Annual Report

2018

Science for a **better life**

Five-Year Summary

	2014	2015	2016	2017	2018
Bayer Group (€ million)					
Sales	41,339	46,085	34,943	35,015	39,586
EBITDA[1]	8,315	9,573	8,801	8,563	10,266
EBITDA before special items[1]	8,685	10,256	9,318	9,288	9,547
EBITDA margin before special items (in %)[1]	21.0	22.3	26.7	26.5	24.1
EBIT[1]	5,395	6,241	5,738	5,903	3,914
EBIT before special items[1]	5,833	7,060	6,826	7,130	6,480
Income before income taxes	4,414	5,236	4,773	4,577	2,318
Net income (from continuing and discontinued operations)	3,426	4,110	4,531	7,336	1,695
Earnings per share (from continuing and discontinued operations) (€)[1]	4.14	4.97	5.44	8.29	1.80
Core earnings per share (from continuing operations) (€)[1]	5.89	6.82	6.67	6.64	5.94
Net cash provided by operating activities (from continuing and discontinued operations)	5,810	6,890	9,089	8,134	7,917
Net financial debt	19,612	17,449	11,778	3,595	35,679
Capital expenditures (as per segment table)[2]	2,484	2,554	2,627	2,418	2,564
Bayer AG					
Total dividend payment	1,861	2,067	2,233	2,402	2,611
Dividend per share (€)	2.25	2.50	2.70	2.80	2.80
Innovation					
Research and development expenses (€ million)	3,537	4,274	4,405	4,504	5,246
Ratio of R&D expenses to sales – Pharmaceuticals (%)	15.6	16.0	16.7	16.2	15.5
Ratio of R&D expenses to sales – Crop Science (%)	10.3	10.7	11.7	11.7	13.0
Employees in research and development[3]	13,900	14,753	14,213	14,041	17,275
Employees					
Number of employees[3] (Dec. 31)	117,400	116,600	99,592	99,820	116,998
Personnel expenses (including pension expenses) (€ million)	9,693	11,176	9,459	9,528	11,548
Proportion of employees with health insurance (%)	96	96	98	98	98
Fluctuation (voluntary/total) (%)	4.8/11.4	5.0/13.9	4.8/13.2	4.8/10.4	5.4/14.4
Hours of vocational and ongoing training per employee	18.0	20.0	23.0	23.4	17.1
Safety & Environmental Protection					
Recordable Incident Rate (RIR) for Bayer employees[4]	0.44	0.43	0.40	0.45	0.39
Loss of Primary Containment Incident Rate (LoPC-IR)[5]	0.13	0.11	0.17	0.13	0.09
Total energy consumption (terajoules)	26,288	24,677	26,243	25,832	39,628
Energy efficiency (kWh/€1,000)[6]	246	200	209	205	278
Total greenhouse gas emissions (CO_2 equivalents in million t)[7]	4.06	4.62	4.64	3.63	5.45
Hazardous waste generated (thousand t)	377	431	428	485	421
Water use (million m³)	104	110	93	98	124

2017 figures restated; figures for 2014–2016 as last reported; t = metric tons
[1] For definitions of the indicators see A 2.4
[2] Group total 2016 including Covestro
[3] Employees calculated as full-time equivalents (FTEs)
[4] RIR: Number of reportable occupational injuries and illnesses per 200,000 hours worked
[5] LoPC = Loss of Primary Containment; number of incidents in which chemicals leak from their primary container, such as pipelines, pumps, tanks or drums, per 200,000 working hours
[6] Quotient of total energy consumption and external sales
[7] Direct emissions from power plants, waste incinerators and production plants and indirect emissions from external supplies of electricity, steam and refrigeration (according to the market-based method)

GRI-102-48

Fiscal 2018

Bayer increases sales and earnings – leader in agriculture after acquisition

- // Group sales at €39.6 billion (Fx & portfolio adj. + 4.5%)
- // EBITDA before special items increases to €9.5 billion (+ 2.8%), held back by currency effects of approx. €0.5 billion
- // Pharmaceuticals with higher sales (Fx & portfolio adj.) and slightly lower earnings
- // Consumer Health: sales level with prior year (Fx & portfolio adj.), earnings decline
- // Crop Science reports sales gains, substantially higher earnings due to the acquisition, integration off to a strong start
- // Positive safety profile of glyphosate unchanged – Bayer vigorously defending itself against lawsuits
- // Net income at €1.7 billion, impacted by one-time effects
- // Core earnings per share at €5.94, above expectations
- // Proposed dividend of €2.80 per share, leading to record pay-out
- // Net financial debt at €35.7 billion – significantly better than expected
- // Bayer confirms 2019 Group outlook and 2022 targets

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Chairman's Letter

The safety of our products is our top priority

Dear stockholders and friends of Bayer:

I'm pleased to present our new Annual Report, which looks back on a particularly eventful year that was not an easy one. In 2018, we completed the biggest acquisition in Bayer's history, advancing to the number one position in the agriculture sector. With that, we have stringently focused our businesses on the growth markets of health and nutrition, where we are among the best companies in the world with our know-how and innovation capabilities.

Nevertheless, the performance of our stock in 2018 was very disappointing. While the DAX was down 18 percent on the year, our share price dropped by about 40 percent. After we had to accept a ruling – which we consider to be incorrect – by a court of first instance in the United States, the strategic progress we made and the company's solid operational performance were overshadowed by the uncertain outcome of the product liability litigation concerning glyphosate.

Although it was these topics that dominated the headlines, I believe it's important to emphasize that last year we again kept our company's main promise – "Science for a better life" – millions of times over. Our products have helped to improve the lives of our customers – patients, consumers and farmers. That is what defines us, and that is what drives our actions.

Bayer CEO Werner Baumann

Our employees throughout the world are key to making this possible. In 2018, they again put their skills and their passion into their commitment to Bayer. On behalf of the Board of Management, I would like to sincerely thank them for that commitment, and I also would like to thank you, dear stockholders, for your support and trust.

Operationally, we experienced a difficult market environment in 2018, with significant negative currency effects and growing uncertainty caused by global trade disputes. On top of that, we were unable to fully exploit our growth potential because of production bottlenecks in the Pharmaceuticals Division and structural problems at Consumer Health.

We nevertheless increased our Group sales by 4.5 percent on a currency- and portfolio-adjusted basis. EBITDA before special items benefited from the second-half earnings contribution from the acquired Monsanto business and rose by nearly 3 percent.

In 2018, there was also some encouraging news about our pharmaceuticals pipeline and our ongoing product development. For example, we received approval in the United States for Vitrakvi™, a highly effective and innovative cancer medication. We successfully concluded a Phase III study of darolutamide, a development substance we are working on in oncology together with a partner.

Xarelto™ became the only oral anticoagulant to be approved in the United States and Europe for the treatment of coronary artery disease and peripheral artery disease. At the same time, we achieved further progress with our Leaps projects in disruptive technologies, such as in the area of stem cell research, together with our partners.

We successfully completed the acquisition of Monsanto in summer 2018 following lengthy and intensive antitrust processes. The integration is off to a very good start and advancing rapidly. Equally encouraging is the progress we have made on reducing debt. Our net financial debt of approximately €36 billion is €3 billion less than we had expected at the start of the year.

As I already mentioned, there was a great deal of discussion last year about the safety of glyphosate. The ruling by a court of first instance in the Johnson case led to negative reactions in the media and the capital markets. This played into the hands of the activists and professional critics of agriculture. Among consumers and stockholders, it mainly caused uncertainty.

Yet the facts have not changed: glyphosate is a safe product. That has been proven by numerous scientific studies and the independent assessments of regulatory authorities throughout the world over a period of more than 40 years.

Most recently, the Canadian health ministry once again reviewed the safety of glyphosate, stating unequivocally in January 2019 that “No pesticide regulatory authority in the world currently considers glyphosate to be a cancer risk to humans at the levels at which humans are currently exposed.” For us, this official statement serves to underline once again that we have the scientific facts on our side. We will therefore continue to vigorously defend glyphosate in all the pending litigation.

In light of all these developments, 2018 was a challenging year but also a year of significant progress. I am pleased that for 2018 we can once again enable you, our stockholders, to participate appropriately in Bayer's success. We are therefore proposing to the Annual Stockholders' Meeting a dividend of €2.80 per share, leading to a new record dividend payout.

At the end of last year, we announced and explained our company's updated strategy along with a related package of measures and ambitious medium-term financial targets. Our success in the coming years will depend partly on accomplishing the integration at Crop Science but also on implementing the measures we announced and adjusting the innovation model in our pharmaceuticals business.

This will put Bayer in the best possible position to deliver long-term value creation as a world-leading life science company.

Based on our mission "Science for a better life," we help to address questions in health and nutrition that are of paramount importance in people's lives: How can we feed a constantly growing global population in an era of climate change? How can we use innovation to shape demographic change in such a way that it leads to a longer lifetime that can be actively used in good physical and mental condition? How can we ensure that people in developing countries benefit better from the latest research and technological progress? How can we best utilize the opportunities of digitalization and artificial intelligence for the benefit of patients, consumers, farmers and the environment? How can we ensure that the world manages its finite resources responsibly and sustainably?

The answers to these questions will clearly determine not only our future prosperity but also our social cohesion. We aim to make our contribution as a company with a global reach, a global perspective and a strong sense of responsibility. We plan to invest some €35 billion in our future during the period through 2022, with research and development accounting for over two-thirds of this figure.

Our realigned Crop Science Division is working on innovative seed and crop protection products, digital and customized solutions for farms of all sizes, and new approaches to sustainable, resource-efficient agriculture.

We are working on improvements in health care, whether through our Pharmaceuticals Division which is focusing on therapeutic areas with a high medical need or through the over-the-counter products of our Consumer Health Division which support individual health protection.

The safety of our products and the well-being of customers and patients are our top priority.

Our activities in health and nutrition are united by the common Bayer brand, which enjoys a very good reputation around the world, standing for quality and integrity, as well as by a common infrastructure and, not least, by a common and vibrant corporate culture. At Bayer, we place great value on trust and mutual respect in our dealings with one another.

We want people to know what Bayer stands for. We plan to build on the pioneering role we have assumed regarding transparency, such as through the publication of numerous safety studies in crop protection. And we intend to live up to our responsibility as a global corporation through our ongoing commitment to the principles of the United Nations Global Compact and an orientation toward clear values.

We want to be judged – also by you, our stockholders – on our adherence to these values and our attainment of the ambitious targets we have set for the coming years. Thank you for the trust you place in Bayer. In 2019, we will continue to do all we can to live up to this trust.

Sincerely,

Werner Baumann
Chairman of the Board of Management of Bayer AG

Board of Management

Werner Baumann

Chairman

Werner Baumann studied economics in Aachen and Cologne, joining Bayer AG in 1988. After holding positions of increasing responsibility in Spain and the United States, he became a member of the Board of Management of Bayer HealthCare. He was appointed to the Bayer Board of Management in 2010, first as Chief Financial Officer and then as Chief Strategy and Portfolio Officer. Baumann has been Chairman of the Bayer Board of Management since May 2016.

Wolfgang Nickl

Finance

Wolfgang Nickl studied business administration in Stuttgart and Los Angeles. Following numerous roles in Europe and the United States at Western Digital Corporation, Nickl was appointed Chief Financial Officer in 2010. In 2013, he joined Netherlands-based ASML N.V. as Executive Vice President and Chief Financial Officer. Nickl has been a member of the Bayer Board of Management since April 2018.

Dr. Hartmut Klusik[1]

Human Resources · Technology · Sustainability

Hartmut Klusik studied chemistry in Marburg. After gaining a Ph.D., he began his professional career at Wolff Walsrode in 1984. He transferred to crop protection production at Bayer in Brazil in 1990. Following assignments in the United States and Australia and after holding positions of increasing responsibility at Bayer CropScience, he was appointed to the Board of Management of Bayer HealthCare, with responsibility for Product Supply. He was appointed to the Bayer Board of Management in January 2016.

[1] Labor Director

Kemal Malik

Innovation

Kemal Malik studied medicine and worked in a London hospital. After holding different positions of increasing responsibility at Bristol-Myers Squibb, he joined Bayer in 1995. In 2007, Malik became a member of the Executive Committee, head of Global Development and Chief Medical Officer of Bayer HealthCare. He was appointed to the Bayer Board of Management in February 2014.

Stefan Oelrich

Pharmaceuticals

Stefan Oelrich joined Bayer as a commercial trainee. After qualifying as a commercial assistant, he held a number of positions of increasing responsibility in Bayer's HealthCare business. In 2011, Oelrich joined Sanofi, where he held numerous roles before being appointed Executive Vice President Diabetes & Cardiovascular in the company's Executive Committee. Oelrich has served as a member of the Bayer Board of Management and head of the Pharmaceuticals Division since November 2018.

Heiko Schipper

Consumer Health

After completing his studies in business economics in Rotterdam, Heiko Schipper acquired experience at Heineken before joining Nestlé in 1996, where he held various sales and marketing roles in Bangladesh, Indonesia and Switzerland. Schipper took on general management roles with increasing responsibility in the Philippines and Greater China. He was later appointed CEO of Nestlé Nutrition and a member of the Nestlé Group Executive Board. Schipper has been a member of the Bayer Board of Management since March 2018.

Liam Condon

Crop Science

Liam Condon studied international marketing in Dublin and Berlin. He held various positions of increasing responsibility with the former Schering AG, Berlin, Germany, and with Bayer HealthCare in Europe and Asia, including as Managing Director of Bayer HealthCare China and head of Bayer HealthCare in Germany. Condon became Chief Executive Officer of Bayer CropScience in 2012. He was appointed to the Bayer Board of Management and head of the Crop Science Division in January 2016.

Report of the Supervisory Board

Dear stockholders:

During 2018, the Supervisory Board monitored the conduct of the company's business by the Board of Management on a regular basis with the aid of detailed written and oral reports received from the Board of Management, and also acted in an advisory capacity. In addition, the Chairman of the Supervisory Board maintained a constant exchange of information with the Chairman of the Board of Management and with the other Management Board members. In this way the Supervisory Board was kept continuously informed about the company's intended business strategy, corporate planning (including financial, investment and human resources planning), earnings performance, the state of the business and the situation in the company and the Group.

Where Board of Management decisions or actions required the approval of the Supervisory Board, whether by law or under the Articles of Incorporation or the rules of procedure, the draft resolutions were inspected by the members at the meetings of the full Supervisory Board, sometimes after preparatory work by the committees, or approved on the basis of documents circulated to the members. The Supervisory Board was involved in decisions of material importance to the company. We discussed at length the business trends described in the reports from the Board of Management and the prospects for the development of the Bayer Group as a whole, the divisions and the principal affiliated companies in Germany and abroad.

Change on the Supervisory Board

Dr. Klaus Sturany's term of office as a member of the Supervisory Board ended at the end of the Annual Stockholders' Meeting on May 25, 2018. The Supervisory Board elected Professor Norbert Winkeljohann to succeed him until the end of the Annual Stockholders' Meeting 2023.

Work of the Supervisory Board

The Supervisory Board convened seven times in 2018. No member of the Supervisory Board attended only half or fewer than half of its meetings or those of the committees on which they served. The average attendance rate by Supervisory Board members at the meetings of the Supervisory Board and of its committees held in 2018 was more than 97 percent. A detailed overview of the attendance of the individual members of the Supervisory Board at the meetings of the Supervisory Board and its committees is shown in the "Further Information" section under "Governance Bodies."

The members of the Board of Management regularly attended the meetings of the Supervisory Board. Where necessary, the Supervisory Board met without the Board of Management or with only the Chairman of the Board of Management present.

The deliberations of the Supervisory Board focused on questions relating to Bayer's strategy, portfolio, business activities and personnel matters. The work of the Supervisory Board focused particularly on two main areas that were each addressed at several meetings: First, the Monsanto transaction, including the progress of the merger control proceedings, the performance of the Monsanto business, the related risks and the integration of the business. And second, the further development of Bayer's strategy and the portfolio, efficiency and structural measures required to implement it. Between the meetings of the Supervisory Board, these issues were also the subject of an extensive dialogue between the Chairman of the Supervisory Board and the Chairman of the Board of Management.

The discussions at the meetings held in 2018 centered on the following topics.

At its February meeting, the Supervisory Board dealt with the Annual Report 2017, the agenda for the Annual Stockholders' Meeting 2018, the status of the merger control proceedings relating to the Monsanto acquisition and the Group's risk management system, and adopted resolutions on the compensation of the Board of Management.

At an extraordinary meeting convened in April, the Supervisory Board looked in detail at the required divestment of parts of the Crop Science business in connection with the merger control proceedings for the Monsanto transaction. The Supervisory Board also approved a further reduction of Bayer's interest in Covestro.

At its May meeting, the Supervisory Board discussed the business performance to date in 2018 and the upcoming Annual Stockholders' Meeting. It also adopted resolutions pertaining to two deviations from the recommendations of the German Corporate Governance Code along with a resolution to approve the existing consulting contracts between Bayer companies and companies of the global PricewaterhouseCoopers (PwC) network in light of the proposal to the Annual Stockholders' Meeting that Professor Norbert Winkeljohann be elected to the Supervisory Board.

Werner Wenning, Chairman of the Supervisory Board of Bayer AG

At an extraordinary meeting in July, the Supervisory Board examined the divestment of the global prescription dermatology products business and adopted a resolution on this matter.

At its September meeting, the Supervisory Board extended the service contract of Liam Condon by five years and that of Hartmut Klusik by one year, and appointed Stefan Oelrich to the company's Board of Management for a three-year term commencing November 1, 2018. The Supervisory Board also approved Dieter Weinand's departure from the company by mutual agreement with effect as of October 31, 2018. In addition, the Supervisory Board adjusted the performance targets for the Board of Management for 2018 in view of the closing of the Monsanto acquisition. The Supervisory Board discussed the status of the glyphosate-related litigations in detail. The Supervisory Board then examined in great detail the further development of the strategy of the Bayer Group and its individual divisions. It was established that the Supervisory Board explicitly supports the strategy of the Board of Management.

At an extraordinary meeting in November, the Supervisory Board dealt in detail with the status of the Monsanto integration and the integrated financial planning. The Supervisory Board also once again looked closely at the status of the litigations in connection with glyphosate. The discussion also addressed the extent to which these risks had been analyzed and assessed prior to the Monsanto acquisition. Following the related discussion at the previous meeting, the Supervisory Board once again conferred about the further development of the strategy and adopted resolutions on a series of portfolio, efficiency and structural measures. Specifically, it discussed the planned divestment of the Animal Health business, the sunscreen and foot care businesses of the Consumer Health Division and the 60 percent interest in the German site services provider Currenta. In connection with the planned efficiency and structural measures, the Supervisory Board examined the increased alignment of the pharmaceutical research activities toward external innovation and the reduction of inhouse capacities in this area, the concentration of production for all recombinant Factor VIII products at the Berkeley, California, site, the decision not to utilize the Factor VIII facility built in Wuppertal, and adjustments to the corporate and central functions, service functions and country platforms. The Supervisory Board also discussed the updated financial planning of the Bayer Group and was briefed on the planned Capital Markets Day.

At its meeting in December 2018, the Supervisory Board undertook the routine review of the fixed compensation of the members of the Board of Management and the pension amounts of the former members of the Board of Management. Also at this meeting, the Board of Management presented its planning for the business operations in the years 2019 through 2022 and its expectations for the company's future rating. The Supervisory Board approved the proposed financing framework for 2019 and the securing of a new credit facility. At this meeting, the Supervisory Board took a detailed look at the efficiency audit, which had been conducted with external support. Building on the discussions at previous meetings and a detailed examination of the relevant documents undertaken in the meantime, the Supervisory Board also dealt once again with the risks arising from Monsanto's glyphosate business. This discussion also focused on a comprehensive expert report by a prominent law firm that examined compliance with audit obligations and duty of care responsibilities in this regard when the Monsanto transaction was prepared and implemented. The report came to the conclusion that the members of the Board of Management had fulfilled their statutory duties in connection with the Monsanto transaction, particularly with regard to the examination and assessment of the liability risks related to the glyphosate business. The Supervisory Board concurred with the report's findings. Finally, the Supervisory Board resolved to issue an unqualified declaration of future compliance with the German Corporate Governance Code. Following the December meeting, an information and discussion forum was held for the members of the Supervisory Board on the topic of innovation at Crop Science.

Committees of the Supervisory Board

The Supervisory Board has a Presidial Committee, an Audit Committee, a Human Resources Committee, a Nominations Committee and an Innovation Committee. The current membership of the committees is shown in the "Further Information" section under "Governance Bodies."

The meetings and decisions of the committees, and especially the meetings of the Audit Committee, were prepared on the basis of reports and other information provided by the Board of Management. Reports on the committee meetings were presented at the meetings of the full Supervisory Board.

