	100.00	
Malaysia	Sigma-Aldrich (M) Sdn Bhd	Kuala Lumpur	100.00	
Malaysia	Versum Materials Malaysia Sdn Bhd	Kuala Lumpur	100.00	
New Zealand	Merck Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Auckland	100.00	
New Zealand	Sigma-Aldrich New Zealand Co.	Auckland	100.00	
Philippines	Merck Business Solutions Asia Inc., a subsidiary of Merck KGaA, Darmstadt, Germany	Bonifacio Global City	99.99	
Philippines	Merck Inc., a subsidiary of Merck KGaA, Darmstadt, Germany	Bonifacio Global City	100.00	
Singapore	Merck Performance Materials Pte. Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Singapore	100.00	
Singapore	Merck Pte. Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Singapore	100.00	
Singapore	Sigma-Aldrich Pte. Ltd.	Singapore	100.00	
Singapore	Versum Materials Singapore International Pte. Ltd.	Singapore	100.00	
Singapore	Versum Materials Singapore Pte. Ltd.	Singapore	100.00	

Footnotes follow at the end of the table

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA, Darmstadt, Germany (%)
South Korea	Merck Electronic Materials Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Seoul	100.00	
South Korea	Merck Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Seoul	100.00	
South Korea	Merck Performance Materials Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Pyeongtaek-shi	100.00	
South Korea	Sigma-Aldrich Korea Ltd.	Seoul	100.00	
South Korea	Versum Materials ADM Korea Inc.	Ansan-si	100.00	
South Korea	Versum Materials HYT Inc.	Ansan-si	100.00	
South Korea	Versum Materials Korea Inc.	Siheung-si	100.00	
South Korea	Versum Materials Korea Technology Inc.	Ansan-si	100.00	
South Korea	Versum Materials PM Korea Inc.	Ulsan	100.00	
South Korea	Versum Materials SPC Korea Ltd.	Pyeongtaek-shi	100.00	
Taiwan	Merck Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Taipei	100.00	
Taiwan	Merck Performance Materials Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Taipei	100.00	
Taiwan	SAFC Hitech Taiwan Co., Ltd.	Kaohsiung	100.00	
Taiwan	Versum Materials Taiwan Co., Ltd.	Taipei	74.00	
Thailand	Merck Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Bangkok	45.11	
Vietnam	Merck Healthcare Vietnam Limited, a subsidiary of Merck KGaA, Darmstadt, Germany	Ho Chi Minh City	100.00	
Vietnam	Merck Vietnam Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Ho Chi Minh City	100.00	
Latin America				
Argentina	Merck S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Buenos Aires	100.00	
Argentina	Sigma-Aldrich de Argentina S.R.L.	Buenos Aires	100.00	
Brazil	Merck S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Rio de Janeiro	100.00	
Brazil	Sigma-Aldrich Brasil Ltda.	Barueri	100.00	
Chile	Merck S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Santiago de Chile	100.00	
Chile	Sigma-Aldrich Quimica Ltda.	Santiago de Chile	100.00	
Colombia	Merck S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Bogota	100.00	
Ecuador	Merck C.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Quito	100.00	
Guatemala	Merck, S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Guatemala City	100.00	
Mexico	Merck Biopharma Distribution S.A. de C.V., a subsidiary of Merck KGaA, Darmstadt, Germany	Mexico City	100.00	
Mexico	Merck, S.A. de C.V., a subsidiary of Merck KGaA, Darmstadt, Germany	Mexico City	100.00	
Mexico	Sigma-Aldrich Quimica, S. de R.L. de C.V.	Toluca	100.00	
Panama	Mesofarma Corporation	Panama City	100.00	
Peru	Merck Peruana S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Lima	100.00	
Uruguay	Ares Trading Uruguay S.A.	Montevideo	100.00	

Footnotes follow at the end of the table

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA, Darmstadt, Germany (%)
Middle East and Africa (MEA)				
Egypt	Merck Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Cairo	100.00	
Israel	Inter-Lab Ltd.	Yavne	100.00	
Israel	InterPharm Laboratories Ltd.	Yavne	100.00	
Israel	Merck Serono Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Herzliya Pituach	100.00	
Israel	PMatX Ltd.	Yavne	90.00	
Israel	QLight Nanotech Ltd.	Jerusalem	100.00	
Israel	Sigma-Aldrich Israel Ltd.	Rehovot	100.00	
Israel	Versum Materials Israel Ltd.	Tel Aviv	100.00	
Kenya	Merck Healthcare and Life Science Limited, a subsidiary of Merck KGaA, Darmstadt, Germany	Nairobi	100.00	
South Africa	Merck (Pty) Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Halfway House	100.00	
South Africa	Sigma-Aldrich (Pty) Ltd.	Kempton Park	100.00	
Tunisia	Merck Promotion SARL, a subsidiary of Merck KGaA, Darmstadt, Germany	Tunis	100.00	
Tunisia	Merck SARL, a subsidiary of Merck KGaA, Darmstadt, Germany	Tunis	100.00	
United Arab Emirates	Merck Serono Middle East FZ-Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Dubai	100.00	
II. Companies accounted for using the equity method				
North America				
United States	Syntropy Technologies LLC	Wilmington	50.00	

