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.

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- 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.

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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.

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

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.

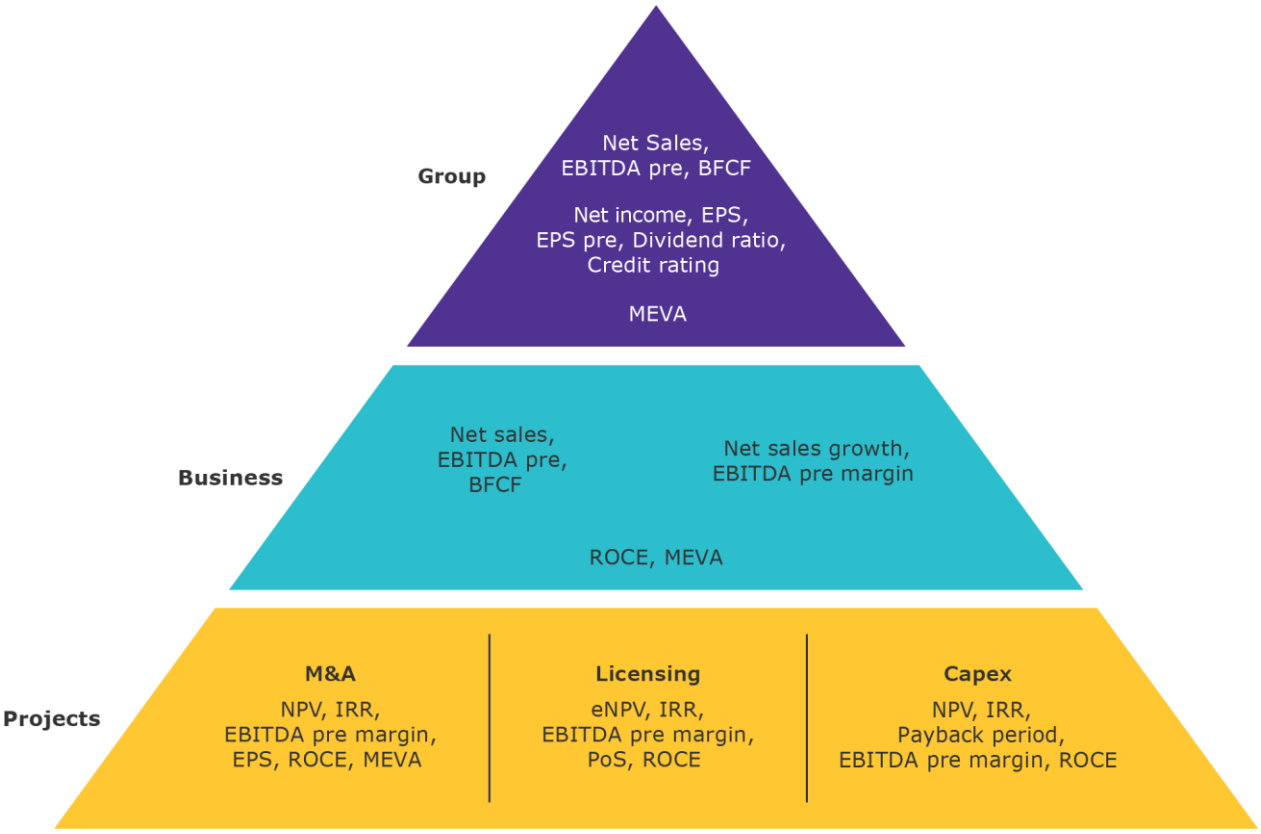
Sustainable dividend policy

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.

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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.

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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.