Presidial Committee: This comprises the Chairman and Vice Chairman of the Supervisory Board along with a further stockholder representative and a further employee representative. The Presidial Committee serves primarily as the mediation committee pursuant to the German Codetermination Act. It has the task of submitting proposals to the Supervisory Board on the appointment of members of the Board of Management if the necessary two-thirds majority is not achieved in the first vote at a plenary meeting. Certain decision-making powers in connection with capital measures, including the power to amend the Articles of Incorporation accordingly, have also been delegated to this committee. On a case-by-case basis, furthermore, the Supervisory Board can delegate certain responsibilities to the Presidial Committee. Finally, the Presidial Committee may also undertake preparatory work for full meetings of the Supervisory Board.

The Presidial Committee convened twice in 2018. At a meeting in April, the Presidial Committee dealt with the issuance of shares to Temasek without granting subscription rights and adopted the necessary resolution on the partial use of the Authorized Capital II. At a meeting in June 2018, the Presidial Committee dealt with the capital increase with subscription rights to be implemented as well as with the issuance of bonds to implement an exchange offer for existing Monsanto bonds, and adopted resolutions on both items. By way of a written resolution in May 2018, the Presidial Committee amended the proposal for the use of the distributable profit that had been included in the Notice of the Annual Stockholders' Meeting because the number of shares had risen since its publication as a result of the capital increase for which subscription rights were excluded.

Audit Committee: The Audit Committee comprises three stockholder representatives and three employee representatives. In the year under review, Dr. Klaus Sturany served as Chairman of the Audit Committee until the day of the Annual Stockholders' Meeting, May 25, 2018, and Professor Norbert Winkeljohann succeeded him in this function following his election to the Supervisory Board on May 25, 2018. Both satisfied the statutory requirements concerning the expertise in the field of accounting or auditing that a member of the Supervisory Board and the Audit Committee is required to possess. The Audit Committee meets regularly four times a year.

Its tasks include in particular oversight of the accounting, the financial reporting process, the effectiveness and ongoing development of the internal control system, the risk management system, the internal audit system, the compliance system and the audit of the financial statements. The Audit Committee prepares the resolutions of the Supervisory Board concerning the financial statements and management report of Bayer AG and the proposal for the use of the distributable profit, the consolidated financial statements and management report of the Bayer Group and the agreements with the auditor (particularly the awarding of the audit contract, the determination of the main areas of focus for the audit and the audit fee agreement). The committee submits a reasoned proposal to the full Supervisory Board concerning the auditor's appointment, and takes appropriate measures to determine and monitor the auditor's independence. The audit focuses particularly on whether the financial statements have been prepared in compliance with the statutory requirements and whether the financial reporting provides a true and fair view of the financial position and results of operations of the company and the Group.

The Audit Committee discussed developments in the area of corporate compliance at each of its meetings, where necessary.

The Chairman of the Board of Management and the Chief Financial Officer at the respective time regularly attended the meetings of the Audit Committee. Representatives of the auditor were also present at all the meetings and reported in detail on the audit work and the audit reviews of the interim financial reports.

The Audit Committee devoted special attention in 2018 to the effects of the Monsanto transaction on the financial reporting and to the litigations related to glyphosate. The individual meetings focused mainly on the following topics: At the February meeting, the Audit Committee discussed the financial statements of Bayer AG and the consolidated financial statements of the Bayer Group. It also carefully considered the risk report, which covers the risk early warning system, and the report on the internal control system (ICS). The Audit Committee discussed the further developed policies for risk reporting. Further, the Audit Committee examined the development of legal and compliance cases. Finally, the Audit Committee made a recommendation to the full Supervisory Board concerning the resolution to be submitted to the Annual Stockholders' Meeting on the appointment of the auditor of the financial statements. The principal topics at the April meeting were the yearly reports by the Group Compliance Officer and Internal Audit, digitization and process optimization initiatives in the CFO's area, and determining the main areas of focus for the audit of the 2018 financial statements.

At the August meeting, the interim financial report and, in particular, the glyphosate-related litigations were discussed in detail. At its November meeting, the Audit Committee discussed the yearly report of the Tax department, the audit conducted pursuant to Section 32 of the German Securities Trading Act (WpHG) (EMIR), the audit budget for the external auditor for 2019 and the framework for the auditor's non-audit services.

Human Resources Committee: On this committee, too, there is parity of representation between stockholders and employees. It consists of the Chairman of the Supervisory Board and three other Supervisory Board members. The Human Resources Committee prepares the personnel decisions of the full Supervisory Board, which resolves on appointments or dismissals of members of the Board of Management. The Human Resources Committee resolves on behalf of the Supervisory

Board on the service contracts of the members of the Board of Management. However, it is the task of the full Supervisory Board to resolve on the total compensation of the individual members of the Board of Management and the respective compensation components, as well as to regularly review the compensation system on the basis of recommendations submitted by the Human Resources Committee. The Human Resources Committee also discusses the long-term succession planning for the Board of Management.

The Chairman of the Board of Management regularly attended the meetings of the Human Resources Committee where the issues discussed did not relate to him personally.

The Human Resources Committee convened on three occasions and also passed one resolution in writing outside a meeting. In each case, the meetings involved deliberations and the adoption of resolutions relating to the compensation of the Board of Management and the service contracts of Board of Management members, the extension of the terms of office of Liam Condon and Hartmut Klusik, the departure of Dieter Weinand and the appointment of Stefan Oelrich to the Board of Management.

Nominations Committee: This committee carries out preparatory work when an election of stockholder representatives to the Supervisory Board is to be held. It suggests suitable candidates for the Supervisory Board to propose to the Annual Stockholders' Meeting for election. The Nominations Committee comprises the Chairman of the Supervisory Board and the other stockholder representative on the Presidial Committee.

The Nominations Committee met once in 2018 and adopted a recommendation for an election proposal to the Annual Stockholders' Meeting 2019.

Innovation Committee: The Innovation Committee is primarily concerned with the innovation strategy and innovation management, the strategy for the protection of intellectual property, and major research and development programs at Bayer. Within its area of responsibility, the committee advises and oversees the management and prepares any Supervisory Board decisions. The Committee comprises the Chairman of the Supervisory Board and five other members of the Supervisory Board, with parity of representation between stockholder and employee representatives. The Chairman of the Board of Management and the member of the Board of Management responsible for Innovation regularly attend the meetings of the Innovation Committee.

The Innovation Committee convened once in 2018. At this meeting, it dealt with digital transformation at Bayer and the further development of the Bayer Lifescience Center (Leaps) after the latter topic had been discussed at earlier meetings.

Corporate governance

The Supervisory Board dealt with the principles of corporate governance at Bayer. In particular, it resolved in its May meeting on a declaration on two temporary deviations from the recommendations of the German Corporate Governance Code. At its December meeting, the Supervisory Board then resolved to issue an unqualified declaration of future compliance. Further, at the meetings of the Supervisory Board the Chairman of the Supervisory Board gave a summary of his dialogue with investors.

Financial statements and audits

The financial statements of Bayer AG were prepared according to the requirements of the German Commercial Code and Stock Corporation Act. The consolidated financial statements of the Bayer Group were prepared according to the German Commercial Code and the International Financial Reporting Standards (IFRS). The combined management report was prepared according to the German Commercial Code. The auditor, Deloitte GmbH Wirtschaftsprüfungsgesellschaft, Munich, has audited the financial statements of Bayer AG, the consolidated financial statements of the Bayer Group and the combined management report. The auditor responsible for the audit was Professor Frank Beine. The conduct of the audit is explained in the auditor's reports. The auditor finds that Bayer has complied, as appropriate, with the German Commercial Code, the German

Stock Corporation Act and/or the International Financial Reporting Standards endorsed by the European Union, and issues an unqualified opinion on the financial statements of Bayer AG, the consolidated financial statements of the Bayer Group and the combined management report. The financial statements of Bayer AG, the consolidated financial statements of the Bayer Group, the combined management report and the audit reports were submitted to all members of the Supervisory Board. They were discussed in detail by the Audit Committee and at a meeting of the full Supervisory Board. The auditor submitted a report on both occasions and was present during the discussions.

We examined the financial statements of Bayer AG, the proposal for the use of the distributable profit, the consolidated financial statements of the Bayer Group and the combined management report. While examining the combined management report, we also examined in particular the nonfinancial statement that is fully integrated in the management report. This statement was also examined by the auditor. We have no objections, thus we concur with the result of the audit.

We have approved the financial statements of Bayer AG and the consolidated financial statements of the Bayer Group prepared by the Board of Management. The financial statements of Bayer AG are thus confirmed. We are in agreement with the combined management report and, in particular, with the assessment of the future development of the enterprise. We also concur with the dividend policy and the decisions concerning earnings retention by the company. We assent to the proposal for the use of the distributable profit, which provides for payment of a dividend of €2.80 per share.

The Supervisory Board would like to thank the Board of Management and all employees for their dedication and hard work in 2018.

Leverkusen, February 26, 2019
For the Supervisory Board

Werner Wenning
Chairman

Investor Information

Performance of Bayer stock

The performance of Bayer stock was clearly in negative territory in 2018. The company's shares reached their high for the year in January, at €107.48. Following declines through the end of March, the price recovered significantly to more than €100 per share in May. Bayer stock then registered declines over the further course of the year, particularly in August as a result of a judgment by a court of first instance in the United States in connection with glyphosate, and closed the year at €60.56. Including the dividend of €2.80 per share paid at the end of May, the return on Bayer stock was minus 39.2%. By comparison, the German stock index DAX30 fell by 18.3% in 2018.

1

Bayer Stock Data

		2017	2018
Earnings per share from continuing and discontinued operations	€	8.41	1.80
Core earnings per share from continuing operations[1]	€	6.64	5.94
Cash flow from operating activities in continuing operations per share	€	7.99	8.49
Equity per share	€	44.57	49.49
Dividend per share	€	2.80	2.80
Year-end price[2]	€	104.00	60.56
High for the year[2]	€	123.30	107.48
Low for the year[2]	€	100.00	59.16
Total dividend payment[3]	€ million	2,402	2,611
Number of shares entitled to the dividend (Dec. 31)	million shares	826.95	932.55
Market capitalization (Dec. 31)	€ billion	86.0	56.5
Average daily share turnover on German stock exchanges	million shares	2.0	3.6
Price/EPS[2]		12.4	33.6
Price/core EPS[2]		15.7	10.2
Price/cash flow[2]		13.0	7.1
Dividend yield	%	2.7	4.6

2017 figures restated
[1] For details on the calculation of core earnings per share see Combined Management Report, A 2.4
[2] Xetra closing prices (source: Bloomberg)
[3] In April 2018, the Republic of Singapore subscribed to 31 million new shares carrying dividend rights for 2017 through a subsidiary. The 2017 total dividend payment therefore increased by the sum of the dividends attributable to the newly issued shares.

Successful financing in turbulent markets

In addition to the European Central Bank reducing its bond purchases, concerns about escalating trade disputes and a no-deal Brexit led to increased volatility in the capital markets. While interest rates remained low, credit spreads increased sharply, roughly doubling over the course of the year. The premiums for new issues commonly seen in the bond market also expanded markedly compared with the previous year. As expected, total issue volumes did not reach the record levels of the prior year, but were still well above the average of the last 10 years.

2018 was a very eventful year for Bayer, not only generally but also in terms of financing: All maturing bonds in U.S. dollars, British pound sterling and Japanese yen were redeemed and various financing sources leveraged to finance the Monsanto acquisition. On April 16, the Republic of Singapore subscribed to 31 million new Bayer AG shares through a subsidiary, generating gross proceeds of €3.0 billion. This issuance was followed in June by a capital increase with subscription rights for existing stockholders that generated net proceeds of some €6.0 billion, with approximately 74.6 million shares issued.

Bond issues also took place at the same time. On June 18, Bayer issued unsecured bonds in 144a/RegS format with a volume of US$15.0 billion. Eight tranches with maturities of between three and 30 years were successfully placed with institutional investors. The following day, Bayer completed the financing by placing unsecured bonds with a volume of €5.0 billion on the euro market.

Bayer also took over 16 outstanding bonds with a total volume of US$6.9 billion from Monsanto. Bayer initiated an exchange offer for all 16 debt instruments, granting the bondholders of Monsanto the option of acquiring securities guaranteed by Bayer AG. Some 83% of the outstanding bond volume was exchanged.

Further details of all outstanding bonds are given in B Consolidated Financial Statements, Note [27].

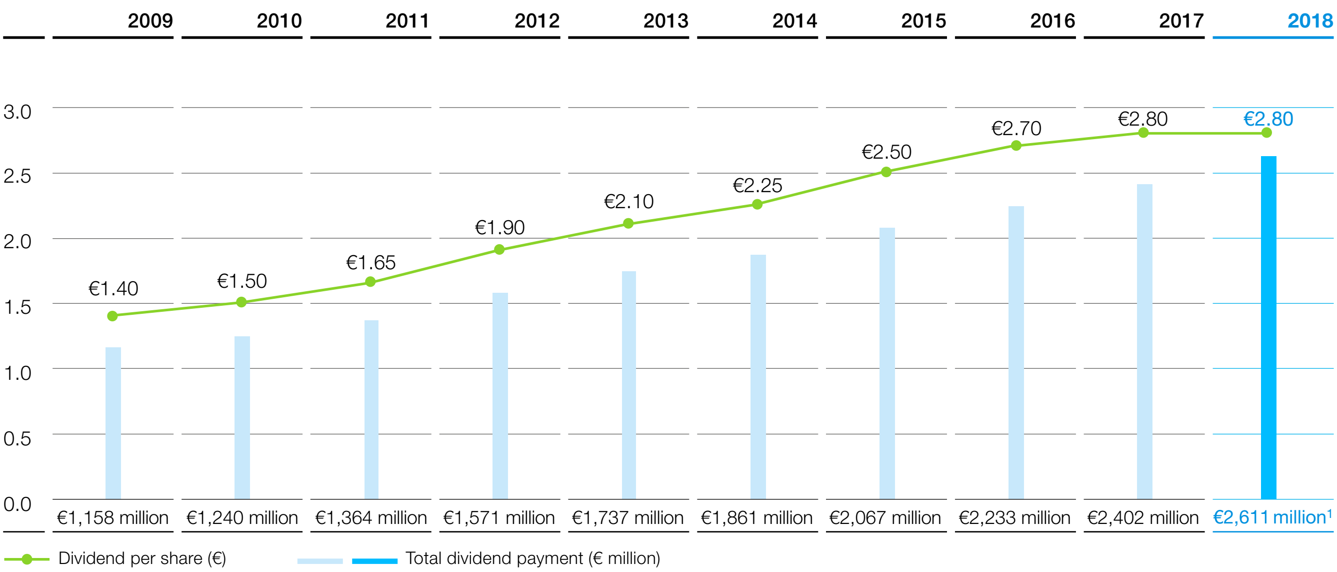
Dividend of €2.80 per share, matching prior year

We registered successful operational performance overall in 2018 and want our stockholders to adequately share in the company's success through an attractive dividend. The Board of Management and the Supervisory Board will therefore propose to the Annual Stockholders' Meeting that the dividend remain unchanged at €2.80 per share, which corresponds to 47.1% of core earnings per share in 2018.

The dividend yield calculated on the share price at year-end 2018 amounts to 4.6%.

2

Dividends Per Share and Total Dividend Payments



[1] In April 2018, the Republic of Singapore subscribed to 31 million new shares carrying dividend rights for 2017 through a subsidiary. The 2017 total dividend payment therefore increased by the sum of the dividends attributable to the newly issued shares.

Investor relations activities in 2018

GRI 102-43

Bayer's investor relations activities in 2018 focused on the Monsanto acquisition and our Capital Markets Day, where we presented our new medium-term targets, along with the accompanying communications for the equity and debt measures. We intensified our contact with investors and analysts in general at a number of roadshows and conferences in Germany and abroad.

At the Capital Markets Day, our most important investor relations event of the year, institutional investors and analysts had the opportunity to engage in direct dialogue with our executive management. It was one of our company's best-attended IR events, with participation by more than 150 capital market representatives. The conference program offered information on our company's strategy and medium-term financial targets, as well as on the current business performance. In addition, topics relating specifically to Crop Science were addressed in depth during a series of workshops.

A sustainable investment

GRI 102-43, 102-44

We continued our dialogue with sustainability-oriented investors, analysts and rating agencies in 2018. The discussions focused on the acquisition of Monsanto, as well as on business ethics, product stewardship and the environmental impact of our activities.

www.bayer.com/awards

Bayer continues to be included in the important sustainability indices FTSE4Good, MSCI World Low Carbon Target Index, STOXX® Europe Sustainability Index and the STOXX® Global ESG Impact index.

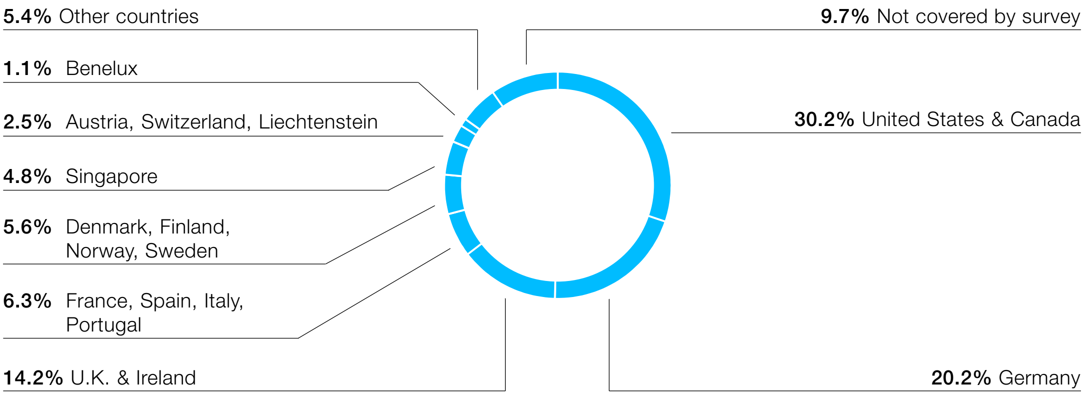
In addition, in 2018 Bayer was again evaluated by the CDP (Carbon Disclosure Project) as one of the leading international pharmaceutical companies in the areas of climate protection and sustainable water management.

A growing number of stockholders

The number of Bayer stockholders rose substantially in 2018. At the end of 2018, approximately 383,000 stockholders were listed in our share register – an increase of more than 11% compared with the previous year. Our ownership structure illustrates the international distribution of our capital stock. The highest proportion of our outstanding shares, at approximately 30%, is held by investors in the United States and Canada, followed by Germany, with about 20%. Bayer has a 100% free float as defined by Deutsche Börse, the operator of the Frankfurt Stock Exchange.

3

Shareholder Composition – Regional Allocation



Source: Cmi2i

About this Report

This integrated Annual Report combines our financial and our sustainability reporting. Our aim is to elucidate the interactions between financial, ecological and societal factors and underline their influence on our company's long-term success. The integrated Bayer Annual Report 2018 is available online as an HTML report, PDF file and app.

Legal principles and reporting standards

The consolidated financial statements of the Bayer Group as of December 31, 2018, comply with the International Financial Reporting Standards (IFRS), as adopted by the E.U., valid at the closing date and with the provisions of the German Commercial Code in conjunction with German financial reporting standards (DRS). With due regard to these provisions, the combined management report provides an accurate overview of the financial position and results of operations of the Bayer Group. The Corporate Governance Report also conforms with the recommendations of the German Corporate Governance Code. The consolidated financial statements and the combined management report are published in the Federal Gazette in line with the statutory disclosure requirement.

The Bayer Group's sustainability reporting has been aligned to the guidelines of the Global Reporting Initiative (GRI) and the 10 principles of the U.N. Global Compact (UNGC) since 2000. This report has been prepared in accordance with the GRI Standards: "core" option. The detailed GRI index with the corresponding UNGC principles and Bayer's areas of activity can be found online. This report also serves as a Communication on Progress in line with the U.N. Global Compact.

GRI Community Bayer AG 2019

www.bayer.com/gri

Global Compact LEAD PARTICIPANT

We also use, for example, the international recommendations and guidelines of the OECD and ISO 26000 as a guide for defining and selecting nonfinancial indicators and in our reporting. In selecting and measuring our key data, we take into account the recommendations of the Greenhouse Gas Protocol with respect to greenhouse gas emissions and those of the European Federation of Financial Analysts Societies, the World Business Council for Sustainable Development and the European Chemical Industry Council (CEFIC) with respect to other nonfinancial indicators.