Footnotes follow at the end of the table

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA, Darmstadt, Germany (%)	Fair value as of Dec. 31. 2020 (€ million)	Fair value as of Dec. 31. 2019 (€ million)
III. Subsidiaries not consolidated for reasons of materiality						
Germany						
Germany	Merck 25. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00	<0.5	<0.5
Germany	Merck 26. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00	<0.5	<0.5
Germany	Merck 27. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00	<0.5	<0.5
Germany	Merck 28. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00	<0.5	<0.5
Germany	Merck 29. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00	<0.5	<0.5
Germany	Merck 30. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00	<0.5	<0.5
Germany	Merck 31. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00	<0.5	<0.5
Germany	Merck 36. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00	<0.5	<0.5
Germany	Merck 37. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00	<0.5	<0.5
Germany	Merck 38. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00	<0.5	<0.5
Germany	Merck 39. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00	<0.5	<0.5
Germany	Merck 40. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00	<0.5	<0.5
Germany	Merck 41. Allgemeine Beteiligungs-GmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00	<0.5	<0.5
Other European countries						
Greece	Sigma-Aldrich (OM) Ltd.	Athens	100.00		<0.5	<0.5
Ireland	SAFC Arklow Ltd.	Arklow	100.00		<0.5	<0.5
Russia	Chemical Trade Limited LLC	Moscow	100.00		<0.5	<0.5

Footnotes follow at the end of the table

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA, Darmstadt, Germany (%)	Fair value as of Dec. 31. 2020 (€ million)	Fair value as of Dec. 31. 2019 (€ million)
United Kingdom	BioControl Systems Limited	London	100.00		<0.5	-
United Kingdom	Merck Cross Border Trustees Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Feltham	100.00		<0.5	<0.5
United Kingdom	Merck Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Feltham	100.00		<0.5	<0.5
United Kingdom	Merck Pension Trustees Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Feltham	100.00		<0.5	<0.5
United Kingdom	Sigma Chemical Co. Ltd.	Gillingham	100.00		<0.5	<0.5
United Kingdom	Sigma-Aldrich Financial Services Limited	Gillingham	100.00		<0.5	-
North America						
United States	EMD Digital Holdings LLC	Wilmington	100.00		<0.5	-
United States	Fluka Chemical Corp.	St. Louis	100.00		<0.5	<0.5
United States	TocopheRx, Inc.	Burlington	100.00		B)	B)
Latin America						
Dominican Republic	Merck Dominicana, S.R.L., a subsidiary of Merck KGaA, Darmstadt, Germany	Santo Domingo	100.00		<0.5	<0.5
Panama	Merck, S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Panama City	100.00		<0.5	-
Middle East and Africa (MEA)						
Algeria	MDCA Pharma Promotion SARL	Hydra	49.00		<0.5	<0.5
Morocco	Merck Maroc S.A.R.L., a subsidiary of Merck KGaA, Darmstadt, Germany	Casablanca	100.00		<0.5	<0.5
Nigeria	Merck Pharmaceutical and Life Sciences Ltd., a subsidiary of Merck KGaA, Darmstadt, Germany	Lagos	100.00		<0.5	<0.5
IV. Majority interest in non-controlled companies						
Germany						
Germany	Merck Foundation gGmbH, a subsidiary of Merck KGaA, Darmstadt, Germany	Darmstadt	100.00	100.00	<0.5	<0.5
Latin America						
Venezuela	Merck S.A., a subsidiary of Merck KGaA, Darmstadt, Germany	Caracas	100.00		<0.5	<0.5
Venezuela	Representaciones MEPRO S.A.	Caracas	100.00		<0.5	<0.5

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA, Darmstadt, Germany (%)	Fair value as of Dec. 31. 2020 (€ million)	Fair value as of Dec. 31. 2019 (€ million)
V. Associated companies not accounted for using the equity method for reasons of materiality						
Other European countries						
Netherlands	Calypso Biotech B.V.	Amsterdam	38.81		B)	B)
Netherlands	iOnctura B.V.	Amsterdam	29.44		B)	B)
Switzerland	Asceneuron SA	Lausanne	25.35		B)	B)
Switzerland	CAMAG Chemie-Erzeugnisse und Adsorptionstechnik AG	Muttenz	39.11		2	2
Switzerland	Vaximm AG	Basel	22.06		B)	B)
North America						
United States	Prolog Healthy Living Fund II, L.P.	St. Louis	50.58		C)	C)
United States	Prolog Healthy Living Fund, L.P.	St. Louis	38.32		C)	C)
VI. Other equity positions						
Germany						
Germany	Alcan Systems GmbH	Darmstadt	<20.00		B)	B)
Germany	Azelis Deutschland Kosmetik GmbH	Sankt Augustin	<20.00		<0.5	2
Germany	Ferroelectric Memory GmbH	Dresden	<20.00		B)	-
Germany	InfraServ GmbH & Co. Wiesbaden KG	Wiesbaden	<20.00		12	6
Germany	Inuru GmbH	Berlin	<20.00		<0.5	<0.5
Germany	IOmx Therapeutics AG	Martinsried	<20.00		B)	B)
Germany	LegenDairy Foods GmbH	Berlin	<20.00		B)	B)
Germany	micropsi industries GmbH	Berlin	<20.00		B)	-
Germany	pharma mall Gesellschaft für Electronic Commerce mbH	Sankt Augustin	<20.00		1	1
Germany	PharmLog Pharma Logistik GmbH	Boenen	<20.00		2	3
Germany	PrintCity GmbH & Co. KG	Neuried	<20.00	<20.00	<0.5	<0.5