Nonfinancial statement pursuant to the German Commercial Code

The nonfinancial statement pursuant to the CSR Directive Implementation Act (Sections 289b et seq. and 315b et seq. of the German Commercial Code) is integrated into the combined management report and covers data for the Bayer Group and Bayer AG as the parent company. As a framework for this, we also apply the GRI Standards (Section 289d of the German Commercial Code). The required disclosures, the corresponding chapters of the combined management report and the corresponding Bayer areas of activity with regard to the aspects prescribed by law are given in the index to the nonfinancial statement. The legality, accuracy and expediency of the nonfinancial statement have been verified by the Supervisory Board.

See A 4.6 regarding the index to the nonfinancial statement

Data collection and reporting thresholds

GRI 102-45

In accordance with IFRS 5 (Non-current Assets Held for Sale and Discontinued Operations), financial indicators are given for continuing operations unless otherwise explicitly indicated. The same applies to HR and HSE (health, safety and environment) indicators and our social data.

Reporting of the Group's HSE data includes all fully consolidated companies in which we hold at least a 50 percent interest. Data on occupational injuries are collected at all sites worldwide. Environmental indicators are measured at all environmentally relevant production, research and administration sites. We consider environmentally relevant sites to be all those whose annual energy consumption is more than 1.5 terajoules.

Several nonfinancial indicators (particularly related to employees and procurement) are reported only for our significant locations of operation in line with the requirements of the corresponding GRI indicators. In 2018, this covered 18 countries that accounted for more than 80% of total Bayer Group sales.

See A 1.1.2, A 2.1.3 and Note 6 to B Consolidated Financial Statements for information on the acquisition and the related divestments

We closed the acquisition of Monsanto on June 7, 2018. The integration of Monsanto's personnel and functions has been concluded such that cross-functional management is ensured by Bayer's Board of Management. Further integration measures such as the systems and process integration are either being planned or implemented, and are scheduled for completion in the coming years according to the underlying complexity of the individual subject areas. The acquired agriculture business is included in the quantitative and qualitative disclosures except where otherwise indicated.

GRI 102-45

External verification

The auditing company Deloitte GmbH Wirtschaftsprüfungsgesellschaft (Deloitte), Munich, Germany, has audited the consolidated financial statements (including the notes thereto) of Bayer AG, Leverkusen, and the combined management report for the fiscal year from January 1, 2018, to December 31, 2018, and has issued an unqualified opinion (reasonable assurance). The audit also includes the disclosures pertaining to the nonfinancial statement pursuant to Section 315c of the German Commercial Code in conjunction with Section 289c of the German Commercial Code. The audit opinion on the combined management report does not pertain to the following, indented text passages and elements of the combined management report:

Section	Chapter
Diverse stakeholders in focus	1.2.3 Sustainability Management
Collaboration formats aimed at specific target groups	1.2.3 Sustainability Management
Binding and transparent compensation structures	1.4.1 Employees
Quality management of segments	1.6.1 Product Stewardship
Biodiversity in the segments	1.6.1 Product Stewardship
Commitment to reducing animal studies	1.6.1 Product Stewardship
Global pharmaceutical monitoring system	1.6.1 Product Stewardship
Processes in plant biotechnology	1.6.1 Product Stewardship
Training farmers and Bayer employees	1.6.1 Product Stewardship
Occupational illnesses	1.6.2 Occupational, Plant and Transportation Safety
Other direct air emissions	1.6.3 Environmental Protection
Water use in the Bayer Group 2018	1.6.3 Environmental Protection
Waste by means of disposal	1.6.3 Environmental Protection
Liaison offices – Contact with political stakeholders	4.2 Compliance

The auditor, Deloitte, subjected these sections to an audit with limited assurance. The pro-forma sales of Crop Science and the declaration of compliance with the German Corporate Governance Code have not been audited by the auditor.

Additional information

// As the indicators in this report are stated in accordance with commercial rounding principles, totals and percentages may not always be exact.
// For further guidance, the Annual Report contains references in the margin as follows:

Cross-references within the Annual Report

References to websites

GRI references

A Combined Management Report

of the Bayer Group and Bayer AG as of December 31, 2018

1. Fundamental Information About the Group

1.1 Corporate Profile and Structure

The foundation for our success: innovation strength
Bayer supports efforts to attain U.N. Sustainable Development Goals
Largest acquisition in Bayer's history bolsters agricultural business

1.1.1 Corporate Profile

Bayer is a life science company and a global leader in health care and nutrition. Our innovative products support efforts to overcome the major challenges presented by a growing and aging global population. Guided by our corporate purpose "Bayer: Science for a better life," we help to prevent, alleviate and treat diseases. We are also making an important contribution to providing a reliable supply of high-quality food, feed and plant-based raw materials, while at the same time promoting the sustainable use of natural resources. Our business activities therefore also support the attainment of the United Nations Sustainable Development Goals.

We aim to bolster profitability and create value for our customers, shareholders and employees. Around the world, the Bayer brand stands for trust, reliability and quality. Across our various businesses, our activities are guided by our corporate values of **L**eadership, **I**ntegrity, **F**lexibility and **E**fficiency, or LIFE for short. Our value culture ensures a common identity throughout the enterprise across national boundaries, management hierarchies and cultural differences.

1.1.2 Corporate Structure

Corporate structure as of December 31, 2018

The management structure of the Bayer Group comprises three divisions – Pharmaceuticals, Consumer Health and Crop Science – and the Animal Health business unit, which are also our reporting segments. The corporate functions, Business Services and the service company Currenta support the operational business.

A 1.1.2/1

Bayer Group Structure in 2018

Pharmaceuticals concentrates on prescription products, especially for cardiology and women's health care, and on specialty therapeutics focused on the areas of oncology, hematology and ophthalmology. The division also comprises the radiology business, which markets diagnostic imaging equipment together with the necessary contrast agents. Our portfolio includes a range of key products that are among the world's leading pharmaceuticals for their indications. The prescription products from Pharmaceuticals are primarily distributed through wholesalers, pharmacies and hospitals.

Consumer Health is a leading supplier of nonprescription (OTC = over-the-counter) medicines, medical products, cosmetics and other self-care solutions in the categories of dermatology, nutritional supplements, pain and cardiovascular risk prevention, digestive health, allergy, cough and cold, foot care and sun protection. The products are generally sold by pharmacies, supermarket and drugstore chains, online retailers and other large retailers.

Crop Science is the world's leading agriculture enterprise following the acquisition of Monsanto, with businesses in crop protection and seeds. We offer a broad portfolio of high-value seeds, improved plant traits, innovative chemical and biological crop protection products, digital solutions and extensive customer service for sustainable agriculture. We market these products primarily via wholesalers and retailers or directly to farmers. In addition, we market pest and weed control products and services to professional users outside the agriculture industry. Most of our crop-protection products are manufactured at the segment's own production sites. Numerous decentralized formulation and filling sites enable the company to quickly react to the needs of local markets. The breeding, propagation, production and/or processing of seeds, including seed dressing, takes place at locations close to our customers, either at our own facilities or under contract.

Animal Health is a global leader in its field. We develop innovative products and solutions for the prevention and treatment of diseases in companion and farm animals. We market our animal health products globally through veterinarians and other distribution channels such as pharmacies or retail stores.

The **corporate functions** and **Business Services** operate as Group-wide competence centers in which business support services are bundled. **Currenta** is the service company responsible for managing and operating the Chempark sites in Leverkusen, Dormagen and Krefeld-Uerdingen.

More information on the segments' products and activities is contained in the following table:

A 1.1.2/2

Products and Activities of the Segments

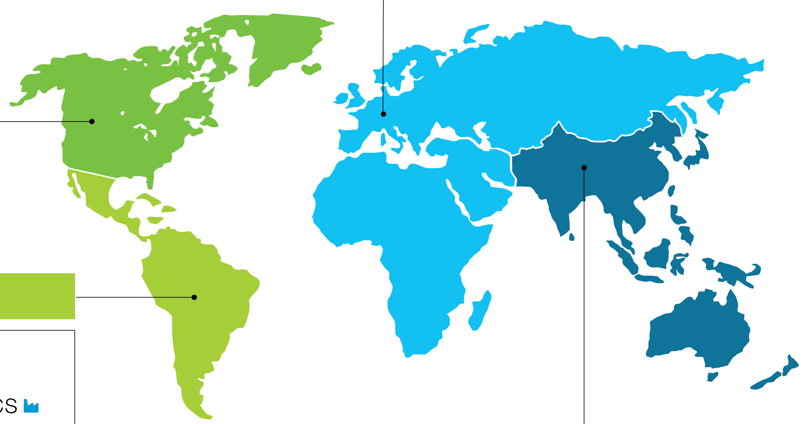
Indication/Application/Business	Core activities and markets	Main products and brands[1]
Pharmaceuticals		
Cardiology	Hypertension, pulmonary hypertension, heart attack and stroke, thrombosis, coronary artery disease (CAD), peripheral artery disease (PAD)	Xarelto™, Adalat™, Aspirin™ Cardio, Adempas™
Oncology	Liver cancer, renal cell carcinoma, thyroid carcinoma, prostate cancer, colorectal cancer, gastrointestinal stromal tumors (GIST), follicular lymphoma, solid tumors with NTRK gene fusions	Nexavar™, Xofigo™, Stivarga™, Aliqopa™, Vitrakvi™
Ophthalmology	Visual impairment due to age-related macular degeneration (AMD), diabetic macular edema (DME) or retinal vein occlusion (RVO)	Eylea™
Hematology	Hemophilia A	Kogenate™/Kovaltry™/Jivi™
Women's health	Contraception, gynecological therapy	Mirena™ product family, Yaz™/Yasmin™/Yasminelle™; Visanne™
Infectious diseases	Bacterial infections	Avalox™/Avelox™, Cipro™, Ciprobay™
Radiology	Contrast agents; diagnostic imaging equipment for use with contrast agents	Gadovist™, Ultravist™, Medrad Spectris Solaris™, Medrad Stellant™
Neurology	Multiple sclerosis	Betaferon™/Betaseron™
Consumer Health		
Dermatology	Wound care, skin care, skin and intimate health	Bepanthen™, Canesten™
Nutritionals	Multivitamin products, dietary supplements	One A Day™, Elevit™, Berocca™, Supradyn™, Redoxon™
Pain	General pain relief	Aspirin™, Aleve™
Digestive health	Digestive health complaints	MiraLAX™, Rennie™, Iberogast™
Allergy	Allergies	Claritin™
Cough and cold	Cough and cold	Aspirin™, Alka-Seltzer™, Afrin™
Foot care	Foot care	Dr. Scholl's™
Sun protection	Sun protection	Coppertone™
Crop Science		
Herbicides	Chemical crop protection products to control weeds	Roundup™, Adengo™, Alion™, Corvus™, Atlantis™, Harness™, Warrant™
Corn Seed & Traits	Seeds and traits for corn	Dekalb™, SmartStax™ RIB Complete, VT Double™ PRO, VT Triple™ PRO
Soybean Seed & Traits	Seeds and traits for soybeans	Asgrow™, Intacta RR2PRO™ Roundup Ready 2 Xtend™, Roundup Ready 2 Yield™
Fungicides	Biological and chemical products to protect crop plants from fungal diseases	Flint™, Fox™, Luna™, Nativo™, Prosaro™, Serenade™, Xpro™
Insecticides	Biological and chemical products to protect crop plants from harmful insects and their larvae	BioAct™, Confidor™, Movento™, Sivanto™
Environmental Science	Products for professional pest control, vector control, forestry, golf courses and parks, railway tracks	Ficam™, Maxforce™, Esplanade™, K-Othrine™
Vegetable Seeds	Vegetable seeds	Seminis™, DeRuiters™
Digital Agriculture	Digital applications for agriculture	Climate FieldView™
Other	Seeds and traits for cotton, oilseed rape/canola, rice and wheat as well as biological and chemical seed treatment products to protect against fungal diseases and pests	Gaucho™, Bollgard™ II, Bollgard™ II XtendFlex™, Deltapine™
Animal Health		
Companion animals business	Veterinary medicines and solutions to protect and maintain the health and wellbeing of companion animals, focusing on antiparasitics and anti-infectives	Advantage™ product family, Seresto™, Drontal™ product family, Baytril™
Farm animals business	Veterinary medicines and solutions to treat and prevent parasitic diseases, anti-infectives, immunostimulants, pharmacological treatments and farm hygiene products	Baytril™, Cydectin™

[1] The order of the products listed is no indication of their significance.

We operate sites around the world, and some are used by multiple segments. As of December 31, 2018, the Bayer Group comprised 420 consolidated companies in 90 countries.

A 1.1.2/3

Bayer Worldwide 2018



North America

United States

Berkeley	PH ⚗ 🏭
Kansas City	CS 🏭
Luling	CS 🏭
Morristown	CH ⚗
Muscatine	CS 🏭
Myerstown	CH 🏭
Pittsburgh	▦
San Francisco	PH ⚗
Saxonburg	PH 🏭
Shawnee	AH ⚗ 🏭
Soda Springs	CS 🏭
St. Louis	CS ⚗ ▦
Whippany	▦ | PH ⚗ ▦ | CH ⚗
Woodland	CS ⚗

Europe / Middle East / Africa

Belgium

Antwerp	CS 🏭

Germany

Bergkamen	PH 🏭
Berlin	PH ⚗ 🏭 ▦*
Bitterfeld – Wolfen	CH 🏭
Darmstadt	CH ⚗
Dormagen	CS 🏭
Frankfurt am Main	CS ⚗ 🏭
Grenzach	CH 🏭
Hürth – Knapsack	CS 🏭
Kiel	AH 🏭
Cologne	PH ⚗
Leverkusen	▦* | PH 🏭 ▦
Monheim	CS ⚗ ▦* | AH ⚗ ▦*
Weimar	PH 🏭
Wuppertal	PH ⚗ 🏭

Finland

Turku	PH ⚗ 🏭

France

Gaillard	CH ⚗
Lyon	CS ⚗
Sophia Antipolis	CS ⚗
Villefranche	CS 🏭

Italy

Garbagnate	PH 🏭

Netherlands

Bergschenhoek	CS ⚗

Norway

Oslo	PH ⚗

Switzerland

Basel	PH ⚗ ▦ | CH ▦*
Muttenz	CS 🏭

Latin America

Argentina

Zárate	CS 🏭

Brazil

Belford Roxo	CS 🏭
Camaçari	CS 🏭
Petrolina	CS ⚗
São Paulo	▦ | CS ⚗ ▦ | AH ⚗ ▦

Mexico

Lerma	CH 🏭
Mexico City	▦

Asia / Pacific

China

Beijing	▦ | PH ⚗ 🏭 ▦
Qidong	CH ⚗

India

Thane	▦
Vapi	CS 🏭

Indonesia

Cimanggis	CH 🏭

Japan

Koka	PH 🏭
Osaka	PH ⚗ ▦
Tokyo	PH ⚗ ▦

New Zealand

Auckland	AH ⚗

PH: Pharmaceuticals
CH: Consumer Health
CS: Crop Science
AH: Animal Health
⚗ Significant research and development location
🏭 Significant production location
▦* Headquarters
▦ Significant administrative site

Management functions of Bayer AG

As the parent company of the Bayer Group, Bayer AG – represented by its Board of Management – performs the principal management functions for the entire company. This mainly comprises the Group's strategic alignment, resource allocation, and the management of financial affairs and managerial staff, along with the management of the Group-wide operational business of the segments. In addition, Bayer AG also performs the corresponding parent company functions for Pharmaceuticals and Crop Science in Germany.

Changes to the corporate structure

On June 7, 2018, Bayer completed the acquisition of the Monsanto Company, St. Louis, Missouri, United States (Monsanto), for US$63 billion, including debt. The divestments to BASF required to fulfill the antitrust conditions were completed on August 1, 2018, for all businesses earmarked for divestment excluding the vegetable seed business, which was divested as of August 16, 2018. The closing of these transactions led to the hold separate order being lifted and enabled the integration of Monsanto into the Bayer Group to begin.

See A 2.1.3 for further details of the Monsanto acquisition; see "About this Report" for information on reporting thresholds

In connection with the acquisition, the structure was adjusted as of the second quarter of 2018 to reflect the relative sizes of the various strategic business entities at that time and moving forward. Due to the relative sizes of the former Monsanto businesses "Corn seed and traits" and "Soybean seed and traits," we now report our corresponding strategic business entities Corn Seed & Traits and Soybean Seed & Traits separately. The former Monsanto business "Agricultural Productivity" was allocated among Herbicides, Environmental Science and Other, while "Cotton seed and traits" and "All other crops seeds and traits" are reported under Other and the "Vegetable seeds" business was allocated to our Vegetable Seeds business entity. Due to its relative size, we no longer report our SeedGrowth business separately, but under Other. Regional reporting is not impacted by these changes. The figures for previous reporting periods have been adjusted accordingly.

A comparison of the Crop Science reporting structure in effect until December 31, 2017, and the reporting structure in effect since the second quarter of 2018 is shown in the following graphic.

A 1.1.2/4

Realigned Crop Science Structure

Reporting structure until Dec. 31, 2017	Reporting structure as of Dec. 31, 2018
Crop Protection/Seeds	–
Crop Protection	–
Herbicides	Herbicides
–	Corn Seed & Traits
–	Soybean Seed & Traits
Fungicides	Fungicides
Insecticides	Insecticides
SeedGrowth	–
Seeds	–
Environmental Science	Environmental Science
–	Vegetable Seeds
–	Other
Crop Science (total)	**Crop Science (total)**

The Monsanto business is included in full from the date the acquisition closed. The divestments to BASF are not included in the figures from the dates the transactions were completed. The reported portfolio effect on the sales of Crop Science (and of the Bayer Group) therefore includes the contribution from the Monsanto business since June 7, 2018, less the contribution of the divested businesses to Q3 2017 sales after August 1 and 16, respectively.

1.2 Strategy and Management

Corporate strategy targets long-term profitable growth

Group targets reflect our integrated business approach

Comprehensive range of portfolio, efficiency and structural measures through 2022

Sustainability management underpins all business activities

1.2.1 Strategy and Targets

Group strategy

The steadily growing and aging global population presents fundamental challenges in health care and nutrition. How will we feed up to 10 billion people in 2050 while contending with the impact of climate change? How will we ensure quality of life for an ever-increasing number of elderly people?

These are the challenges that we are looking to address. In line with our corporate purpose "Science for a better life," we are driving the development of better medicines and the production of high-quality food through innovative solutions. We continuously develop our businesses such that they assume leadership positions in their respective industries and market segments to create value and achieve long-term success for our company. Our efforts are sustained by our employees and by our core competencies of innovation, customer focus, quality, process efficiency and portfolio management.

We are committed to the United Nations Sustainable Development Goals (SDGs). In line with our core competencies, we actively support SDGs 2 and 3: "Good Health and Well-Being" and "Zero Hunger."

Portfolio, efficiency and structural measures – Bayer 2022 program

We aim to strengthen our core life science businesses through 2022 by implementing a series of portfolio, efficiency and structural measures designed to enhance productivity and innovation while significantly improving competitiveness. Through these measures, we are paving the way for sustainable business success. The planned portfolio measures include exiting the Animal Health business and the sun care (Coppertone™) and foot care (Dr. Scholl's™) product lines, as well as divesting our 60% interest in Currenta. We also intend to significantly improve cost structures. The planned efficiency and structural measures are set to include a reduction in internal research and development capacities at the Pharmaceuticals segment, with the freed-up resources set to be directed toward strengthening investment in collaborative research models and external innovations. Furthermore, we have decided not to utilize the factor VIII facility constructed in Wuppertal, Germany, and to focus all recombinant factor VIII production in Berkeley, United States. At the Consumer Health segment, we will adapt the organizational structure and reduce costs to succeed in a rapidly changing market environment. At the Crop Science segment, the focus is on successfully integrating the acquired business and realizing the resulting sales and cost synergies. The aforementioned efficiency and structural measures also entail the planned reduction of approximately 12,000 jobs. The changes in the segments and the efforts to streamline the portfolio will be complemented by extensive adjustments within the company, particularly within the corporate and supporting functions, Business Services and the country platforms.

Strategies of the Segments

Pharmaceuticals

See also A 1.3

Demographic change is impacting health care systems through the growing number of chronic diseases and the increasing occurrence of multiple conditions. In addition, digital technologies have the potential to transform the way health care is delivered. Examples include telemedicine, artificial intelligence-driven diagnostic and treatment support, as well as combining computer processing power with the availability of large data sets to enable personalized testing and treatment.

We are seeking to contribute to medical progress through our focus on researching, developing and marketing innovative medicines, primarily in the therapeutic areas of cardiology, oncology, women's health, hematology and ophthalmology.

Our near- to medium-term growth is being primarily driven by Xarelto™ and Eylea™. It is expected to be further fueled by several promising late-stage R&D pipeline candidates. To safeguard long-term growth, we are continuing to invest in research and development (R&D) in areas in which a substantial need for innovation remains. Moreover, given the continued growth opportunities in biologics and novel technologies, we are expanding our efforts to access more external innovation through research collaborations and inlicensing.

We continue to build capabilities in leveraging data, advanced analytics and artificial intelligence to deliver greater value to patients and customers, and to increase productivity across the pharmaceutical value chain from R&D to Medical Affairs, Commercial and Product Supply. One successful example of our efforts is the digital transformation of Bayer's production site in Garbagnate, Italy, which the World Economic Forum in 2018 acknowledged as an advanced digital lighthouse across industries. The project drives improvements in key production processes and thus ensures the availability of products for patients.

To improve access to our products in developing and emerging countries (Access to Medicine, or ATM for short), we have entered into a series of long-term partnerships focusing on aspects such as the provision of contraceptives and logistics support for both multilateral and bilateral family planning programs. We work closely with the World Health Organization as part of our endeavors to combat neglected tropical diseases. As well as making product donations and providing financial support, Bayer is also involved in the further development of active ingredients.

www.bayer.com/
sustainable-healthcare

Consumer Health

Cost pressure on public health care systems and the growing empowerment of consumers are increasingly putting the spotlight on the benefits of self-care and point to further long-term growth of the consumer health market. At the same time, digitalization is reshaping marketing, commercial and business models.

We provide our consumers and customers with the information, knowledge, products and services they need to take more responsibility for their health, improving their quality of life.

We invest in innovation to reinforce our core brands Claritin™, Aspirin™, Aleve™, Bepanthen™, Canesten™, Alka-Seltzer™, One A Day™, MiraLAX™, Iberogast™, Elevit™, Redoxon™, Supradyn™, Berocca™, Rennie™, Afrin™ and others. We are also placing greater focus on digital marketing and e-commerce, and are enhancing our presence in key markets such as the United States, Germany, Russia and China, as well as additional countries.

Our strategy moving forward will accelerate our core categories, geographies and the transfer of prescription medicines and active ingredients to nonprescription status. We will strengthen our capabilities including digital and insights and drive marketing and sales execution. A new operating model will enhance consumer and customer-centricity and drive agility, efficiency and consistency in execution.

Crop Science

The world faces enormous challenges including a changing climate, limited natural resources and a growing population. At the same time, the need for food, animal feed and renewable raw materials is growing worldwide.

Following our acquisition of Monsanto, we are now the world leader in agriculture. As such, we are even better positioned to shape agriculture through breakthrough innovation for the benefit of farmers, consumers and our planet. Our strategy is based on three key elements: innovation, sustainability and digital transformation.

See also A 1.3

Our industry-leading innovation engine builds on a unique combination of seeds and traits, crop protection and digital tools. It enables us to deliver more innovation to farmers even more quickly. We offer tailored solutions to reflect the specific needs of our customers' farms, crops and soil.

www.bayer.com/foodchain

Crop Science supports farmers in growing healthy, safe and affordable food in a sustainable way. Together with partners, the global alliance Better Life Farming was launched to provide holistic and innovative solutions for smallholder farmers in the developing world to enable them to grow their farms into sustainable businesses. Furthermore, we partner with public and private partners in numerous sustainability initiatives worldwide.

In the area of digital transformation, we are using the latest technologies and decision science to take our operations and agriculture to the next level. The Climate Corporation, a subsidiary we acquired through the Monsanto transaction, plays a key role in this respect. In the field of digital farming, we work with innovative partners and utilize new technologies, including advanced seed scripting tools, that combine multiple data sets as we look to support farmers with seed selection, placement and seeding density, helping them to better reach their farming potential.

Animal Health

The development of the animal health market is primarily driven by a growing global population and higher average incomes. This leads to higher pet ownership levels and, in the farm animals segment, to rising meat and dairy consumption – with a corresponding increase in demand for medicines that effectively and safely protect and treat those animals.

We meet this demand by offering innovative medicines and services. Our promising pipeline is a key driver for future growth.

In the companion animals business, Animal Health holds a leading position in the global parasiticide segment. We are focusing on maximizing the continued growth of the innovative Seresto™ collar, opening new distribution channels and leveraging the brand equity of our Advantage™ product family.

In the farm animals business, we are commercializing and developing antiparasitics and anti-infectives. We are continuing to strengthen our customer engagement while also driving cross-species initiatives, such as the Antibiotic Stewardship Program promoting the responsible use of antibiotics.

Targets and key performance indicators

Our strategy is aimed at achieving long-term profitable growth balanced with our responsibility for the environment and society. To advance the consistent implementation of our strategy, we have set ambitious Group targets.

A 1.2.1/1

Bayer Group Financial Targets

Target	Target attainment 2018	New target 2019
Growth and Profitability		
Group sales (Fx & portfolio adj. change); revised forecast in September 2018: more than €39 billion	Increase by 4.5% to €39.6 billion	Increase by approx. 4% to around €46 billion
EBITDA before special items; revised forecast in September 2018: increase by a low- to mid-single-digit percentage	Increase by 2.8%	Currency-adjusted increase to approx. €12.2 billion and margin of around 27%
Core earnings per share; revised forecast in October 2018: €5.70 – €5.90	€5.94	Currency-adjusted increase to approx. €6.80

Fx & portfolio adj. = adjusted for currency and portfolio effects

Our nonfinancial targets through 2020 will cease to apply in the current form from the end of 2018 as they pertain only to the Bayer Group excluding the acquired agriculture business. The following table illustrates the attainment of these targets through the end of 2018. In view of the portfolio changes, we conducted a new materiality analysis in fall 2018 that will serve as the basis for new, ambitious Group targets that will be defined in 2019.

See also A 1.2.3

A 1.2.1/2

Nonfinancial Bayer Group Targets (concluded in 2018)

Target	Target attainment[1]
Innovation	
Group: target adjusted in September 2018: R&D investment of around €4.9 billion (2018)	€5.2 billion
Pharmaceuticals: Transition of nine new molecular entities (NMEs) and one new indication or one new formulation project into development (2018)	Five NMEs transferred
Consumer Health: Transition of 25 consumer-validated concepts into early development (2018)	40 new concepts transferred
Crop Science: Transfer of three to four new molecular entities (NMEs), plant traits or biologics into confirmatory technical proof-of-concept field studies	Start of field studies on five NMEs
Supplier management	
Evaluation of all potentially high-risk suppliers with significant Bayer spend (2020)	100%
Development and establishment of a new sustainability standard for our supply base (2020)	Implemented
Resource efficiency	
Improvement of 10% in energy efficiency (2020); reference value 2015: 143 kWh / €1,000 external sales	126 kWh / €1,000 external sales (12% improvement)
Reduction of 20% in specific greenhouse gas emissions (2020); reference value 2015: 55.7 kg CO_2e / €1,000 external sales	42.0 kg CO_2e / €1,000 external sales (– 25 %)
Safety	
Reduction of 35% in occupational safety incident rate (Recordable Incident Rate – RIR) (2020); reference value 2012: 0.50	RIR 0.36 (– 28%)
Reduction of 30% in process and plant safety incidents (Loss of Primary Containment Incident Rate – LoPC-IR) (2020); reference value 2012: 0.21	LoPC-IR 0.13 (– 38%)
Product stewardship	
Conclusion of assessment of hazard potential of all substances (> 99%) used in quantities exceeding one metric ton per annum (2020)	85%
Compliance	
Annual compliance training for virtually 100% of Bayer managers	98%
Employees	
Continuous improvement in employee satisfaction; reference value 2017: 79%	77%
Increase in the proportion of women in senior management to 35% (2020); reference value 2010: 21%	34%
Increase in the proportion of senior managers from outside the European Union, the United States or Canada to 25% (2020); reference value 2013: 18%	21%

[1] Excluding the acquired agriculture business

As the table above shows, we already attained our 2020 targets for supplier management, safety (LoPC-IR) and resource efficiency in 2018. We had also been making good progress in attaining the other targets. We will generally continue to expand our activities in the target categories in 2019 and report on attainment. However, we will need to fundamentally realign our targets in view of the integration of the acquired agriculture business and the impact it has on our enterprise.

1.2.2 Management Systems

One of the prime objectives of the Bayer Group is to achieve profitable growth in order to steadily increase the enterprise value and sustain the company as a going concern. Economic planning and management for the company takes place within a framework for the segments determined by the Board of Management in the course of the strategic management process and translated into specific targets during operational planning. Continuous monitoring of business developments complements the planning and management process, and key management and performance indicators are regularly updated. This process also involves implementing strategic objectives and adopting countermeasures in the event of deviations from the budget. Moreover, the Board of Management uses targets and performance indicators to steer the company's sustainable alignment.

We use the following indicators to plan, manage and monitor the development of our business:

Operational management indicators

See also A 2.4

The main parameters in economic management within the Bayer Group at the operational level are figures for sales, earnings and capital employed, which therefore also significantly affect short-term variable compensation.

Growth is measured primarily in terms of the change in sales after adjusting for currency and portfolio effects (Fx & p. adj.) in order to reflect the operational business development of the Group and the segments. A key measure of profitability at the Group and segment levels is EBITDA before special items. The EBITDA margin before special items, which is the ratio of EBITDA before special items to sales, serves as a relative indicator for the internal and external comparison of operational earning power. Another important profitability indicator for the Bayer Group is core earnings per share, which is the core net income divided by the weighted average number of shares.

Strategic value-based indicator: return on capital employed (ROCE)

See also A 2.2.3 and A 2.4

Return on capital employed (ROCE), which measures the company's economic success in relation to the capital employed, supplements the operational management indicators. As a strategic indicator, ROCE measures the periodic capital return. This can then be compared with the weighted average cost of capital. If ROCE is greater than the cost of capital, this indicates that a contribution is being made to increasing the enterprise value, as the expectations of the capital market have been exceeded. Monitoring ROCE over time supports the analysis of long-term business development, while comparing ROCE between business areas is a process that aids portfolio analysis.

1.2.3 Sustainability Management

We safeguard our societal and economic viability through sustainable action. Understood in this context and as a part of our corporate strategy, sustainability is integrated into our work procedures. We underline our mission as a company that acts sustainably through our commitment to the U.N. Global Compact and the Responsible Care™ initiative, as well as through our involvement in the World Business Council for Sustainable Development (WBCSD). In our sustainability reporting we have followed the guidelines of the Global Reporting Initiative (GRI) for many years.

www.bayer.com/unsdg
See also A 1.2.1

Bayer is committed to the U.N. Sustainable Development Goals (SDGs) and has published a company position paper detailing this. Our innovations, products and services contribute to overcoming some of the biggest global challenges, including the goals of "Zero Hunger" (SDG 2) and "Good Health and Well-Being" (SDG 3) in particular.

Clearly defined responsibilities and structures

As part of Bayer's corporate strategy, sustainability is firmly established at Board level. Responsibility for the Group's sustainable orientation lies with the Board of Management member responsible for Human Resources, Technology and Sustainability in his role as Chief Sustainability Officer, and with the Sustainable Development Committee (SDC) under the auspices of the Corporate Health, Safety & Sustainability function. The SDC sets targets and draws up initiatives, management systems and corporate policies, and reviews their implementation. Operational implementation is effected with the help of nonfinancial targets and performance indicators throughout the value chain, based on a clear definition of responsibilities in the corporate structure and the identification of key areas of activity using a materiality analysis. Corporate policies ensure our sustainability principles are firmly established in business operations and are implemented through corresponding management systems, committees and processes. The review and revision of these regulations and internal audits ensure that our management systems are continuously improved and aligned to the respective requirements. The operational implementation of sustainability management in our acquired agriculture business is the responsibility of the Crop Science Division.

www.bayer.com/policies

A 1.2.3/1

Structure of Sustainability Management

GRI 102-47

Sustainability management		
Organization	**Major areas of activity 2018**	**Steering, measurement and documentation**
› Member of the Board of Management responsible for Human Resources, Technology and Sustainability › Corporate Health, Safety & Sustainability function › Sustainable Development Committee	› Product and process innovation › Access to medicine › Sustainable food supply › Employee relations & development › Business ethics › Product stewardship › Safety › Environmental protection / resource efficiency › Supplier management › Stakeholder engagement / partnering › Societal engagement	› Corporate policies on, for example, – human rights – compliance – HSE key requirements – responsible marketing › Targets / indicators › HSEQ management systems and audits › Opportunity and risk management › Integrated Annual Report with independent auditing
Legal requirements such as the CSR Implementation Directive and initiatives such as WBCSD, GRI, UNGC and Responsible Care		

Materiality analysis and areas of activity

We regularly analyze the expectations and requirements of our major stakeholders and compare these with our own assessment of their relevance for Bayer. This enables us to identify at an early stage the latest developments along with sustainability-related opportunities and risks, which we can then incorporate into our strategy. In view of the Monsanto acquisition, we examined our areas of activity in 2018 (see A 1.2.3/1). Using a comprehensive materiality analysis, we conducted a worldwide survey of external stakeholders with specialist expertise and internal managers from various areas of the company. The areas of activity listed below were identified. These are to form the basis for a new sustainability strategy and new nonfinancial targets that we shall present in the course of 2019.

www.bayer.com/materiality

GRI 102-44

A 1.2.3/2

Results of the Materiality Analysis

Major areas of activity from 2019		
Climate protection	Business ethics	Sustainable food supply
Environmental protection	Product stewardship	Access to health care
Innovation		

www.bayer.com/areas-of-activity
www.bayer.com/gri

On our sustainability website we include a table showing our areas of activity that are relevant to this report and as they applied until the end of 2018 with definitions and the corresponding Group targets and GRI aspects. A detailed GRI content index with the corresponding UNGC principles can also be found online.

GRI 102-46

Stakeholder dialogue promotes acceptance and business success

www.bayer.com/value-creation

As a company, Bayer is a part of society and of public life. Through open dialogue with our stakeholders we aim to build trust in our actions, our products and the social value of our services, because the expectations and viewpoints of our stakeholders affect public acceptance of Bayer and thus our commercial success. How we create direct financial value for our stakeholders worldwide with our business activities is shown by the value creation graphic on our sustainability website.

GRI 102-42, 102-43

Stakeholder dialogue helps us to recognize important trends and developments in society and our markets at an early stage and take this information into account when designing our business. The integration of various stakeholder groups is planned within the scope of our stakeholder engagement process. This process also includes monitoring the results of individual dialogue measures. In strategic decision-making processes such as investment projects and launches of new products, Bayer approaches key social and political players right from the start of a new project to canvass their support. The open dialogue makes it possible to identify opportunities and risks early on. This process is in line with our Stakeholder Engagement Guideline and is supplemented by an internal information platform.

GRI 102-40

We fundamentally distinguish four stakeholder groups with which we engage in discussing different issues in various dialogue formats.

A 1.2.3/3

Our Most Important Stakeholder Groups

Bayer			
Partners	Financial market participants	Social interest groups	Regulators
> Customers > Suppliers > Employees > Associations > Universities / schools	> Investors > Banks > Rating agencies	> General public > NGOs > Local communities > Competitors	> Lawmakers > Politicians > Authorities

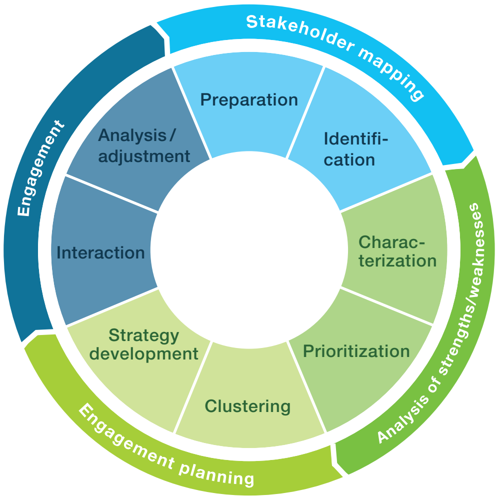
Diverse stakeholders in focus

GRI 102-43

Our stakeholder engagement process describes how the expectations of our stakeholders can be taken into account in a specific project, for example, and dialogue with them steered. We regularly review the engagement process based on social trends.

A 1.2.3/4

Stakeholder Engagement Process



Collaboration formats aimed at specific target groups

GRI 102-43

Our regular stakeholder activities range from dialogue at local, national and international level and active involvement in committees and specialist workshops all the way through to comprehensive information programs, issue-related multi-stakeholder events and participation in international initiatives and collaborations.

The selected topics described below provide insights into our engagement with respect to our most important stakeholder groups. We always focus on a fact-based dialogue.

GRI 102-44

As part of the process of acquiring and integrating the agriculture business, we held wide-ranging talks with representatives of nearly all our stakeholder groups in 2018. Examples included the Capital Markets Day for investors and a Bayer AG parliamentary evening as well as intensive media relations work including joint interviews with a Bayer executive manager and a critic in leading publications (e.g. Board of Management member Liam Condon and Robert Habeck, head of Germany's Green Party, in the German magazine Capital).

GRI 102-44

Our approaches for addressing the glyphosate debate included launching a transparency initiative and publishing safety studies; participating in topic-specific talks around the world (Liam Condon at the World Food Convention, for instance); and creating an online platform to answer questions about glyphosate, crop protection, agriculture and genetic engineering.

GRI 102-44

www.bayer.com/pol-involvement

In the political realm, we conducted discussions with political decision-makers, and collaborated in specialist committees and cooperation projects. Active participation by Bayer in political decision-making processes is explicitly sought by the key players involved. The company's Public and Governmental Affairs Committee develops the principles for the alignment of Bayer's political lobbying. In 2018, Bayer's global lobbying work focused on the issues of “innovation,” “access,” “reputation” and “freedom to operate.”

GRI 102-43

We prioritize being a reliable partner that is aware of its societal responsibility toward the communities adjacent to our sites. To this end – at our production sites in particular – we maintain open dialogue between local management and community members, which is supported by the respective country organization. This dialogue includes personal discussions with residents, citizens' initiatives, representatives of religious communities and the regional press. This community dialogue is anchored in a globally valid corporate policy on site management.

In 2018, our everyday business once again included dialogue with our customers – especially with respect to their satisfaction with our products and services. In this context, our segments navigate very different regulatory frameworks. As a consequence, direct contact between Pharmaceuticals or Consumer Health and the respective customer environment, and especially patients, is regulated in very different ways for each segment. With regard to the collection of customer satisfaction data, different legal requirements apply for prescription medicines from Pharmaceuticals than for nonprescription medicines, for example. The primary market research and data research that must be conducted, including systematic internet analysis, strictly adhere to the legal requirements, which can vary significantly depending on the market. At Crop Science, customer-centricity is achieved throughout the value chain by way of the 500-plus projects of the food chain partnerships, for example, or through direct cooperation with farmers, as demonstrated by the Bayer ForwardFarms. These programs emphasize innovative crop solutions and services for sustainable agriculture.

www.forwardfarming.com
www.bayer.com/foodchain

For more information on dialogue with stakeholders, please refer to the chapters Investor Information, Employees (Communication at all levels), Procurement and Supplier Management (Training measures and dialogue on the issue of sustainability), Sustainability Management (International Initiatives), Societal Engagement (Universities/Schools) and Product Stewardship (Commitment); see also our sustainability website.

www.bayer.com/en/stakeholder-dialogue.aspx

1.3 Focus on Innovation

Merger of the research activities of Bayer and Monsanto establishes foundation for breakthrough innovations in the agriculture industry

Joint precision cardiology laboratory opened at the Broad Institute in Boston; oncology portfolio strengthened by registration of larotrectinib (tradename: Vitrakvi™) in the United States, the first treatment with an initial registration in a tumor-agnostic indication

Synthetic biology joint venture Joyn Bio commences operations to improve nitrogen fixation in agriculture

Social innovations in Africa – driven by collaborations with the myAgro and One Acre Fund social enterprises

Innovations – which we define as new solutions that generate added value for our customers and society – are a cornerstone of our Group strategy. Our activities focus on innovative products based on our strong research and development (R&D) competencies supplemented with targeted process, service and business model innovations.

Our innovations help us contribute to solving global challenges in medical care and food security. In addition to the strong innovative capabilities of our employees throughout the company, our efforts concentrate on excellence in research and development, a broad open innovation network, and the use of new, groundbreaking technologies and data science findings.

By merging our innovative crop protection with Monsanto's globally leading plant biotechnology and breeding R&D activities, we are establishing the foundation for breakthrough innovations in the agriculture industry.