Footnotes follow at the end of the table

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA, Darmstadt, Germany (%)	Fair value as of Dec. 31. 2020 (€ million)	Fair value as of Dec. 31. 2019 (€ million)
Other European countries						
Belgium	ReWind Therapeutics N.V.	Leuven-Heverlee	<20.00		B)	B)
Finland	Abacus Diagnostica OY	Turku	<20.00		<0.5	<0.5
Finland	Forendo Pharma OY	Turku	<20.00		B)	B)
France	Aveni SACS	Massy	<20.00		B)	B)
France	DNA Script S.A.S.	Paris	<20.00		B)	B)
France	Scipio Bioscience S.A.S.	Montrouge	<20.00		B)	-
Netherlands	Anavo Therapeutics B.V.	Leiden	<20.00		B)	-
Netherlands	Mosa Meat B.V.	Maastricht	<20.00		B)	B)
Netherlands	SynAffix B.V.	Nijmegen	<20.00		B)	B)
Switzerland	FoRx Therapeutics AG	Basel	<20.00		B)	B)
Switzerland	Inthera Bioscience AG	Schlieren	23.28		B)	B)
United Kingdom	Artios Pharma Limited	Cambridge	<20.00		B)	B)
United Kingdom	Macrophage Pharma Limited	Cambridge	20.31		B)	B)
United Kingdom	Peratech HoldCo Limited	Brompton-on-Swale	<20.00		B)	B)
United Kingdom	Storm Therapeutics Limited	London	<20.00		B)	B)
North America						
United States	Akili Interactive Labs, Inc.	Boston	<20.00		B)	B)
United States	Allozyne, Inc.	Seattle	<20.00		<0.5	<0.5
United States	Altoida, Inc.	Suwanee	<20.00		B)	B)
United States	ApoGen Biotechnologies, Inc.	Seattle	<20.00		B)	B)
United States	Biolinq Inc.	San Diego	<20.00		B)	B)
United States	ElectronInks Inc.	Austin	<20.00		B)	B)
United States	F-star Therapeutics, Inc.	Wilmington	<20.00		B)	B)
United States	Galecto, Inc.	Wilmington	<20.00		B)	B)
United States	Hydrochlor, LLC	Wilmington	50.00		D)	
United States	Immunitas Therapeutics, Inc.	Wilmington	<20.00		B)	B)
United States	Indi Molecular, Inc.	Culver City	<20.00		B)	B)
United States	Inorganic Intelligence, Inc.	Wilmington	<20.00		B)	-
United States	Kraig Biocraft Laboratories, Inc.	Ann Arbor	<20.00		<0.5	<0.5
United States	Lumiode, Inc.	New York	<20.00		B)	B)
United States	MemryX Inc.	Ann Arbor	<20.00		B)	B)
United States	Metalenz, Inc.	Boston	<20.00		B)	-
United States	Neurable Inc.	Boston	<20.00		B)	B)
United States	Pacific Light & Hologram, Inc.	Wilmington	<20.00		B)	B)

Footnotes follow at the end of the table

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA, Darmstadt, Germany (%)	Fair value as of Dec. 31. 2020 (€ million)	Fair value as of Dec. 31. 2019 (€ million)
United States	Pictor Labs, Inc.	Los Angeles	<20.00		B)	-
United States	Plexium Inc.	Wilmington	<20.00		B)	B)
United States	Precigen, Inc.	Germantown	<20.00		226	101
United States	Progyny, Inc.	Menlo Park	<20.00		B)	B)
United States	Raze Therapeutics, Inc.	Cambridge	<20.00		B)	B)
United States	Ribometrix Inc.	Durham	<20.00		B)	B)
United States	Riffyn, Inc.	Oakland	<20.00		B)	B)
United States	Robert W. Baird & Co.	Chicago	<20.00		C)	C)
United States	SeeQC, Inc.	Elmsford	<20.00		B)	-
United States	Sonde Health, Inc.	Boston	<20.00		B)	B)
United States	Telios Pharma, Inc.	Wilmington	<20.00		9	9
United States	Tioga Pharmaceuticals, Inc.	San Diego	<20.00	<20.00	< 0.5	< 0.5
United States	Vera Therapeutics, Inc.	Wilmington	<20.00		11	-
United States	Xilio Therapeutics, Inc.	Waltham	<20.00		B)	B)
Asia-Pacific (APAC)						
Australia	Immutep Limited	Sydney	<20.00		<0.5	<0.5
China	Multitude Therapeutics Inc.	Shanghai	<20.00		B)	-
China	Nanjing Xinchen Neuromorphic Technology Co., Ltd.	Nanjing	<20.00		B)	-
Japan	Showa Denko Versum Materials 2 Co., Ltd.	Tokyo	35.00		D)	
South Korea	Contruction Guarantee Cooperative	Seoul	<20.00		<0.5	-
Latin America						
Cayman Islands	CLEARInk Displays, Ltd.	Grand Cayman	<20.00		B)	B)

Footnotes follow at the end of the table

Country	Company	Registered office	Equity interest (%)	thereof: Merck KGaA, Darmstadt, Germany (%)	Fair value as of Dec. 31. 2020 (€ million)	Fair value as of Dec. 31. 2019 (€ million)
Middle East and Africa (MEA)						
Algeria	Novapharm Production SARL	Wilaya de Tipiza	20.00		<0.5	1
Israel	ARTSaVIT Ltd.	Yavne	<20.00		B)	B)
Israel	Immunorizon Ltd.	Yavne	20.00		B)	B)
Israel	MediSafe Project Ltd.	Haifa	<20.00		B)	B)
Israel	Metabomed Ltd.	Yavne	<20.00		B)	B)
Israel	Pantheon Biosciences Ltd.	Yavne	<20.00		B)	B)
Israel	Pilltracker 2015 Ltd.	Tel Aviv	<20.00		B)	B)
Israel	PxE Computational Imaging Ltd.	Lachish Darom	<20.00		B)	B)
Israel	Sentaur Bio Ltd.	Yavne	22.50		B)	B)
Israel	Wiliot Ltd.	Caesarea	<20.00		B)	B)

A) Companies opting for exemption as provided for by Section 264 (3) and Section 264b of the German Commercial Code.

B) Companies which are affiliates from the Merck Ventures B.V. , a subsidiary of Merck KGaA, Darmstadt, Germany, portfolio. As of December 31, 2020, the fair value of the M Ventures portfolio amounted to € 234 million (December 31, 2019: € 275 million).

C) Closed-end funds classified as debt in accordance with IFRS 9.

D) This is an affiliate within the meaning of IFRS 11 (joint activity).

Darmstadt, February 16, 2021

Stefan Oschmann

Belén Garijo

Kai Beckmann

Peter Guenter

Marcus Kuhnert

Responsibility Statement

To the best of our knowledge, and in accordance with the applicable reporting principles, the consolidated financial statements of the Group, as of December 31, 2020, give a true and fair view of the assets, liabilities, financial position and profit or loss of the Group, and the combined management report of the fiscal year 2020 includes a fair review of the development and performance of the business and the position of the Group, together with a description of the material opportunities and risks associated with the expected development of the Group.

Darmstadt, February 16, 2021

Stefan Oschmann

Belén Garijo

Kai Beckmann

Peter Guenter

Marcus Kuhnert

Reproduction of the Independent Auditor's Report

Based on the results of our audit, we have issued the following unqualified audit opinion:

Independent Auditor's Report

To MERCK Kommanditgesellschaft auf Aktien, Darmstadt, Germany

Report on the Audit of the Consolidated Financial Statements and of the Combined Management Report

Opinions

We have audited the consolidated financial statements of MERCK Kommanditgesellschaft auf Aktien, Darmstadt, Germany, and its subsidiaries (the Group), which comprise the consolidated balance sheet as of December 31, 2020, the consolidated income statement, the consolidated statement of comprehensive income, consolidated statement of changes in net equity and consolidated cash flow statement for the financial year from January 1, 2020, to December 31, 2020, and notes to the consolidated financial statements, including a summary of significant accounting policies. In addition, we have audited the combined management report of MERCK Kommanditgesellschaft auf Aktien, Darmstadt, Germany, for the financial year from January 1, 2020, to December 31, 2020. In accordance with German legal requirements, we have not audited the components of the combined management report specified in the "Other Information" section of our auditor's report.

In our opinion, on the basis of the knowledge obtained in the audit,

- the accompanying consolidated financial statements comply, in all material respects, with the IFRSs as adopted by the EU, and the additional requirements of German commercial law pursuant to Section 315e (1) HGB [Handelsgesetzbuch: German Commercial Code] and, in compliance with these requirements, give a true and fair view of the assets, liabilities, and financial position of the Group as of December 31, 2020, and of its financial performance for the financial year from January 1, 2020, to December 31, 2020, and
- the accompanying combined management report as a whole provides an appropriate view of the Group's position. In all material respects, this combined management report is consistent with the consolidated financial statements, complies with German legal requirements and appropriately presents the opportunities and risks of future development. Our opinion on the combined management report does not cover the content of the components of the combined management report specified in the "Other Information" section of the auditor's report.