Breakthrough innovations: see Glossary

To further develop the innovation expertise of the entire organization, we have trained more than 1,000 employees in modern methods such as Systematic Inventive Thinking, Design Thinking and Lean Start-up since these training programs began in 2016. We have also established an agile, worldwide, cross-segment and cross-functional network of more than 700 innovation coaches and over 80 innovation ambassadors to help our employees develop and drive forward new ideas and projects. An established online platform enables all employees to find information about new innovation trends and current projects as well as globally interconnect and exchange with each other on innovation topics. In addition, selected innovations are advanced in a cross-segment entrepreneurship program. Our innovation activities were internationally honored once again in 2018: Boston Consulting Group ranks Bayer among the world's 50 most innovative companies.

Excellence in research and development

Bayer's success has always been based on excellence in research and development. The R&D activities we pursue are aligned with the innovation strategies of our segments to improve human, animal and plant health. We are increasingly employing data science methods in all our R&D activities and bolstering our scientists' expertise with targeted data science learning programs.

See the following subsections for further details

Bayer maintains a global network of R&D locations, which employ roughly 17,300 researchers. In 2018, our research and development investments increased by a nominal 16.5% to €5,246 million.

Bayer AG key data: see also A 1.7

A 1.3/1

Information on Research and Development in 2018

	R&D expenses € million		R&D expenses before special items € million		Share of R&D expenses %		R&D expenses before special items % of sales		R&D employees FTE	
	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018
Pharmaceuticals[1]	2,888	2,893	2,724	2,589	64.1	55.1	16.2	15.5	8,138	7,924
Consumer Health	240	226	228	221	5.3	4.3	3.9	4.1	368	346
Crop Science	1,166	1,950	1,120	1,856	25.9	37.2	11.7	13.0	5,174	8,526
Animal Health	155	143	145	141	3.4	2.7	9.2	9.4	333	440
Reconciliation	55	34	55	33	1.2	0.6	4.7	2.0	28	39
Total	**4,504**	**5,246**	**4,272**	**4,840**	**100**	**100**	**12**	**12**	**14,041**	**17,275**

[1] The 2018 R&D costs for Pharmaceuticals include income of approximately €190 million from a Xarelto™ development collaboration with Janssen Research & Development, LLC, a subsidiary of Johnson & Johnson.

Global open innovation network

Partnerships are integral to our innovation strategy. We enter into strategic alliances with various partners such as universities, governmental agencies, start-ups, suppliers and industry. This gives us access to complementary technologies and expertise that substantially broaden our spectrum for innovation.

www.innovate.bayer.com

Our open innovation network spans all parts of the company along the value chain, with our open innovation portal offering a platform for collaborations. We further extended our open innovation activities again in 2018. Measures included launching another incubator for biotech start-ups in Kobe, Japan (CoLaborator™ Kobe) and expanding our collaboration with the Broad Institute in Boston through the establishment of a joint laboratory for cardiovascular research. Furthermore, we invest in funds that finance start-up companies in the life science industry, such as High-Tech Gründerfonds III. The Monsanto acquisition also included the Monsanto Venture Capital Unit, which now operates as Bayer Growth Ventures. The aim here is to provide initial capital to start-ups in the life science sector. In the field of social innovation, we have launched partnerships with the myAgro and One Acre Fund social enterprises to support farmers in Africa.

Details of our open innovation activities can be found below and in the specific innovation sections for the respective segments.

CoLaborator™ in Kobe, Japan

Following the establishment of Bayer CoLaborator™ in Berlin, San Francisco, Moscow and West Sacramento, a further research incubator was founded in Kobe, Japan, in 2018. This makes Bayer the first foreign company active in the pharmaceuticals business to operate such a research facility in Japan. We offer young life science companies excellent research and development collaboration opportunities at the Biomedical Innovation Cluster in Kobe. Two companies – Epigeneron, Inc. and Myoridge Co. Ltd. – have already set up laboratories there and are developing technologies to identify drug-target interactions and the production of ultrapure cardiac muscle cells respectively.

High-Tech Gründerfonds

For Bayer, start-ups are important partners in the innovation ecosystem that help propel us toward our goal of developing new solutions in the fields of health care and nutrition. Following our investment in High-Tech Gründerfonds II, our company also joined High-Tech Gründerfonds III in 2018 and is focusing here on innovative start-ups in biotechnology and production technologies.

Social innovations in Africa

Bayer is engaging in targeted partnerships to support innovative ideas and business models that help improve living conditions in developing countries. In 2018, Crop Science entered into partnerships with the myAgro social enterprise in Mali and with the One Acre Fund in Kenya, which supports smallholders in East Africa. The myAgro model enables smallholder farmers who do not have a bank account or access to credit to save small amounts via a prepaid model. At the start of the planting season, high-quality seed and fertilizer are supplied to the farmers, even those in remote villages. This enables small farms – which are usually worked by the families themselves – to increase their yields by 50 to 100 percent on average.

Social innovation is an element of our societal engagement (see A 1.4.3).

Bayer invests in breakthrough innovations

Another key tool for achieving our strategic goals is the use of groundbreaking technologies. Access to these technologies is facilitated by Leaps by Bayer, a new innovation and collaboration model with locations in Berlin, Boston and San Francisco. This program aims to discover breakthrough innovations in health care (for example in relation to the regeneration of damaged cardiac muscle and/or brain cells to repair tissue damage following myocardial infarctions or to cure neurodegenerative diseases) and nutrition (for example to significantly reduce fertilizer use in farming). We have invested a total of approximately €600 million in start-ups and collaborations so far.

www.leaps.bayer.com

Via Leaps by Bayer, we have established the Joyn Bio joint venture together with Ginkgo Bioworks. This joint venture commenced research operations in Boston, Massachusetts, in March 2018 and also operates laboratories in West Sacramento, California. These activities seek to boost the agriculture industry's efforts to improve sustainability, for example by reducing the environmental impact of nitrogen fertilizers with the help of novel synthetic biology methods. The program will initially focus on cereals that can use soil microbes to satisfy most of their nitrogen requirements.

Furthermore, we use our Life Science Collaboration Program to make cross-divisional assessments of innovations in the fields of biology and technology, such as developments in the areas of gene editing and artificial intelligence.

Patents protect Bayer's intellectual property

Reliable global protection of intellectual property rights is particularly important for an innovation company like Bayer. In most cases, it would be impossible to cover the high costs incurred in the research and development of innovative products without this protection. We are therefore committed worldwide to protecting both the international patent system and our own intellectual property. Depending on the legal framework, we endeavor to obtain patent protection for our products and technologies in major markets. When we successfully market patent-protected products, this enables us to reinvest the profits in sustainable research and development.

Patent terms vary according to the laws of the country granting the patent, but the basic term is usually 20 years from the filing date of a patent application. Since it takes an average of 11 to 13 years to develop a new medicine or crop protection active ingredient, only seven to nine years of patent protection generally remain following the product's approval. The same applies to the development of a new transgenic trait. In an attempt to nevertheless provide an adequate incentive to make the necessary major investments in research and development, the European Union (E.U.) member states, the United States, Japan and some other countries extend patent terms or issue supplementary protection certificates to compensate for the shortening of the effective patent protection period due to regulatory approval processes for new drugs. For the same reason, some countries also grant such extended patent terms for new crop protection products, but not for transgenic traits.

The following table shows the expiration dates for Bayer's most significant Pharmaceuticals patents:

A 1.3/2

Pharmaceuticals Patent Expiration Dates

	Market										
Products	Germany	France	Italy	Switzer-land	Spain	U.K.	China	Japan	Brazil	Canada	U.S.A.
Adempas™											
Active ingredient	2028	2028	2028	2028	2028	2028[e]	2023	2027-2028[d]	2023[b]	2023	2026[e]
Production process/intermediate	2030	2030	2030	2030	2030	2030	2030	2030	2030[b]	2030	2030
Eylea™											
Active ingredient	2025	2025	2025	2025	2025	2025[e]	2020	2021-2023[d]	2020[b]	2020	–
Formulation	2027	2027	2027	2027	2027	2027	2027[b]	2028-2029[d]	2027[b]	2027	–
Jivi™											
Active ingredient	2025	2025	2025	2025	2025	2025	2025	2025[a]	2025[b]	2025[a]	2025[a]
Formulation	–	–	–	–	–	–	–	2020	2020	–	–
Kogenate™											
Formulation	–	–	–	–	–	–	–	2020	2020	–	–
Kovaltry™											
Formulation	–	–	–	–	–	–	–	2023[e]	2020	–	–
Production process	2018	2018	2018	2018	2018	2018	2018	2023[e]	2023	2018	2021[e]
Production process (cell line/chaperone)	2029[e]	2024[a]	2029[e]	–	2024[a]	2024[a]	–	2028[e]	–	2024	2024
Mirena™											
Inserter	2029	2029	2029	2029	2029	2029	2029	2029	2029[b]	2029	2031
Nexavar™											
Active ingredient	2021	2021	2021	2021	2021	2021	2020	2021-2025[d]	2025	2020	2020
Salt form	2022	2022	2022	2022	2022	2022	-	-	-	-	-
Polymorph	2025	2025	2025	2025	2025	2025	2025	2025-2026[d]	2025[b]	2025	2027
Formulation	2026	2026	2026	2026	2026	2026	2026	2026-2027[d]	2026[b]	2026	2028[e]
Stivarga™											
Active ingredient	2028	2028	2028	2028	2028	2024[a]	2024	2026[d]	2028[c]	2024	2031
Monohydrate form	2027	2027	2027	2027	2027	2027	2027	2027[d]	2027[b]	2027	2032
Formulation	2025	2025	2025	2025	2025	2025	2025	2026[d]	2025[b]	2025	2031
Production process	2031	2031	2031	2031	2031	2031	2031	2031[f]	2031[b]	2031	2031[f]
Coated tablet	2033	2033	2033	2033	2033	2033	2033[b]	2033[b]	2033[b]	2033[b]	2033[b]
Xarelto™											
Active ingredient	2023	2023	2023	2023	2023	2023	2020	2022-2025[d]	2022	2020	2024
Formulation	2024	2024	2024	2024	2024	2024	2024	2025-2028[d]	2028[c]	2024	2024
Xofigo™											
Use	2024	2024	2024	2024	2024	2024	2019	2022[e]	–	2019	2022
Production process	2031	2031	2031	2031	2031	2031	2031	2031	2031[b]	2031	2031

[a] Current expiration date; patent term extension applied for
[b] Patent application pending
[c] Patent term revised
[d] Application-specific term extension(s)
[e] Patent term extension granted
[f] Separate claims granted for high-purity active ingredient

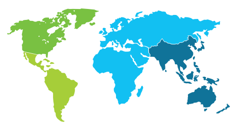
Crop Science regularly applies for patent protection for its new crop protection active ingredients as well as for protection for inventions related to its manufacturing processes, innovative mixtures, formulations and uses. Additionally, we routinely obtain patent protection and/or plant variety protection for our seeds, genomics-related products and processes, breeding technology, and commercial varietal and hybrid seed products. Therefore, in the Crop Science area where products often combine multiple technologies – each separately patented in different areas of the world, with patents often granted only late in the product lifecycle – the link between patents and products is more complex than at Pharmaceuticals.

Although the patents have already expired for some of our crop protection active ingredients, such as glyphosate, trifloxystrobin, prothioconazole[1] or imidacloprid, we have a portfolio of patents on formulations, mixtures and/or manufacturing processes for these active ingredients. Additionally, some of our younger active ingredients such as fluopyram and bixafen are still patent-protected in the United States, Germany, France, the United Kingdom, Brazil, Canada and other countries until at least 2023. In fact, fluopyram, for example, is patent-protected until 2024 in the United States and 2025 in Brazil.[2] While our patent coverage on the first-generation Roundup Ready™ trait for soybeans has expired, most Roundup Ready™ soybeans in the U.S. are protected by patents covering specific varieties. In addition, most of our customers and licensees are choosing our second-generation Roundup Ready 2 Yield™ trait for soybeans with patent coverage that extends into the next decade. In Brazil and Argentina, farmers are increasingly adopting our next-generation Intacta RR2 PRO soybean that also has patent coverage extending into the next decade. Patents on our next-generation herbicide trait which confers dicamba tolerance extend into the next decade. In corn seed and traits, patent coverage on our first-generation YieldGard trait has expired. However, most farmers have already upgraded to next-generation branded corn traits with patent coverage extending into the next decade.

Pharmaceuticals

Pharmaceuticals focuses on indications with high medical need in the areas of cardiovascular disease, oncology, gynecology, hematology and ophthalmology. We conduct research and development at several locations, mainly in Germany, the United States, Japan, China, Finland and Norway.

Bayer worldwide;
see also A 1.1.2/3



Promising new molecular entities from our research pipeline are transferred to preclinical development. We define a new molecular entity (NME) as a chemical or biological substance that is not yet approved for use in humans. In preclinical development, these substances are examined further in various models with respect to their suitability for clinical trials and the associated “first-in-humans” studies.

In 2018, we developed a new strategy for our global research and development organization that will boost our innovation potential and productivity. Aimed at producing quality rather than quantity, the strategy focuses on a deeper understanding of diseases, better characterization of product candidates and modality-independent approaches to improve the technical success rate.

Our more intensive characterization of product candidates led to a shift in our schedule in 2018. We transferred five new active ingredients to preclinical development instead of nine new active ingredients and one new indication or one new formulation project as had been originally planned. Future active ingredient candidates will come from internal research, collaborations and purely external sources. On the basis of our throughput model, we expect that five to seven active ingredients will be transferred to development each year following full implementation of the innovation model.

[1] Last to expire for prothioconazole are the Supplementary Protection Certificates in several European countries expiring in 2019 and in some CIS countries in 2020.
[2] Patent protection without considering any patent term extension or Supplementary Protection Certificate protection

We conducted clinical trials with several drug candidates from our research and development pipeline in 2018. We strengthened products that were already on the market through additional development activities to further improve their application and/or expand their spectrum of indications.

Clinical trials are an essential tool for determining the efficacy and safety of new drugs before they can be used to diagnose or treat diseases. The benefits and risks of new medicinal products must always be scientifically proven and well documented. All clinical trials at Bayer satisfy strict international guidelines and quality standards, as well as the respective applicable national laws and standards.

Bayer also publishes information about clinical trials in line with the applicable national laws and according to the principles of the European (EFPIA) and U.S. (PhRMA) pharmaceutical industry associations, these principles being defined in position papers.

www.bayer.com/ethics-in-rnd

Information about our own clinical trials can be found in the publicly accessible register www.ClinicalTrials.gov and our own Trial Finder database. Further information on our globally uniform standards, the monitoring of studies and the role of the ethics committees can be found on the internet.

Progress in Phase II clinical projects
The following table shows our most important drug candidates currently in Phase II clinical testing projects.

A 1.3/3

Research and Development Projects (Phase II)[1]

Projects	Indication
BAY 1093884 (anti-TFPI antibody)	Hemophilia
Fulacimstat (BAY 1142524, chymase inhibitor)	Chronic kidney disease
BAY 1193397 (AR alpha 2c rec ant.)	Peripheral artery disease (PAD)
BAY 1213790 (anti-FXIa antibody)	Prevention of thrombosis
BAY 1817080 (P2X3 antagonist)	Chronic cough
BAY 2253651 (TASK channel blocker)	Obstructive sleep apnea
BAY 2306001 (IONIS-FXIRx)[2]	Prevention of thrombosis
Levonorgestrel (progestin) + indomethacin (NSAID) combi IUS	Contraception
Rogaratinib (pan-FGFR inhibitor)	Urothelial cancer
Vericiguat (sGC stimulator)	Chronic heart failure with preserved (HFpEF) ejection fraction
Vilaprisan (S-PRM)	Endometriosis

[1] As of January 31, 2019
[2] Sponsored by Ionis Pharmaceuticals, Inc.
The nature of drug discovery and development is such that not all compounds can be expected to meet the predefined project goals. It is possible that any or all of the projects listed above may have to be discontinued due to scientific and/or commercial reasons and will not result in commercialized products. It is also possible that the requisite U.S. Food and Drug Administration (FDA), European Medicines Agency (EMA) or other regulatory approvals will not be granted for these compounds. Moreover, we regularly review our research and development pipeline so that we can give priority to advancing the most promising pharmaceuticals projects.

Below are the most significant changes that occurred in 2018 compared with the previous year:

The Phase II study with copanlisib in patients with relapsed or refractory diffuse large B-cell lymphoma (DLBCL), an aggressive form of non-Hodgkin lymphoma (NHL), was concluded. A Phase III study in this indication is not currently planned.

The Phase II studies in which the angiopoietin2 (Ang2) antibody nesvacumab was tested in combination with aflibercept (tradename: Eylea™) in comparison with aflibercept monotherapy were concluded. The results of these studies do not justify proceeding to Phase III of clinical development.

Based on the results of a Phase II trial investigating anetumab ravtansine as a second-line monotherapy for malignant mesothelioma, which failed to meet its primary endpoint of progression-free survival, we will not pursue any further studies in this indication. Anetumab ravtansine will continue to be investigated in other indications in Phase I studies.

In September 2018, the development of the oral AKR1C3 inhibitor to treat endometriosis was discontinued ahead of schedule due to an unfavorable benefit-risk profile.

Also in September 2018, the development of neladenoson bialanate, an oral partial adenosine A1 receptor agonist, was discontinued. Phase II studies involving cardiac insufficiency patients did not reach their primary efficacy endpoints.

Bayer and Merck & Co., Inc., United States, decided in October 2018 to not pursue riociguat any further in the indication diffuse cutaneous systemic sclerosis. A Phase II study in this indication did not meet its primary endpoint.

Likewise in October 2018, following an interim analysis of available clinical data to date, Bayer decided to not further pursue the development of radium-223 dichloride in breast cancer.

In November 2018, Bayer decided to halt the combined Phase I / Phase II study of radium-223 dichloride in the indication multiple myeloma for strategic reasons.

In December 2018, Bayer decided to halt development of the chymase inhibitor fulacimstat in the indication left ventricular dysfunction after myocardial infarction after a Phase II study failed to reach the efficacy endpoints. Development of fulacimstat in the indication chronic kidney disease will continue unchanged.

Progress in Phase III clinical projects
The following table shows our most important drug candidates currently in Phase III clinical testing projects:

A 1.3/4

Research and Development Projects (Phase III)[1]

Projects	Indication
Copanlisib (PI3K inhibitor)	Various forms of non-Hodgkin lymphoma (NHL)
Darolutamide (ODM-201, AR antagonist)	Castration-resistant nonmetastatic prostate cancer
Darolutamide (ODM-201, AR antagonist)	Hormone-sensitive metastatic prostate cancer
Finerenone (MR antagonist)	Diabetic kidney disease
Molidustat (HIF-PH inhibitor)	Renal anemia
Rivaroxaban (FXa inhibitor)	Peripheral artery disease (PAD)
Rivaroxaban (FXa inhibitor)	VTE treatment in children
Vericiguat (sGC stimulator)[2]	Chronic heart failure with reduced ejection fraction (HFrEF)
Vilaprisan (S-PRM)	Symptomatic uterine fibroids

[1] As of January 31, 2019
[2] Sponsored by Merck & Co., Inc., U.S.A.
The nature of drug discovery and development is such that not all compounds can be expected to meet the predefined project goals. It is possible that any or all of the projects listed above may have to be discontinued due to scientific and / or commercial reasons and will not result in commercialized products. It is also possible that the requisite U.S. Food and Drug Administration (FDA), European Medicines Agency (EMA) or other regulatory approvals will not be granted for these compounds. Moreover, we regularly review our research and development pipeline so that we can give priority to advancing the most promising pharmaceuticals projects.

Below are the most significant changes that occurred in 2018 compared with the previous year:

Bayer and the U.S. study network NSABP (National Surgical Adjuvant Breast and Bowel Project) decided to discontinue ahead of schedule a Phase III clinical study investigating the active substance regorafenib as an adjuvant therapy in colon carcinoma due to an insufficient number of participants.

In March 2018, Bayer and MSD International GmbH, a Group company of Merck & Co., Inc., decided to discontinue the joint development and commercialization of Sivextro™ (active ingredient: tedizolid phosphate) to treat infections of the skin and subcutaneous tissue.

At the ESC (European Society of Cardiology) congress in Munich in August 2018, Bayer and development partner Janssen Research & Development, LLC, United States, presented the results of the clinical Phase III COMMANDER HF and MARINER trials conducted by Janssen investigating the oral Factor Xa inhibitor rivaroxaban (tradename: Xarelto™).

The COMMANDER HF trial investigated whether, when administered additionally to the standard therapy, rivaroxaban reduces the risk of cardiovascular events in coronary heart disease patients following acute worsening of heart failure. The data showed a numerical reduction in stroke and myocardial infarction events in patients treated with rivaroxaban, but this was outweighed by the high rate of death events in both study arms, many of which were not related to thrombosis, contributing to a failure to achieve the primary endpoint of the study. Work in this indication will not be continued.