Pursuant to Section 322 (3) sentence 1 HGB, we declare that our audit has not led to any reservations relating to the legal compliance of the consolidated financial statements and of the combined management report.

Basis for the Opinions

We conducted our audit of the consolidated financial statements and of the combined management report in accordance with Section 317 HGB and EU Audit Regulation No 537/2014 (referred to subsequently as "EU Audit Regulation") and in compliance with German Generally Accepted Standards for Financial Statement Audits promulgated by the Institut der Wirtschaftsprüfer [Institute of Public Auditors in Germany] (IDW). Our responsibilities under those requirements and principles are further described in the "Auditor's Responsibilities for the Audit of the Consolidated Financial Statements and of the Combined Management Report" section of our auditor's report. We are independent of the group entities in accordance with the requirements of European law and German commercial and professional law, and we have fulfilled our other German professional responsibilities in accordance with these requirements. In addition, in accordance with Article 10 (2)(f) of the EU Audit Regulation, we declare that we have not provided non-audit services prohibited under Article 5 (1) of the EU Audit Regulation. We believe that the evidence we have obtained is sufficient and appropriate to provide a basis for our opinions on the consolidated financial statements and on the combined management report.

Key Audit Matters in the Audit of the Consolidated Financial Statements

Key audit matters are those matters that, in our professional judgment, were of most significance in our audit of the consolidated financial statements for the financial year from January 1, 2020, to December 31, 2020. These matters were addressed in the context of our audit of the consolidated financial statements as a whole, and in forming our opinion thereon, we do not provide a separate opinion on these matters.

Impairment testing of goodwill of the operating segments Life Science and Performance Materials

Explanatory notes on the impairment tests can be found in the notes to the consolidated financial statements under note 18.

The financial statement risk

The goodwill in the consolidated financial statements as of December 31, 2020 amounts to EUR 15,959 million (38.2% of the Group's total assets), with EUR 10,287 million of this attributable to Life Science and with EUR 4,146 million to Performance Materials. The goodwill of Life Science results especially from the acquisitions of the Miilipore Corporation, USA, in July 2010 and of the Sigma-Aldrich Corporation, USA, in November 2015. Due to the acquisition of Versum Materials, Inc., USA, in October 2019 the goodwill of Performance Materials has increased significantly.

Goodwill is to be tested for impairment once a year, and may need be tested ad hoc if necessary. In performing the goodwill impairment test, the Group primarily determines the recoverable amount by means of the discounted cash flow method. The valuation model used to determine the recoverable amount is complex and the result of this valuation are highly dependent on the projection of future net cash flows (taking into account future revenue growth, profit margins and long-term growth rates) and the discount factor used, and therefore is subject to significant estimation uncertainty.

There is a risk for the financial statements that an existing goodwill impairment loss was not recognized as of the reporting date. In addition, there is a risk that the related disclosures in the notes to the consolidated financial statements are not complete and appropriate.

Our audit approach

Using our own sensitivity analyses, we assessed with the involvement of our own specialists in valuation the extent to which the goodwill of the cash-generating units would still be sufficiently covered by the respective recoverable amount if assumptions and parameters underlying the calculations were to change in a manner that is deemed possible.

We reconciled the expected net cash flows underlying the recoverable amount calculations with the current medium-term plan approved by management. To assess the assumptions used in preparing the medium-term plan, we obtained an understanding of the planning process through discussions with company representatives, including corporate management and representatives from the corporate divisions and the research and development department, we assessed the plausibility and consistency of the explanations received with the projections, and we compared the assumptions used with the expectations of external analysts and sources.

As part of our audit of the discount factor, we analyzed the peer group used. With regard to other assumptions and parameters (e.g. risk-free interest rate, beta factor, market risk premium), we compared those assumptions and parameters with our own assumptions and publicly available data to assess whether these were appropriate and whether they were within the range of external recommendations, to the extent available. In addition, we verified the calculation model used to determine the discount factor and qualified the method by using our own calculation model.

We assessed the appropriateness of the valuation model used. To verify arithmetical accuracy, we used a risk-based audit approach to recalculate the Company's calculations based on samples contained in the valuation model.

In addition, we assessed whether the Company's disclosures regarding the goodwill impairment test in the notes to the consolidated financial statements are complete and appropriate.

Our observations

The calculation method used for the goodwill impairment test is appropriate and in line with the applicable valuation principles. Overall, the assumptions and parameters used by management are balanced. The disclosures in the notes to the consolidated financial statements are complete and properly depict the judgment associated with the subsequent measurement of goodwill.

Recognition and measurement of income tax liabilities

Explanatory notes on the recognition and measurement of income tax liabilities can be found in the notes to the consolidated financial statements under note 15.

The financial statement risk

As of December 31, 2020, current income tax liabilities amount to EUR 1,460 million.

The Group operates in different jurisdictions with different legal systems. The application of local regulations on income tax, tax incentives and transfer pricing rules is complex. The recognition and measurement of income tax liabilities require the Group to exercise judgment in assessing tax matters and to make estimates regarding uncertain tax positions.

The measurement of income tax liabilities and the assessment of unrecognized contingent tax liabilities are subject to judgment and estimation uncertainty. The Group engages event driven external experts to support its own risk assessment with expert opinions from tax specialists.

There is a risk for the financial statements that income tax liabilities are not fully recognized or not appropriately measured.

Our audit approach

We involved our own specialists in international tax law into the audit team in order to evaluate the Group's assessment of tax risks and as far as obtained the related opinions of external experts engaged by the Group.

We obtained an understanding of existing tax risks through inquiry of employees of the tax department. We assessed the competence, capabilities and objectivity of the external experts and evaluated their expert opinions.

In addition, we analyzed correspondence with the relevant tax authorities and assessed the assumptions underlying the determination of income tax liabilities based on our knowledge and experience of how the relevant legal requirements are currently applied by the tax authorities and courts.

Our observations

The valuation model and assumptions underlying the recognition and measurement of income tax liabilities are reasonable.

Other Information

Management and the Supervisory Board are responsible for the other information. The other information comprises the following components of the combined management report, whose content was not audited:

- the corporate governance statement referred to in the combined management report,
- the components of the combined non-financial statement referred to in the combined management report,
- information extraneous to combined management reports and marked as unaudited and
- the remaining parts of the annual report.

The other information does not comprise the consolidated financial statements, the audited parts of the combined management report and our auditor's report.

Our opinions on the consolidated financial statements and on the combined management report do not cover the other information, and consequently we do not express an opinion or any other form of assurance conclusion thereon.

In connection with our audit, our responsibility is to read the other information and, in so doing, to consider whether the other information

- is materially inconsistent with the consolidated financial statements, with the information in the combined management report audited for content or our knowledge obtained in the audit, or
- otherwise appears to be materially misstated.

Responsibilities of Management and the Supervisory Board for the Consolidated Financial Statements and the Combined Management Report

Management is responsible for the preparation of the consolidated financial statements that comply, in all material respects, with IFRSs as adopted by the EU, and the additional requirements of German commercial law pursuant to Section 315e (1) HGB and that the consolidated financial statements, in compliance with these requirements, give a true and fair view of the assets, liabilities, financial position, and financial performance of the Group. In addition, management is responsible for such internal control as they have determined necessary to enable the preparation of consolidated financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the consolidated financial statements, management is responsible for assessing the Group's ability to continue as a going concern. They also have the responsibility for disclosing, as applicable, matters related to going concern. In addition, they are responsible for financial reporting based on the going concern basis of accounting unless there is an intention to liquidate the Group or to cease operations, or there is no realistic alternative but to do so.

Furthermore, management is responsible for the preparation of the combined management report that, as a whole, provides an appropriate view of the Group's position and is, in all material respects, consistent with the consolidated financial statements, complies with German legal requirements, and appropriately presents the opportunities and risks of future development. In addition, management is responsible for such arrangements and measures (systems) as they have considered necessary to enable the preparation of a combined management report that is in accordance with the applicable German legal requirements, and to be able to provide sufficient appropriate evidence for the assertions in the combined management report.

The Supervisory Board is responsible for overseeing the Group's financial reporting process for the preparation of the consolidated financial statements and of the combined management report.

Auditor's Responsibilities for the Audit of the Consolidated Financial Statements and of the Combined Management Report

Our objectives are to obtain reasonable assurance about whether the consolidated financial statements as a whole are free from material misstatement, whether due to fraud or error, and whether the combined management report as a whole provides an appropriate view of the Group's position and, in all material respects, is consistent with the consolidated financial statements and the knowledge obtained in the audit, complies with the German legal requirements and appropriately presents the opportunities and risks of future development, as well as to issue an auditor's report that includes our opinions on the consolidated financial statements and on the combined management report.

Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with Section 317 HGB and the EU Audit Regulation and in compliance with German Generally Accepted Standards for Financial Statement Audits promulgated by the Institut der Wirtschaftsprüfer (IDW) will always detect a material misstatement. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these consolidated financial statements and this combined management report.

We exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the consolidated financial statements and of the combined management report, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinions. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal controls.
- Obtain an understanding of internal control relevant to the audit of the consolidated financial statements and of arrangements and measures (systems) relevant to the audit of the combined management report in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of these systems.
- Evaluate the appropriateness of accounting policies used by management and the reasonableness of estimates made by management and related disclosures.
- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Group's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in the auditor's report to the related disclosures in the consolidated financial statements and in the combined management

report or, if such disclosures are inadequate, to modify our respective opinions. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Group to cease to be able to continue as a going concern.