The MARINER trial investigated whether rivaroxaban is superior to placebo in the prevention of symptomatic venous thromboembolism (VTE) and VTE-related death after hospital discharge for acutely medical ill patients at high risk of VTE. While the composite primary efficacy endpoint was not achieved, the evaluation showed a reduction of symptomatic VTE events. The major bleeding events rate with rivaroxaban was low and not significantly different compared with placebo.

In October 2018, the Phase III ARAMIS trial investigating the safety and efficacy of darolutamide in patients with nonmetastatic castration-resistant prostate cancer met its primary endpoint. The substance significantly extended metastasis-free survival compared to placebo, and its safety profile and tolerability were consistent with observations from previous trials. Darolutamide is a novel androgen receptor antagonist for the oral treatment of prostate cancer that is being developed jointly by Bayer and the Finnish bio-pharmaceutical company Orion Corporation. The ARASENS trial is currently being conducted in metastatic hormone-sensitive prostate cancer.

On the basis of the results of the Phase III ERA-223 trial, Bayer decided to halt work in this indication (use of radium-223 dichloride in combination with abiraterone acetate and prednisone/prednisolone). Bayer had prematurely unblinded the trial in 2017 following reports of an elevated risk of bone fractures and reduced median overall survival in patients treated with this combination. The European, Japanese and U.S. health authorities have concluded their review of the data from the ERA-223 trial and confirmed that, overall, the risk-benefit profile of Xofigo™ (radium-223 dichloride) remains positive in the approved indication, subject to the required changes to the respective labeling. The results of the ERA-223 trial were presented at the ESMO (European Society for Medical Oncology) Congress in October 2018.

In November 2018, researchers observed anomalies in animal studies involving vilaprisan. The aim of these studies was to investigate the safety of vilaprisan in long-term use. Vilaprisan is a development candidate that Bayer is developing for the treatment of symptomatic uterine fibroids and endometriosis. Although the findings are preliminary and preclinical – and were not observed in other vilaprisan studies – Bayer has decided as a precaution to not recruit any additional patients to the ongoing Phase II and Phase III clinical studies until the findings have been thoroughly analyzed and understood. We have notified health authorities, ethics committees and trial investigators about the preliminary findings. We will coordinate any consequent modifications to our ongoing clinical development program with health authorities and ethics committees.

Filings and approvals

We regularly evaluate our research and development pipeline in order to prioritize the most promising pharmaceutical projects. Following the completion of the required studies with a number of these drug candidates, we submitted applications to one or more regulatory agencies for approvals or approval expansions. The most important drug candidates in the approval process are shown below.

A 1.3/5

Main Products Submitted for Approval[1]

Projects	Indication
Rivaroxaban (FXa inhibitor)[2]	U.S.A.: Secondary prophylaxis of acute coronary syndrome (ACS), rivaroxaban in combination with dual antiplatelet therapy (DAPT), ATLAS trial
Rivaroxaban (FXa inhibitor)[2]	U.S.A.: Prevention of venous thromboembolism in high-risk patients after discharge from hospital
Larotrectinib (LOXO-101, TRK fusion inhibitor)[3]	Europe: Solid tumors with NTRK gene fusions

[1] As of January 31, 2019
[2] Submitted by Janssen Research & Development, LLC
[3] Loxo Oncology, Inc., is responsible for regulatory activities in the United States and Bayer for regulatory activities outside the United States.

In February 2018, Eylea™ (active ingredient: aflibercept solution for injection into the eye) was approved by the China Food and Drug Administration (CFDA) for the treatment of visual impairment due to diabetic macular edema.

In May 2018, Eylea™ was approved by the Chinese regulatory authorities for the treatment of visual impairment due to neovascular (wet) age-related macular degeneration.

In July 2018, Kovaltry™ (active ingredient: octocog alfa) was approved by the Chinese regulatory authorities for use in adults and children with hemophilia A for routine prophylaxis, on-demand treatment and perioperative management of bleeding. Kovaltry™ is an unmodified recombinant Factor VIII product.

In August 2018, the European Commission approved a new treatment approach for Eylea™ that enables early extension of the injection interval for patients with neovascular age-related macular degeneration already in the first year of treatment. The new regimen allows clinicians to extend patients' individual injection intervals based on visual and/or anatomic outcomes.

Likewise in August 2018, the European Commission approved a combination of Xarelto™ (rivaroxaban) 2.5 mg twice daily plus acetylsalicylic acid (ASA) 75 to 100 mg once daily for the prevention of atherothrombotic events in adults with coronary artery disease (CAD) or symptomatic peripheral artery disease (PAD) at high risk for ischemic events. The U.S. FDA approved the combination in October 2018.

In November 2018, the European Commission approved damoctocog alfa pegol (tradename: Jivi™) for the treatment and prophylaxis of bleeding in adults and adolescents aged 12 years and older who have been previously treated for hemophilia A. Prior to that, Jivi™ had been approved by the United States in August 2018 and by Japan in September 2018.

Likewise in November 2018, larotrectinib (tradename: Vitrakvi™) was approved in the United States for the treatment of adult and pediatric patients with solid tumors that have a neurotrophic receptor tyrosine kinase (NTRK) gene fusion without a known acquired resistance mutation. The approval also applies to patients with tumors with an NTRK gene fusion that are either metastatic or where surgical resection is likely to result in severe morbidity, and for patients who have no satisfactory alternative treatments or whose cancer has progressed following treatment. The active substance larotrectinib was designed to specifically block the signaling pathway responsible for tumor growth. In August 2018, Bayer filed an application seeking approval of larotrectinib in the European Union as well.

In December 2018, our development partner Janssen Research & Development filed in the United States for approval of Xarelto™ for prevention of venous thromboembolism (VTE) in high-risk patients. The decision to file for approval was based on data from the Phase III MAGELLAN study supported by data from the MARINER study. Both studies evaluated the efficacy of Xarelto™ for the prevention of VTE in patients during hospitalization and immediately after discharge from hospital.

Collaborations

See also A 1.3 “Global open innovation network”

We augment our own research capacities through collaborations and strategic alliances with external industrial and academic research partners. In this way we gain access to complementary technologies and external innovation potential.

In June 2018, Bayer and the MD Anderson Cancer Center at the University of Texas in Houston, United States, signed a five-year collaboration agreement to accelerate the development of novel targeted treatments for cancer patients based on patient or tumor characteristics for which current drug therapies have not shown satisfactory clinical efficacy.

Also in June 2018, Bayer and the Broad Institute of the U.S. universities MIT and Harvard expanded their strategic research collaboration for the development of new therapies for patients with cardiovascular diseases such as heart failure. Researchers from the Broad Institute and Bayer are working together in a joint Precision Cardiology Laboratory at the Broad Institute in Boston. The collaboration is focused on better understanding cardiovascular diseases on a molecular level and developing new therapies for patients.

In August 2018, Bayer and Haplogen GmbH, Austria, entered into a multiyear research collaboration agreement to identify new drug candidates for the treatment of pulmonary diseases such as chronic obstructive pulmonary disease (COPD). Within the context of their collaboration, Bayer and Haplogen will jointly identify and research new potential drug candidates. Bayer will be responsible for subsequently developing and commercializing any suitable drug candidates.

In January 2019, Bayer and Kyoto University agreed on a strategic research alliance to jointly identify new drug targets for the treatment of pulmonary diseases such as idiopathic pulmonary fibrosis. The goal of the research alliance is to identify specific targets and pathways that are causing the disease and to discover new treatments to modulate these pathways and prevent further lung function decline. Bayer will have an option for the exclusive use of the collaboration results.

The following table shows examples of the main R&D collaborations.

A 1.3/6

Main Collaborations

Partner	Collaboration objective
Broad Institute	Strategic partnership to research and develop new therapeutic options in the fields of cardiovascular medicine and oncology and establishment of a joint research laboratory
Compugen Ltd.	Research and development of new immunotherapy approaches in oncology
German Cancer Research Center (DKFZ)	Strategic partnership to research and develop new therapeutic options in oncology, especially in immunotherapy, and establishment of a joint research laboratory
Evotec AG	Collaboration to identify development candidates for the treatment of endometriosis and kidney diseases
Haplogen GmbH	Research collaboration in the field of pulmonary diseases such as chronic obstructive pulmonary disease (COPD)
Ionis Pharmaceuticals, Inc.	Development of the antisense drug IONIS-FXIRx for thrombosis prevention and development of IONIS-FXI-LRx in the preclinical phase
Janssen Research & Development, LLC of Johnson & Johnson	Development and marketing of Xarelto™ (rivaroxaban) for the treatment of coagulation disorders
Kyoto University	Research alliance to identify new therapeutic approaches for pulmonary diseases
Loxo Oncology, Inc.	Development and marketing of larotrectinib (LOXO-101, tradename Vitrakvi™) for the treatment of cancer patients with a mutation of the TRK gene and LOXO-195 for the treatment of patients with cancer types that have acquired resistance to initial TRK therapies such as larotrectinib
MD Anderson Cancer Center	Development collaboration in oncology
Merck & Co., Inc.	Development and marketing collaboration in the field of soluble guanylate cyclase (sGC) modulation
Orion Corporation	Development and marketing of darolutamide (previously ODM-201) for the treatment of patients with prostate cancer
Peking University	Research collaboration and establishment of a research center for joint projects
PeptiDream Inc.	Active ingredient research in various therapeutic areas and target classes with the help of PeptiDream's Peptide Discovery Platform System Technology
Tsinghua University	Research collaboration and establishment of a research center for joint projects
Ultragenyx Pharmaceuticals	Research and development of a novel gene therapy for the treatment of hemophilia A
University of Oxford	Strategic research partnership to develop novel gynecological therapies
Vanderbilt University Medical Center	Strategic research alliance to identify and develop new potential active ingredients for the treatment of kidney diseases
Wilmer Eye Institute of Johns Hopkins University	Research and development of innovative drug products to treat serious back-of-the-eye diseases
X-Chem, Inc.	Active ingredient research in various therapeutic areas and target classes

Consumer Health

At Consumer Health, we concentrate on developing new nonprescription (OTC) products and solutions that improve consumer health and well-being in the areas of pain and cardiovascular risk prevention, dermatology, nutritional supplements, digestive health, allergy, cough and cold, foot care and sun protection. The focus lies on product developments that are aligned to the desires and needs of consumers. Our innovations range from new product formulations and packaging to technical applications and medical devices. In addition, we developed around 40 new consumer-validated concepts in 2018, thus exceeding our target. Consumer Health maintains a global network of research and development facilities, with sites in the United States, France, Germany and China. A further important part of our innovation strategy is transitioning current prescription medicines that are suitable for self-care to OTC status (Rx-to-OTC switches). In the United States, China, Germany and other core markets, we will continue to make progress in e-commerce by increasing sales and market share on key e-commerce platforms.

Bayer worldwide;
see also A 1.1.2/3

Crop Science

With agricultural expertise spanning more than 100 years, we have a solid track record in farm chemistry research and leadership in biologicals. Above all, the Monsanto acquisition brings leading seed brands and a strong foundation in plant biotechnology traits. As a leading partner to farmers around the world, we are focused on innovation. Working with digital applications and cutting-edge technologies, we develop and market a broad spectrum of tailored solutions for farmers that enable greater productivity in a sustainable way. Our research is aimed at improving agricultural productivity regardless of where farming is taking place, the amount of land being farmed or the agricultural practices deployed.

Bayer worldwide;
see also A 1.1.2/3

Our research and development activities are driven by approximately 7,300 dedicated scientists and researchers operating at more than 35 research and development sites and 175 breeding sites. With a projected annual R&D budget of approximately €2.4 billion over the coming years, we are committed to remaining an industry leader now and in the future when it comes to agricultural innovation in the lab and in the field.

Bayer also enters into collaborations with external partners to drive innovation. We plan to work through an established network to bring new solutions to farmers. Combined R&D spending through Leaps by Bayer (including Bayer Growth Ventures) and other venture capital investment will further improve the future pipeline of sustainable agriculture solutions.

Research and development capacities

Our R&D is focused on developing technologies across multiple platforms to deliver tailored solutions to farmers. Bringing together our expertise across multiple disciplines uniquely positions us to deliver more innovation faster. Here we focus on the following technologies and areas:

Breeding

We tap into our leading germplasm from around the world to find genetics that best meet farmers' regional needs. Before a product is brought to market, we test and monitor its performance through numerous combination scenarios. Our researchers use digital sensors and field imaging to evaluate a large number of products side by side in diverse environments and to learn how plants respond to stress.

See also A 1.6.1 "Crop Science – Focusing on product safety" for information about genetic engineering

Biotechnology

Biotechnology has helped us to develop highly effective solutions over the past 30 years, specifically strengthening plants' resistance to diseases, insects or adverse weather conditions. We transfer beneficial traits, such as an ability to use water efficiently, to a new plant so that it can better survive in its environment. Over the past 20 years, developments such as GM crops have helped to enhance nutrition as well as to make farming more profitable and sustainable by reducing tillage, for example.

Crop protection

We develop innovative, safe and sustainable crop protection tools – such as herbicides, insecticides and fungicides – that play an essential role in achieving a good harvest. They are an important part of our current product offerings and will continue to be a significant focus of our research and development efforts.

Biologicals

Farmers increasingly seek to protect their crops with solutions that span synthetic chemistry, molecular biology and biologicals. We use our expertise and competency in different technology platforms to lead in providing sustainable crop protection solutions. Biologicals contain or are derived from naturally occurring materials, or are based on naturally occurring processes. They can complement or replace traditional fertilizers and chemicals.

Digital applications

The world of agriculture is being transformed by data science, and particularly by algorithms, analytics, deep learning and artificial intelligence, which can deliver crucial benefits for farmers. The potential of a crop plant relies on many complex interactions in the field. For example, yield is dependent on genetics, environmental factors (weather and pest/disease burdens) and agronomic practices. The goal of digital solutions is to give farmers recommendations as to what products to use, in what amount, in what location, and at what time during the season in order to optimize harvest yields.

Research and development pipeline

Our product pipeline contains numerous new crop protection products, seed varieties, digital products and enhanced products (life cycle management). The existing innovation activities at Crop Science are now being supplemented by the product innovation pipeline from Monsanto. The acquired pipeline includes a large number of next-generation biotech pest and weed control plant traits, several new seed treatments, and various digital applications that are currently in development. We estimate the peak sales potential of products with launch dates from 2017 to 2022 to be more than €17 billion.[3] In 2018, we launched confirmatory technical proof-of-concept field studies for five new chemical/biological active ingredients or plant traits.[4]

See also A 1.2.1

The following table shows a selection of new products in late development phases, sorted by key crop, that are highly likely to be launched by 2021.

A 1.3/7

Product Innovation Pipeline[1]

Crop	Market launch	Product group	Indication	Product/trait
Corn	2021	Biotechnology trait	Pest management	SmartStax PRO
	2021	Breeding/native trait	Disease management	Goss wilt
Soybeans	2019	Breeding/native trait	Pest management	Soybean cyst nematode
	2020	Biotechnology trait	Weed management	Xtendflex soybeans
	2021	Biotechnology trait	Pest management	Intacta2Xtend soybeans
Rice	2019	Crop protection	Pest management	Vayego (tetraniliprole)
Oilseed rape/ canola	2019	Biotechnology trait	Weed management	TruFlex canola
	2019	Biotechnology trait	Weed management	LL canola
Cotton	2021	Biotechnology trait	Pest management	Lygus/thrips cotton
Horticulture	2019	Crop protection	Disease management	Tiviant (isotianil)

[1] Planned market launch of selected new products, subject to regulatory approval
As of November 2018

New products and registrations

In 2018, we received marketing authorization in numerous countries for new mixtures and formulations, as well as for expanded indications for existing products and expanded licensing agreements. Key products introduced by and marketing authorizations granted to Monsanto in 2018 prior to the acquisition on June 7, 2018, are also included and identified accordingly to give a better overview.

In May 2018, prior to the acquisition of Monsanto by Bayer, Corteva Agriscience (Indianapolis, Indiana, United States), the agriculture division of DowDuPont Inc., and Monsanto Company (St. Louis, Missouri, United States) announced the signing of a licensing agreement for next-generation technology for insect control in corn for the United States and Canada. Corteva Agriscience will receive a license to stack Monsanto's Corn Rootworm III and MON89034 traits with Corteva Agriscience's insect control traits. The technology will be offered with the Enlist™ herbicide-tolerant trait for corn and is effective against below-ground insect pests.

Serenade™ ASO biological fungicide/bactericide was approved in France for the first time in October 2018. The registration covers foliar and soil applications on a wide range of crops, including oilseed rape/canola, sugar beets, grapes, potatoes, fruits and vegetables. Serenade™ ASO is exempt from the requirements of residue tolerances (MRLs) due to its favorable safety profile.

[3] Subject to regulatory approvals, the expected peak potential pertains only to a selection of products in the pipeline. Products from the digital farming segment are important applications for achieving our peak sales potential. Peak sales are not risk-adjusted and are not to be regarded as cumulative in business areas in which we are already active. This means that additional sales may be generated at the expense of existing product sales.

[4] A new plant trait is a specific characteristic that has not previously been available or offered at Bayer for the crop plant in question.

Collaborations

See also A 1.3 "Global open innovation network"

Crop Science is part of a global network of partners from diverse segments of the agriculture industry and works together with numerous other NGOs, universities and other public and private institutes. In 2018, we entered into new research partnerships and extended existing collaborations. A selection of these is detailed below. Key collaborations entered into by Monsanto in 2018 prior to the acquisition on June 7, 2018, are also included and identified accordingly to give a better overview.

At the beginning of March 2018, Bayer and the International Rice Research Institute (IRRI), headquartered in Los Baños, Philippines, signed an agreement confirming Bayer's participation in the Direct Seeded Rice Consortium led by IRRI to drive forward modern rice cultivation technologies in Asia.

In March 2018, prior to the acquisition of Monsanto by Bayer, Monsanto and AgriMetis, LLC (Lutherville, Maryland, United States) announced the continuation of their research collaboration with the AgriMetis SpinoMetis™ platform, which includes novel insect protection compounds derived from a naturally occurring bacterium. The agreement includes an exclusive global license from AgriMetis to Bayer for agricultural research in row, vegetable and other crops for a three-year period, as well as an option for Monsanto to acquire exclusive commercial rights at the end of the term.

Also in March 2018, prior to the acquisition of Monsanto by Bayer, Monsanto and Pairwise Plants (Research Triangle Park, North Carolina, United States) announced a collaboration to advance agriculture research and development by leveraging gene-editing technology. Under the agreement, Pairwise will work exclusively with Bayer in corn, soybeans, wheat, cotton and oilseed rape/canola crops.

Vector control: see Glossary

In April 2018, Bayer joined with selected members of the agriculture industry – BASF, Mitsui Chemicals, Sumitomo Chemical Company and Syngenta – to pledge its ongoing support to the research, development and supply of innovative vector control solutions to help eradicate malaria by 2040. This industry collaboration is coordinated by the Innovative Vector Control Consortium.

Also in April 2018, we joined with International Finance Corporation (Washington, D.C., United States), Netafim Ltd. (Tel Aviv, Israel) and Swiss Re Corporate Solutions Ltd. (Zürich, Switzerland) in launching a global alliance named Better Life Farming. The aim is to provide comprehensive and innovative solutions for smallholder farmers in the developing world with less than two hectares of land to enable them to grow their farms into sustainable businesses.

In September 2018, Bayer and Genedata AG in Basel, Switzerland, expanded their longstanding partnership in the digitalization of R&D processes. The expanded agreement includes a license for the Genedata Selector platform to support the processing, storage, analysis and evaluation of genomic data for the development of new innovative fungicides to treat plant diseases.

The following table provides an overview of strategically important long-term collaborations that are currently ongoing.