- Evaluate the overall presentation, structure and content of the consolidated financial statements, including the disclosures, and whether the consolidated financial statements present the underlying transactions and events in a manner that the consolidated financial statements give a true and fair view of the assets, liabilities, financial position and financial performance of the Group in compliance with IFRSs as adopted by the EU and the additional requirements of German commercial law pursuant to Section 315e (1) HGB.
- Obtain sufficient appropriate audit evidence regarding the financial information of the entities or business activities within the Group to express opinions on the consolidated financial statements and on the combined management report. We are responsible for the direction, supervision and performance of the group audit. We remain solely responsible for our opinions.
- Evaluate the consistency of the combined management report with the consolidated financial statements, its conformity with [German] law, and the view of the Group's position it provides.
- Perform audit procedures on the prospective information presented by management in the combined management report. On the basis of sufficient appropriate audit evidence we evaluate, in particular, the significant assumptions used by management as a basis for the prospective information, and evaluate the proper derivation of the prospective information from these assumptions. We do not express a separate opinion on the prospective information and on the assumptions used as a basis. There is a substantial unavoidable risk that future events will differ materially from the prospective information.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

We also provide those charged with governance with a statement that we have complied with the relevant independence requirements, and communicate with them all relationships and other matters that may reasonably be thought to bear on our independence, and where applicable, the related safeguards.

From the matters communicated with those charged with governance, we determine those matters that were of most significance in the audit of the consolidated financial statements of the current period and are therefore the key audit matters. We describe these matters in our auditor's report unless law or regulation precludes public disclosure about the matter.

Other Legal and Regulatory Requirements

Report on the Assurance in accordance with Section 317 (3b) HGB on the Electronic Reproduction of the Consolidated Financial Statements and the Combined Management Report Prepared for Publication Purposes

We have performed assurance work in accordance with Section 317 (3b) HGB to obtain reasonable assurance about whether the reproduction of the consolidated financial statements and the combined management report (hereinafter the "ESEF documents") contained in the file that can be downloaded by the issuer from the electronic client portal with access protection, „merckkgaa-2020-12-31.zip"* (SHA256-Hashwert: 241df0f72f0c90276cb0cc9737d36239903231e97d511f6e9f5ab49eee0dee53) and prepared for publication purposes complies in all material respects with the requirements of Section 328 (1) HGB for the electronic reporting format ("ESEF format"). In accordance with German legal requirements, this assurance only extends to the conversion of the information contained in the consolidated financial statements and the combined

* „Merckkgaa" in the filename refers to Merck KGaA, Darmstadt, Germany.

management report into the ESEF format and therefore relates neither to the information contained in this reproduction nor any other information contained in the above-mentioned electronic file.

In our opinion, the reproduction of the consolidated financial statements and the combined management report contained in the above-mentioned electronic file and prepared for publication purposes complies in all material respects with the requirements of Section 328 (1) HGB for the electronic reporting format. We do not express any opinion on the information contained in this reproduction nor on any other information contained in the above-mentioned file beyond this reasonable assurance opinion and our audit opinion on the accompanying consolidated financial statements and the accompanying combined management report for the financial year from January 1, 2020, to December 31, 2020 contained in the "Report on the Audit of the Consolidated Financial Statements and the Combined Management Report" above.

We conducted our assurance work on the reproduction of the consolidated financial statements and the group management report contained in the above-mentioned electronic file in accordance with Section 317 (3b) HGB and the Exposure Draft of the IDW Assurance Standard: Assurance in accordance with Section 317 (3b) HGB on the Electronic Reproduction of Financial Statements and Management Reports Prepared for Publication Purposes (ED IDW AsS 410) and the International Standard on Assurance Engagements 3000 (Revised)]. Accordingly, our responsibilities are further described below. Our audit firm has applied the IDW Standard on Quality Management 1: Requirements for Quality Management in Audit Firms (IDW QS 1).

The company's management is responsible for the preparation of the ESEF documents including the electronic reproduction of the consolidated financial statements and the group management report in accordance with Section 328 (1) sentence 4 item 1 HGB and for the tagging of the consolidated financial statements in accordance with Section 328 (1) sentence 4 item 2 HGB.

In addition, the company's management is responsible for the internal controls they consider necessary to enable the preparation of ESEF documents that are free from material intentional or unintentional non-compliance with the requirements of Section 328 (1) HGB for the electronic reporting format.

The company's management is also responsible for the submission of the ESEF documents together with the auditor's report and the attached audited consolidated financial statements and audited group management report as well as other documents to be published to the operator of the German Federal Gazette [Bundesanzeiger].

The supervisory board is responsible for overseeing the preparation of the ESEF documents as part of the financial reporting process.