A 1.3/8

Important Collaborations

Partner	Collaboration objective
BASF SE	Cofunded collaboration agreement to develop transgenic products with increased yield stability in corn and soybeans
Brazilian Agricultural Research Corporation – Embrapa	R&D cooperation to address specific agricultural challenges in Brazil, e.g. Asian soybean rust
2Blades Foundation	Collaboration research program to identify Asian soybean rust resistance genes in legumes and genes to control fungal diseases in corn
Citrus Research Development Foundation, Inc.	Search for solutions to citrus greening disease, which currently threatens the global citrus production and juice industry
Elemental Enzymes Ag and Turf, LLC	Use of soil microbes to improve plant health and thereby increase crop productivity
Energin .R Technologies 2009 Ltd. (NRGENE)	Collaboration to develop a sequence-based pangenome and haplotype database to facilitate molecular breeding approaches
Evogene Ltd.	Research program to identify genes for fungal disease resistance in corn
Forschungszentrum Jülich GmbH	Research collaboration focused on phenotyping of biologicals in plants
Grains Research and Development Corporation (GRDC)	Partnership for the discovery and development of innovative weed management solutions (herbicides)
Innovative Vector Control Consortium (IVCC)	Joint development of new substances to control mosquitoes that transmit diseases such as malaria and dengue fever
Institute of Molecular Biology and Biotechnology, Foundation for Research and Technology Hellas in Greece (IMBB-FORTH)	Collaboration seeking to reveal key aspects of insect gut physiology and discover novel targets for the development of insect control solutions
KWS SAAT SE	Joint collaboration and commercial agreement for herbicide-tolerant sugar beet
Nimbus Discovery, Inc.	Collaboration to develop broad-spectrum fungicides with new modes of action
Nomad Bioscience GmbH	Research program to develop partner's proprietary technology for increased efficiency of genome editing projects aimed at crop enhancements
Novozymes A/S (BioAg Alliance)	Alliance to codevelop new sustainable microbial solutions for crop agriculture
Pairwise Plants	Research alliance to develop genome editing tools and products in corn, soybeans, cotton, oilseed rape/canola, and wheat
Pivot Bio	Research collaboration to develop an improved soil bacterium strain for increased nitrogen fixation in soybeans
Second Genome, Inc.	Alliance that leverages partner's microbiome/metagenomics platform to expand sourcing and diversity of novel proteins for the development of next-generation insect control traits
Targenomix GmbH	Development and application of systems biology approaches to achieve a better understanding of metabolic processes in plants

Animal Health

Animal Health improves the health and well-being of companion and farm animals through innovations. We focus our research and development activities on antiparasitics, antibiotics, medicines to treat noninfectious disorders and nonantibiotic alternatives for infectious diseases.

Animal Health pursues the One Health concept. We offer animal health products that reduce the risk of transmission of disease pathogens to humans, such as endoparasiticides for cats and dogs or ectoparasiticides to protect especially against fleas and ticks. Through our initiative focusing on companion vector-borne diseases (CVBD™) and with the leading global scientists who participate in this initiative, we are setting trends in basic research and the fight against vector-borne diseases. In our central research activities, we cooperate closely with the research departments at Pharmaceuticals and Crop Science.

www.cvbd.org/

New products and registrations

In 2018, we received more than 100 new product approvals worldwide through product innovations, approval extensions and the geographic expansion of our existing product portfolio. New product launches included Advantix XXL™, a new application size from our Advantage™ range of products for the treatment of very large dogs with just one single dose, and Viper™, a novel louse control product with increased efficacy for sheep which was registered in Australia.

Collaborations

Animal Health also reinforces its business by continually identifying further product development candidates through new and existing collaborations. In 2018, for example, global license agreements were concluded with Mitsui Chemicals Agro, Inc. (MCAG) and NeuroCycle Therapeutics to strengthen the portfolio. We work closely with our partners in areas such as the development of innovative technologies, application innovations and lead structure optimizations.

1.4 Commitment to Employees and Society

Defining our corporate culture through ethics, dialogue and diversity

Focusing on integrating employees from the acquired agriculture business

Unreserved commitment to supporting human rights

Wide-ranging societal engagement

1.4.1 Employees

Bayer's business success is based to a large extent on the knowledge and commitment of our employees. As an employer, we offer our employees attractive conditions and wide-ranging individual development opportunities. Alongside professional training, we focus on conveying our corporate values (LIFE) and establishing a dialogue-oriented corporate culture based on trust, respect for diversity and equality of opportunity. Our responsible approach to structuring working conditions includes fair treatment at work, a transparent and equitable compensation system, retirement benefit plans, the ability to combine working with family commitments, flexible worktime arrangements and a working environment that fosters health. Numerous external awards and surveys bear witness to our excellent reputation as an employer. These include the awards we received in 2018 as one of the best employers in Germany, China, Italy and India.

Responsibility for the human resources strategy of the Bayer Group falls within the remit of the Board of Management and the primary decision-making body of Bayer's HR function, which set binding policies and define priorities for all regions and organizational units. In 2019, the focus in Human Resources will be on further integrating the employees of the acquired agriculture business and the planned portfolio, efficiency and structural measures.

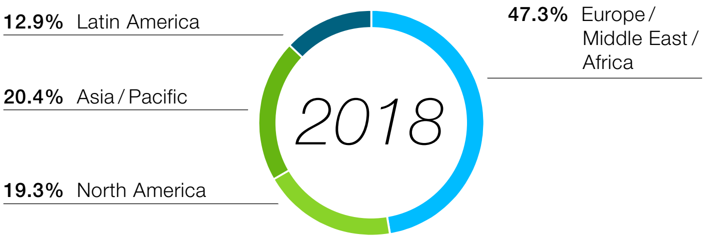
The overall size of our workforce increased substantially in 2018 as a result of the Monsanto acquisition. The acquired agriculture business's human resources department is already part of Bayer's Human Resources & Organization function for organizational purposes, and integration into the Bayer systems began in 2018. All information in this chapter includes the acquired agriculture business, unless otherwise indicated. The acquired agriculture business will continue to use its own systems and processes until full integration is completed.

A 1.4.1/1

Employee Data

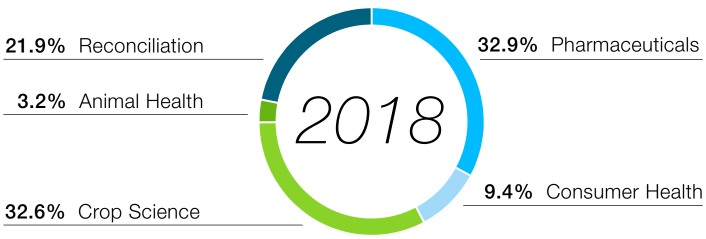
	2017	2018	Change in %
Total	**99,820**	**116,998**	**+ 17.2**

by Region



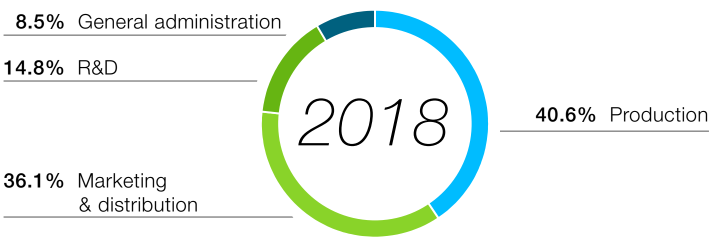
	2017	2018	Change in %
Europe / Middle East / Africa	52,380	55,371	+ 5.7
North America	13,001	22,611	+ 73.9
Asia / Pacific	22,852	23,872	+ 4.5
Latin America	11,587	15,144	+ 30.7

by Segment



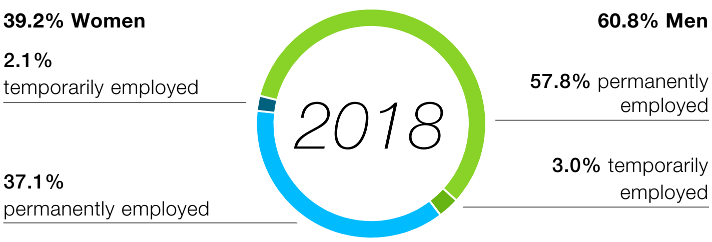
	2017	2018	Change in %
Pharmaceuticals	38,295	38,478	+ 0.5
Consumer Health	11,760	11,050	– 6.0
Crop Science	20,736	38,109	+ 83.8
Animal Health	3,527	3,735	+ 5.9
Reconciliation [1]	25,502	25,626	+ 0.5

by Function



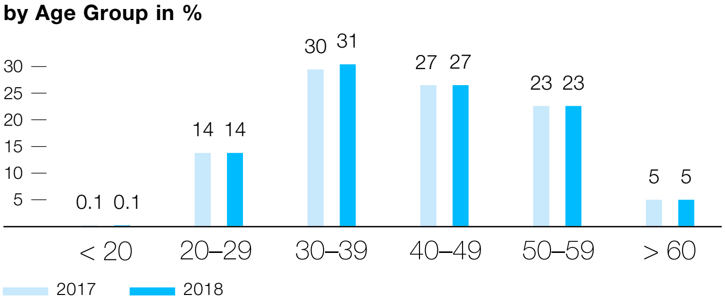
	2017	2018	Change in %
Production	39,669	47,444	+ 19.6
Marketing & distribution	36,622	42,291	+ 15.5
R&D	14,041	17,275	+ 23.0
General administration	9,488	9,988	+ 5.3

by Gender



	Women		Men	
	2017	2018	2017	2018
Europe / Middle East / Africa	21,366	22,503	31,014	32,868
North America	5,620	8,734	7,381	13,876
Asia / Pacific	8,758	9,032	14,094	14,840
Latin America	4,354	5,539	7,233	9,606
Total	40,098	45,808	59,722	71,190

by Age Group in %



Fluctuation in %

	Voluntary		Total	
in %	2017	2018	2017	2018
Women	5.2	6.0	10.1	14.0
Men	4.5	5.0	10.7	14.6
Total	4.8	5.4	10.4	14.4

Number of employees in full-time equivalents (FTE)

[1] Reconciliation encompasses all business activities – especially cross-segment service functions – that are not allocated to any of our reporting segments.

Bayer AG key data:
see also A 1.7

Employee data

On December 31, 2018, Bayer employed 116,998 (2017: 99,820) people worldwide. In Germany we had 32,140 (2017: 31,620) employees, which was 27.5% of the total Bayer Group workforce (2017: 31.7%).

Headcount rose by 17.2% in 2018, with growth in all regions. This comprised an increase of around 17,200 employees, including an addition of 22,100 people through the Monsanto acquisition and the departure of around 4,700 employees through the divestments to BASF. This rise is particularly evident in our Crop Science segment, where the number of employees increased by 83.8%. The breakdown by function shows more employees working in particular in production, in marketing & distribution, and also in R&D. The proportion of women in the workforce decreased by one percentage point to 39.2%. In 2018, there was no significant change in the age structure of our employees compared with the previous year.

Restructuring measures

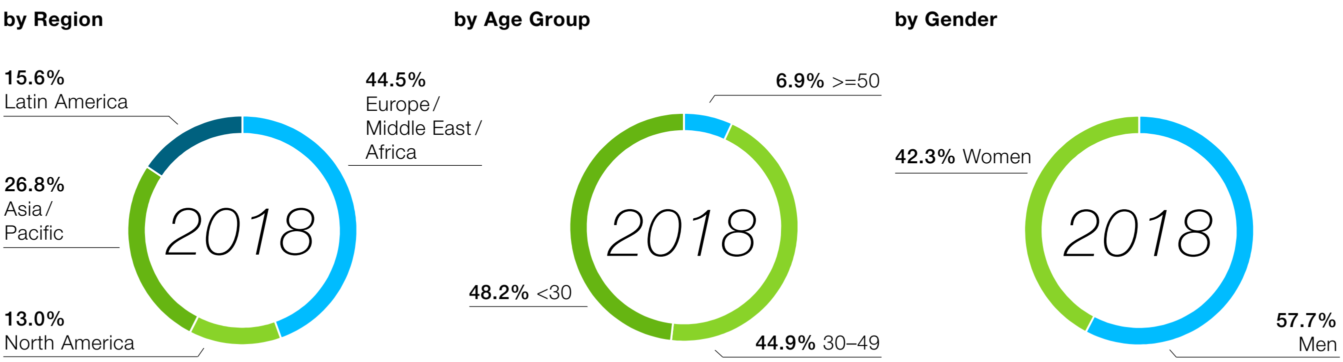
Sustainability and social responsibility reflect our approach to the necessary changes and restructuring measures. For example, we shall complete the worldwide reduction of around 12,000 jobs initiated in December 2018 by the end of 2021. The consequences for employees will be adapted to local laws and regulations, meaning that there might be different solutions in different countries. In all countries we aim to minimize the impact on employees and find fair solutions in cases where job cuts are necessary. In Germany, which remains the company's largest operational base with 32,140 employees, business-related dismissals are fundamentally excluded through the end of 2025 under an agreement with the employee representatives that was concluded in December 2018.

New hires and employment status

In total, the Bayer Group hired 12,333 new employees in 2018 (accounting for 10.5% of our workforce).

A 1.4.1/2

New Hires

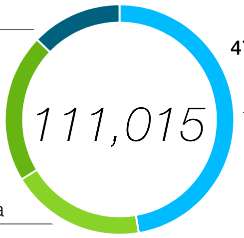


On the reporting date, our employees had worked for the Bayer Group for an average of 9.6 years. The rate of employee-driven terminations (voluntary fluctuation) in 2018 rose to 5.4%. The overall fluctuation rate was 14.4%, an increase of four percentage points compared with the previous year. This figure includes all employer- and employee-driven terminations, retirements and deaths. Our workforce includes only a small number of employees on temporary contracts (5.1%).

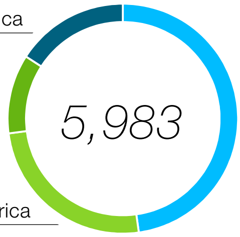
A 1.4.1/3

Employees[1] by Employment Status and Region in 2018

Permanent employees



Temporary employees[2]



[1] The number of employees on either permanent or temporary contracts is stated in full-time equivalents (FTE). Part-time employees are included on a prorated basis in line with their contractual working hours.
[2] Not included are fluctuations in the course of the year owing to seasonal work

Bayer uses temporary employees from staffing agencies primarily in response to short-term personnel requirements, fluctuations in order levels, temporary projects or long-term illness. In some countries, staff are employed via agencies for seasonal work. In Germany, temporary employees make up 1.6% of the total workforce. At our significant locations of operation, this figure is 8.1% (not including fluctuations in the course of the year owing to seasonal work).

Creating attractive working conditions

Competitive compensation and variable pay

Our compensation system combines a basic salary reflecting performance and responsibility with elements based on the company's success, plus extensive additional benefits. Adjustments based on continuous benchmarking make our compensation internationally competitive.

We attach great importance to equal pay for men and women, providing fair compensation and informing our employees transparently about the overall structure of their compensation. Bayer voluntarily pays employees on both permanent and temporary employment contracts in excess of the statutory minimum wage in many of the countries in which we operate.

Binding and transparent compensation structures

At Bayer, individual salaries are based on each employee's personal and professional abilities and the level of responsibility assigned to them. At the managerial level, this is based on uniform evaluation of all positions throughout the Group using the internationally recognized Hay method. This method will be successively applied to the managerial positions in the acquired agriculture business. In areas of the Group and jobs that fall within the scope of a binding collective bargaining agreement, there are no differences in pay based on gender either. In the Emerging Markets and developing countries, compensation levels are aligned to local market conditions. In the majority of cases, full- and part-time employees at our significant locations of operation receive the same rates of pay. Employees on temporary contracts are not entitled to long-term compensation components such as pension plans in some countries.

Significant locations of operation: see Glossary

Our compensation concept also includes variable one-time payments. Approximately €1,100 million is earmarked for bonus awards to employees for 2018 under the Group-wide short-term incentive (STI) program and similar programs (2017: approximately €680 million for employees in continuing operations). In many countries, employee stock programs enable our staff to purchase Bayer shares at a discount. Starting in 2019, these programs will be extended to the employees of the acquired agriculture business as well. Senior managers throughout the Bayer Group are invited to participate in Aspire, a uniform long-term compensation program based on the development of the share price.

Bayer AG key data: see also A 1.7

See also Note 9 to B Consolidated Financial Statements

See also Note 22 to B Consolidated Financial Statements

Bayer AG key data: see also A 1.7

Our personnel expenses for continuing operations amounted to €11,548 million in 2018 (2017: €9,528 million). This change was largely due to the acquisition of the new agriculture business and the associated substantial increase in the number of Bayer employees.

Alongside attractive compensation for their work, Bayer contributes to the financial security of its present and former employees after their retirement. Retirement benefit plans are available to 80% (2017: 75%) of Bayer employees worldwide to complement national pension systems. The benefits provided depend on the legal, fiscal and economic conditions in each country, employee compensation and years of service. Personnel expenses in 2018 included pension expenses of €924 million. Payments of €1,123 million were made in 2018 to current retirees. The value of total pension obligations at the end of 2018 was €26,569 million.

A 1.4.1/4

Personnel Expenses and Pension Obligations

€ million	2017	2018
Personnel expenses	9,528	11,548
of which pension expenses	933	924
Pension obligations[1]	24,492	26,569
Pension benefits paid[2]	1,051	1,123

[1] Present value of defined benefit obligations for pensions and other post-employment benefits as of December 31, 2018
[2] 2017 figure including Covestro until its deconsolidation

Vocational and ongoing training

www.bayer.com/training

Employees can take part in wide-ranging ongoing training opportunities. We bundle our Group-wide continuing education offerings in the Bayer Academy, which offers both continuous professional training and systematic development of managerial employees and has received numerous international awards. Since 2018, our employees have had access to a comprehensive eLearning library that supports learning tailored to individual development needs. These offerings are already available to employees of the acquired agriculture business. The acquired agriculture business additionally has its own vocational training and continuing education offerings, which will be integrated into Bayer's program over the course of 2019.

Significant locations of operation: see Glossary

In 2018, we determined the vocational and ongoing training hours for all employees worldwide (in 2017, those at our significant locations of operation only), including those of the acquired agriculture business. At the same time, the range of face-to-face training offered in the second half of 2018 was reduced. For this reason, vocational and ongoing training hours amounted to only 17.1 hours per employee in 2018. Once the integration of the training systems has progressed further, we will report on the average ongoing training costs, including those of the acquired agriculture business, in 2019.

A 1.4.1/5

Training Activities in Hours in 2018 by Employee Group and Gender

	Women	Men	Total
Employee group[1]			
Management	27.8	23.8	25.5
Specialists	15.0	13.0	13.8
Overall average	**18.7**	**15.9**	**17.1**

[1] Bayer uses the Hay method to determine whether employees belong to junior or senior management. As the evaluation of positions in the acquired agriculture business is not yet complete, our reporting for the whole Group for 2018 refers to specialists and management (both junior and senior).

To meet the need for skilled employees, Bayer provides vocational training in Germany in more than 25 different occupations and offers more vocational training places than is required to meet its needs. In 2018, more than 700 young people started a vocational training course at Bayer in Germany. We employed nearly 2,000 trainees overall in 2018 (around 500 women and 1,500 men). Bayer also offers trainee programs in various areas for those embarking on a career and internships for students around the world.

www.bayer.com/career

Feedback on employee performance and wide-ranging career opportunities

Bayer encourages a culture of candid feedback. Our employees have the opportunity to receive feedback from their supervisors on fulfillment of their professional and behavioral objectives. This evaluation also helps to determine their variable compensation. In 2018, about 78% of our total workforce participated in these feedback discussions. Of the participants, 42% were female and 58% male.

Thanks to our wide-ranging business activities, we offer employees throughout the Bayer Group good opportunities for development. Regular development dialogues between employees and supervisors provide an opportunity to discuss the employees' further career development perspectives. More than 53,000 development dialogues were held and documented in 2018. A total of 44% of employees participated in development dialogues.

Vacancies throughout the Bayer Group, from nonmanagerial right up to management level, are advertised via a globally accessible platform.

Work-life balance

We offer our employees flexible working hours and support in child care and caring for close relatives. In many countries, our commitment in this area goes beyond the statutory requirements. In 2018, part-time employees accounted for around 9% of the Bayer Group workforce, primarily in Europe.

A 1.4.1/6

Part-Time Employees by Gender

	2017	2018
Women	5,639	6,097
Men	3,444	4,401
Total	**9,083**	**10,498**

Bayer enables both men and women to take parental leave. Since national parental leave regulations vary widely from country to country, we only compile data for our significant locations of operation. 1,980 women and 1,228 men at these locations took parental leave in 2018. By the end of the year, 2,486 employees on parental leave had returned to work.

Significant locations of operation: see Glossary

Bayer has introduced uniform conditions for mobile working (home office) in Germany through a General Works Agreement with the Works Council. In addition, through the "BayZeit" long-term account in Germany, employees can convert part of their salary into free time, which they can later take off to care for children or close family members, or to take part in an advanced training course, for example.

Initiatives to promote health and ensure safe working conditions

In 2018, Bayer sustained its global framework concept to promote employee health and quality of life (BeWell@Bayer). It expands the core aspect of health into a comprehensive approach, targets further improvements in the daily work environment and is intended particularly to help balance employees' professional and private lives. We aim to provide employees in all countries with access to affordable and targeted health offerings such as regular medical check-ups, sports programs, rehabilitation and on-site medical care. The acquired agriculture business has similar health promotion programs.

www.bayer.com/en/
working-at-bayer.aspx

Corporate culture: ethics, dialogue, diversity, responsibility

Ethical standards

Fairness and respect are central elements of our corporate culture. That includes observing Group-wide standards of conduct and protecting employees from discrimination, harassment and retaliation. These standards are set forth in our corporate policy entitled "Fairness and Respect at Work." With the help of training, videos and our internal websites, Bayer employees around the world are provided with guidance on how to comply with this corporate policy.