Our objective is to obtain reasonable assurance about whether the ESEF documents are free from material intentional or unintentional non-compliance with the requirements of Section 328 (1) HGB. We exercise professional judgement and maintain professional scepticism throughout the assurance work. We also:

- Identify and assess the risks of material intentional or unintentional non-compliance with the requirements of Section 328 (1) HGB, design and perform assurance procedures responsive to those risks, and obtain assurance evidence that is sufficient and appropriate to provide a basis for our assurance opinion.
- Obtain an understanding of internal control relevant to the assurance of the ESEF documents in order to design assurance procedures that are appropriate in the circumstances, but not for the purpose of expressing an assurance opinion on the effectiveness of these controls.
- Evaluate the technical validity of the ESEF documents, i.e. whether the electronic file containing the ESEF documents meets the requirements of Commission Delegated Regulation (EU) 2019/815 on the technical specification for this electronic file.
- Evaluate whether the ESEF documents enable an XHTML reproduction with content equivalent to the audited consolidated financial statements and the audited group management report.
- Evaluate whether the tagging of the ESEF documents with Inline XBRL technology (iXBRL) enables an appropriate and complete machine-readable XBRL copy of the XHTML reproduction.

Further Information pursuant to Article 10 of the EU Audit Regulation

We were elected as group auditor at the annual general meeting on May 28, 2020. We were engaged by the Supervisory Board on June 30, 2020. We have been the group auditor of MERCK Kommanditgesellschaft auf Aktien, Darmstadt, Germany, without interruption since the financial year 1995.

We declare that the opinions expressed in this auditor's report are consistent with the additional report to the Supervisory Board pursuant to Article 11 of the EU Audit Regulation (long-form audit report).

German Public Auditor Responsible for the Engagement

The German Public Auditor responsible for the engagement is Dirk Janz.

Frankfurt am Main, February 17, 2021

KPMG AG
Wirtschaftsprüfungsgesellschaft
[Original German version signed by:]

[signature] Janz
Wirtschaftsprüfer
[German Public Auditor]

[signature] Jung
Wirtschaftsprüfer
[German Public Auditor]

Business Development 2016 – 2020

This overview may include historically adjusted values in order to ensure comparability with the reporting period.

€ million	2016	2017	2018	2019	**2020**	Change in %
Results of operations						
Net sales	15,024	14,517	14,836	16,152	17,534	8.6%
Operating result (EBIT)[1]	2,481	2,423	1,727	2,120	2,985	40.8%
Margin (% of net sales)[1]	16.5%	16.7%	11.6%	13.1%	17.0%	
EBITDA[1]	4,415	4,164	3,528	4,066	4,923	21.1%
Margin (% of net sales)[1]	29.4%	28.7%	23.8%	25.2%	28.1%	
Adjustments[1]	75	82	272	318	279	-12.5%
EBITDA pre[1]	4,490	4,246	3,800	4,385	5,201	18.6%
Margin (% of net sales)[1]	29.9%	29.3%	25.6%	27.1%	29.7%	
Profit before income tax	2,154	2,129	1,461	1,735	2,630	51.6%
Profit after tax	1,633	2,615	3,396	1,324	1,994	50.6%
Earnings per share (in €)	3.75	5.99	7.76	3.04	4.57	50.3%
Assets and liabilities[2]						
Total assets	38,258	35,621	36,888	43,808	41,796	-4.6%
Non-current assets	30,589	28,166	27,652	34,805	32,516	-6.6%
thereof:						
Goodwill	15,015	13,582	13,764	17,114	15,959	-6.8%
Other intangible assets	9,980	8,317	7,237	9,221	7,653	-17.0%
Property, plant, and equipment	4,231	4,512	4,811	6,192	6,421	3.7%
Current assets	7,670	7,455	9,236	9,003	9,280	3.1%
thereof:						
Inventories	2,609	2,632	2,764	3,342	3,294	-1.4%
Trade receivables and other current receivables	3,161	3,170	3,226	3,488	3,221	-7.7%
Cash and cash equivalents	939	589	2,170	781	1,355	73.6%
Equity	14,050	14,066	17,233	17,914	17,017	-5.0%
Financial liabilities	12,597	10,823	8,896	13,194	12,142	-8.0%
Non-current	8,809	8,033	6,681	8,644	9,785	13.2%
Current	3,788	2,790	2,215	4,550	2,357	-48.2%
Liquidity						
Payments for investments in intangible assets[3]	132	392	106	208	150	-27.8%
Payments for investments in property, plant, and equipment[3]	716	919	910	813	1,413	73.8%
Business free cash flow[1]	3,318	3,193	2,508	2,732	3,765	37.8%
Net financial debt[1]	11,513	10,144	6,701	12,363	10,758	-13.0%
Other key data						
Equity ratio (in %)[1]	36.7%	39.5%	46.7%	40.9%	40.7%	
Research and development costs	1,976	2,108	2,227	2,268	2,288	0.9%
Dividend per share (in €)	1.20	1.25	1.25	1.30	1.40[4]	7.7%
Employees (number as of December 31)	50,348	52,880	51,713	57,036	58,096	1.9%

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

[2] Fiscal 2019 has been adjusted, see Note (2) “Reporting principles“ in the Notes to the Consolidated Financial Statements.

[3] According to the consolidated cash flow statement.

[4] Proposal on the appropriation of profits for 2020.

FINANCIAL CALENDAR

March
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2021
Annual Press Conference

April
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