ILO core labor standards: see Glossary

See also A 1.4.2

Child and forced labor are strictly prohibited at Bayer in accordance with the core labor criteria of the International Labour Organization (ILO). This prohibition is set out in our binding Human Rights Policy and applies Group-wide.

The acquired agriculture business has regulations on standards of conduct and human rights that are comparable with Bayer standards. These will remain in force until the integration has been completed.

Communication at all levels

GRI 102-43

Our employees have the opportunity to discuss company-specific issues and scope for optimization via various communication channels. We involve our employees in business processes through active dialogue. Informing staff in good time and comprehensively about upcoming changes, in compliance with the applicable national and international regulations, is very important to us.

We measure employee engagement at Bayer by means of institutionalized feedback discussions and the Group-wide Employee Survey, which is conducted about every two years. This enables us to monitor the effectiveness of our initiatives and initiate any necessary improvements. In addition, we introduced the Employee Echo – a scaled-down version of the global Employee Survey – in 2018. This is intended to help us identify trends in the course of a year, allowing us to adjust already initiated measures early on. The initial Employee Echo, an online survey, polled 25% of employees worldwide (excluding the acquired agriculture business), who were selected as representative samples using statistical methods. Bayer's score on the Employee Engagement Index – collated from responses to questions about satisfaction, loyalty, advocacy and pride – was 77%, slightly below the figure in the 2017 Group-wide Employee Survey (79%). According to our analyses, the decline also resulted from the changes in the company in 2018, which have led to uncertainty.

We engage in open and trustful dialogue with employee representatives. The main dialogue formats are regular employee assemblies, information events for managers and the European Forum, at which employee representatives from all European sites engage in discussion with the Board of Management on issues of central relevance to the company.

Diversity and internationality are hallmarks of Bayer

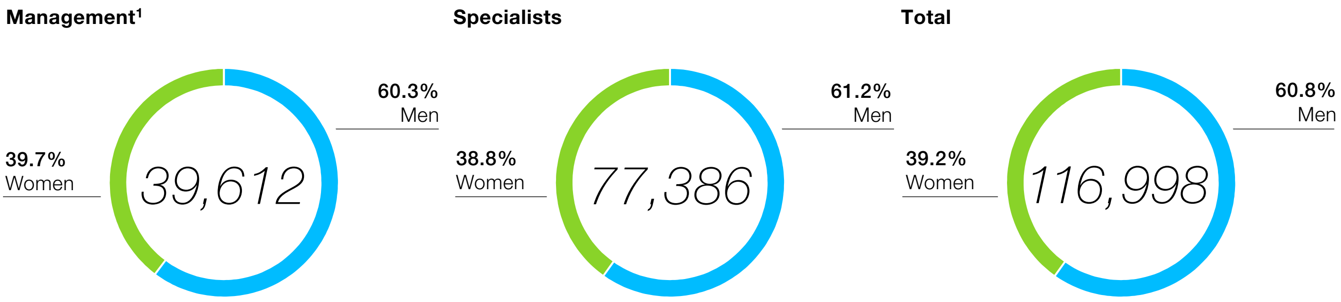
In our employee structure we promote inclusion and diversity, through which we acquire a better understanding of changing markets and consumer groups, gain access to a broader pool of talented people and benefit from an increasing level of creativity and innovative strength. That is why mutual understanding and a gender and cultural balance are important success factors at Bayer. Overall, the Bayer Group employs people from around 150 different nations.

See also A 4.1
See also A 1.2.1

Bayer has endeavored for many years to achieve a better gender balance in management.
The proportion of women in management in 2018 was 39.7% (2017: 40%).

A 1.4.1/7

Employee Structure of the Bayer Group in 2018



[1] Bayer uses the Hay method to determine whether employees belong to junior or senior management. As the evaluation of positions in the acquired agriculture business is not yet complete, our reporting for the whole Group for 2018 refers to specialists and management (both junior and senior).

The proportion of women in the Group Leadership Circle, the highest management level below the Board of Management, increased again compared to previous years. By the end of 2018, it was made up of 21% women (2010: 7%) and 79% men (2010: 93%). The Group Leadership Circle currently comprises 30 nationalities, with around 68% of its members working in their native country. Information on diversity in our Board of Management and our Supervisory Board can be found in our Corporate Governance Report.

As a signatory to the United Nations Women's Empowerment Principles and the Diversity Charter corporate initiative, we pursue an inclusive approach. Diversity is integrated into all relevant human resources processes and driven forward by the management.

www.weprinciples.org
www.charta-der-vielfalt.de/en/

As a socially responsible company, we are also committed to supporting the needs of people with disabilities. Based on voluntary statements by employees, we employ some 2,400 people with disabilities in 29 countries, 40% of whom are women and 60% men. That represents around 2% of our total workforce. Most employees with disabilities work for our companies in Germany, where they made up 5.2% of the workforce in 2018.

Social responsibility for employees worldwide

Almost 98% (2017: 98%) of our employees worldwide either have statutory health insurance or can obtain health insurance through the company.

Employees at all Bayer sites around the world have the right to elect their own representatives. In 2018, the working conditions for around 57% (2017: 63%) of our employees worldwide were governed by collective or company agreements. At various country companies, the interests of the workforce are represented by elected employee representatives who have a right to be consulted on certain personnel-related decisions.

GRI 102-41

1.4.2 Global Respect for Human Rights

Bayer fully supports human rights and has documented its stance in a globally binding corporate policy entitled the "Bayer Human Rights Policy." We are committed to respecting and fostering human rights within our sphere of influence and to reporting transparently on the results of our activities in this area. We also expect our business partners, and particularly our suppliers, to fully observe human rights. Our LIFE values and Corporate Compliance Policy also obligate all employees worldwide to conduct themselves fairly and in a compliant manner in dealings with colleagues, business partners and members of the community.

www.bayer.com/humanrights

ILO core labor standards: see Glossary

We are a founding member of the U.N. Global Compact and respect the Universal Declaration of Human Rights and a range of globally recognized declarations applicable for multinational corporations. These include the OECD Guidelines for Multinational Enterprises, the Tripartite Declaration of Principles concerning Multinational Enterprises and Social Policy, and the core labor standards of the International Labour Organization (ILO).

www.bayer.com/monsanto-human-rights

The acquired agriculture business has expressed its clear commitment to observing human rights in a position paper, which is comparable with the Bayer Human Rights Policy. These two policies are being combined during integration. Until that time, both position papers will continue to apply.

Responsibility and management

The observance of human rights is an integral part of our sustainability management and our human resources strategy. Responsibility for this topic lies with the Board of Management member responsible for Human Resources, Technology and Sustainability, who is assisted by the Sustainable Development Committee (SDC).

Directives, processes and management and monitoring systems control the implementation of human rights standards in business operations. The acquired agriculture business will continue to use its own systems and processes until integration has been fully implemented.

Observing human rights is an interdisciplinary issue at Bayer that covers wide-ranging areas of influence and processes, such as:

See also A 1.4.1

- Employees:
  - Diversity, compensation, fairness and respect at the workplace
  - Prohibition of child and forced labor, and the right to freedom of association

See also A 1.6.2

- Safety:
  - Health and safety at the workplace
  - Plant safety to protect our employees and the people who live near our production sites

See also A 1.3 Pharmaceuticals and A 1.6.1

- Product stewardship, also in relation to clinical studies and biodiversity

www.bayer.com/child-care

- Procurement:
  - Sustainable supplier management (we report on our measures to combat child labor in the seed supply chain on our website)

We report in more detail on our due diligence with respect to human rights in the relevant chapters.

Training and grievance mechanisms

We offer ongoing training programs to enhance employees’ awareness of the importance of human rights in their day-to-day activities. In 2018, more than 60% of our employees received training in aspects of our Human Rights Policy in sessions totaling around 240,000 hours. Aspects of human rights are also covered in the training offerings and the sustainability manual for our suppliers.

See also A 4.2

The compliance organizations at the Group and country levels monitor compliance with our corporate policies. If there are signs of violations of our Human Rights Policy, employees and members of the general public can contact the Bayer Compliance Officers at any time, even anonymously if desired. Alternatively, they can contact the worldwide compliance hotline.

Commitment

GRI 102-43

We engage in dialogue with other stakeholders on the topic of human rights and actively participate in committees and initiatives established to ensure their observance, such as the corresponding working groups of econsense, by contributing to discussions on implementing the National Action Plan (NAP) – Business and Human Rights and, in the supply chain, via our Together for Sustainability (TfS) industry initiative and the Pharmaceutical Supply Chain Initiative (PSCI).

We also support the U.N. Guiding Principles on Business and Human Rights, which provide global standards for preventing and combating possible human rights violations in connection with business activities.

Since the beginning of 2018, we have been actively involved in a pilot project under the auspices of the OECD and the Food and Agricultural Organization (FAO) that is aimed at supporting companies in the implementation of the voluntary Guidance for Responsible Agricultural Supply Chains initiative based on the U.N. Guiding Principles on Business and Human Rights.

www.bayer.com/oecd-fao-guidance

1.4.3 Societal Engagement

Bayer's societal engagement focuses on people who work worldwide in education, science, health and social innovation, and who are committed to improving living conditions. In this way, we support the U.N. Sustainable Development Goals "Good Health and Well-Being" (SDG 3) and "Zero Hunger" (SDG 2). For example, we enable people in developing countries and emerging markets to access our medical products through our various Access to Medicine activities. Another funding area is sports and culture in Germany. In 2018, Bayer – including the acquired agriculture business – made available some €66 million worldwide for charitable projects and activities (2017: €49 million for Bayer excluding Monsanto).

Social innovation: see Glossary

An interdisciplinary corporate function is responsible for the strategic orientation and coordination of our societal engagement. Group-wide donation allocation and management policies form the basis for our donation and foundation activities. The Board of Management and an independent panel of internationally renowned experts help make major funding decisions. The acquired agriculture business has its own extensive societal engagement programs, which will be integrated into our structures from 2019.

Bayer's societal engagement includes the activities of its globally operating company foundations that are aligned toward health care and nutrition: the Bayer Science & Education Foundation for leading-edge research, education and talent promotion, the Bayer Cares Foundation for social innovation and employee engagement, and the Monsanto Fund focusing on community projects, education, food and nutrition.

www.bayer-foundations.com

www.monsantofund.org

We work together with leading nongovernmental organizations, patient groups, foundations, scientific institutions, educational partners and networks of experts around the world to implement many of our initiatives.

Through various initiatives, we help improve living conditions very close to the company's sites. Our company foundations support, for example, science education worldwide at schools near company sites and projects promoting the agricultural self-sufficiency of smallholder farmers. Under the auspices of international volunteering programs, we support volunteer projects by employees near their workplace in many countries.

A 1.4.3/1

Societal Engagement in 2018

- Monsanto and Monsanto Fund: community projects, food and nutrition, education, disaster aid
- Recreational, disabled and competitive sports, cultural events, support for young artists
- Health education and prevention, social health, access to medical care, sustainable development and smallholder farmer projects, disaster aid, employee volunteering and community projects, Grants4Impact & Aspirin Social Innovation
- School projects, Baylab school laboratories, talent promotion, scholarships, promotion of leading-edge research, scientific awards, promotion of academies, symposia, conferences

1.5 Procurement and Supplier Management

Sustainability criteria consistently anchored in supply management

Expansion of supplier development in the area of sustainability

The procurement organization supplies the company with raw materials, goods and services all around the world. We exert influence on society and the environment through our procurement activities and supplier relationships. Not only economic, but also ethical, social and ecological principles are therefore anchored in our Procurement Policy, which is binding for all employees worldwide.

Procurement is a corporate function, the head of which reports directly to the Chief Financial Officer. This function acts centrally on behalf of all segments and leverages synergies by bundling know-how and procurement spend.

Our main direct procurement materials include active ingredients, raw materials, intermediates and finished products. Technical goods and services, marketing services and research and development are important components of our indirect procurement portfolio.

www.bayer.com/en/supplier-management.aspx

The share of renewable raw materials in Bayer's procurement portfolio plays a subordinated role in the Bayer Group. These materials are primarily used when it makes technical, economic and ecological sense to do so. More information can be found on our website.

In 2018, Bayer's supplier portfolio changed as a result of the acquisition of Monsanto and the divestment of the vegetable seed and digital farming businesses. The acquired agriculture business's procurement area is already part of Bayer's Procurement function for organizational purposes. Until the integration into Bayer processes has been completed, this part of the procurement organization will continue to apply its existing procurement and supplier management processes and existing procurement directive.

The following table provides relevant data on our procurement activities (including of the acquired agriculture business).

A 1.5/1

Procurement Activities

	2017	2018
Procurement spend in € billion	14.9	17.1
Spend in OECD countries (mainly Germany and U.S.A.) in € billion	12.2	13.5
Spend in non-OECD countries (mainly Brazil, India and China) in € billion	2.7	3.6
Number of suppliers [1]	93,330	101,188
of which from OECD countries	64,827	68,900
of which from non-OECD countries	28,503	32,288
Number of countries	148	153

[1] Due to the integration of the acquired agriculture business (Monsanto), there may be duplication in the number of suppliers. Supplier consolidation is scheduled to begin 2019.

Bayer AG key data: see also A 1.7

Our selection of suppliers takes account of all types of suppliers and supplier diversity, as supported, for example, by our supplier diversity programs in the United States.

Established procurement processes and long-term contracts

Procurement operates according to established procurement and supplier management processes. Long-term contracts and active supplier management for strategically important goods and services are important elements here. They serve to minimize procurement-specific risks such as supply bottlenecks or significant price fluctuations, as well as to safeguard the company's competitiveness and ensure smooth production processes. Bayer works closely together with selected suppliers to systematically involve them in innovation processes.

Bayer purchases locally wherever possible in order to respond promptly to the requirements of our sites, thereby simultaneously strengthening local economies. In 2018, this applied to 74% (2017: 71%) of our procurement spend at our significant locations of operation, and to 74% (2017: 71%) of procurement spend in all countries worldwide.

Local procurement, significant locations of operation: see Glossary

Sustainability in the supply chain

Clear, sustainability-oriented criteria and standards apply to our supply chain at both a global and regional level. Bayer regards adherence to these criteria and standards as a crucial value-adding factor and a lever for minimizing risks.

A four-step process is thus established throughout the company to improve sustainability practices in the supply chain, comprising the elements awareness-raising and supplier nomination, performance evaluation and development. This process is centrally steered by the Sustainability team in Procurement and implemented through cross-functional cooperation between the Procurement and the Corporate Health, Safety & Sustainability functions. The newly acquired part of the procurement organization will continue to use its existing processes for sustainability in procurement until integration into the Bayer processes has been fully implemented.

Sustainability requirements defined in the Supplier Code of Conduct

Our sustainability requirements are established in the Bayer Supplier Code of Conduct, which is based on our Bayer Human Rights Policy and the principles of the U.N. Global Compact. The code is available in 14 languages and covers the areas of ethics, labor, health, safety, environment and quality, and management systems. The code is applied in the selection and evaluation of our suppliers and is integrated into electronic ordering systems and contracts throughout the Bayer Group. Furthermore, Bayer's standard supply contracts contain a clause that authorizes Bayer to verify suppliers' compliance with our sustainability requirements.

The acquired agriculture business's supplier code of conduct still applies to existing supplier relationships and its content largely corresponds with that of Bayer's own code. A new joint code of conduct will be published at the beginning of 2019.

Evaluating the sustainability performance of our suppliers

Starting in 2019, we plan to integrate the suppliers gained through the acquisition into Bayer's processes for evaluating sustainability performance, which include the EcoVadis online assessments and on-site audits by external and Bayer auditors. To date, the acquired agriculture business's procurement organization has used supplier surveys and audits to review the sustainability performance of its suppliers. Since these processes are not comparable with those of Bayer, the following information for 2018 does not yet include the acquired agriculture business.

Bayer verifies the observance of the code requirements by its suppliers through online assessments or on-site audits. Suppliers are selected for these reviews at the beginning of the year on the basis of their strategic importance and a sustainability risk analysis combining country and category risks. In 2018, there were 248 strategically important suppliers with a procurement spend of €4.84 billion. In addition, there were 238 suppliers with an increased sustainability risk and a significant procurement spend (> €1 million p.a.). Of these 486 suppliers, we evaluated those that did not yet have valid sustainability evaluation.

The number of assessed and audited suppliers also includes a major proportion of the suppliers with a sustainability risk and procurement spend of > €500,000, those for which evaluations were performed through our industry initiatives Together for Sustainability (TfS) and the Pharmaceutical Supply Chain Initiative (PSCI), and suppliers who have proactively allowed themselves to be evaluated.

In total, our service provider EcoVadis assessed 715 (2017: 622) suppliers on our behalf in 2018. The online assessment criteria of EcoVadis correspond to the requirements of our code and also take into account country- and industry-specific conditions and supplier size.

www.tfs-initiative.com
https://pscinitiative.org

In 2018, we arranged for 79 (2017: 57) of our suppliers to be audited on site by external, independent auditors. The audit criteria included both the specifications of our code and the industry-specific requirements of the TfS and PSCI industry initiatives. These initiatives are designed to help standardize the sustainability requirements for suppliers in the chemical and pharmaceutical industries. Such standardization is furthered by the mutual recognition and exchange of assessment and audit results. Bayer auditors evaluate selected new and existing suppliers with a focus on health, safety and environmental protection. These audits are performed on suppliers with significant risk potential as regards substances, production processes, occupational safety or environmental factors, for example, and on toll or contract manufacturers in countries at increased risk. In 2018, 130 (2017: 115) suppliers were evaluated by Bayer auditors.

A 1.5/2

Assessments and Audits of Bayer Suppliers

	2017	2018
Sustainability assessments[1] via the EcoVadis platform	622	715
Sustainability audits[2] by external auditors	57	79
HSE[3] audits by Bayer auditors	115	130

[1] Initial and re-assessments of suppliers working for Bayer; initiated by Bayer and shared via EcoVadis as part of the TfS initiative
[2] Initial and follow-up audits of suppliers working for Bayer; initiated by Bayer and shared as part of the TfS and PSCI initiatives
[3] Health, safety, environment

The online assessments and on-site audits are analyzed and documented so that specific improvement measures can be defined with the suppliers in the case of critical results. In 2018, suppliers who had undergone online assessments by EcoVadis demonstrated need for improvement in particular in the categories of sustainable procurement and the environment, while those who had been audited required improvement in occupational health and safety. A supplier receives a critical result if a serious violation or several major findings in sustainability performance are identified. In 2018, this applied to 17 suppliers (2% of all assessed and audited suppliers; 2017: 3% (20)). In these cases, Bayer requests that the suppliers remedy the identified weaknesses within an appropriate timeframe based on specific action plans. We monitor the implementation of these activities by way of re-assessments or follow-up audits. Bayer reserves the right to terminate a supplier relationship if no improvement is observed during a re-evaluation. In 2018, Bayer had to end one supplier relationship due solely to sustainability performance.

Our regular monitoring shows that 343 (2017: 348) of the 794 (2017: 679) Bayer suppliers evaluated in 2018 improved their sustainability performance.

Training measures and dialogue on the issue of sustainability

GRI 102-43

We offer our suppliers a wide range of development and dialogue opportunities. In 2018, to make the operational implementation of our Supplier Code of Conduct more comprehensible, we developed a Supplier Sustainability Guidance. The first instruction session on its implementation was held at a Bayer Supplier Day in Brazil. The industry initiatives TfS and PSCI offer additional advanced training modules for our suppliers through the TfS Supplier Academy and the PSCI Sustainability Webinars. They also organized training courses and workshops for suppliers in India and China in 2018.

In 2018, Bayer joined together with 10 other industrial companies under the umbrella of econsense to form the German Business Initiative for Sustainable Value Chains. In the selected procurement markets China and Mexico, suppliers were trained locally in sustainable business practices over a nine-month period.

We also support our procurement employees in the implementation of our sustainability requirements with targeted Group-wide training measures.

1.6 Safety for People and the Environment

Transparency initiative: publication of safety studies on crop protection products

Safety first: prevention of accidents and incidents has top priority

Environmental and safety KPIs: successful integration of acquired agriculture business

We prioritize the quality and safety of our products, the safe and responsible operation of our production facilities and the protection of our employees, the people who live near our sites and the environment.

Responsibility for health, safety, environmental protection and quality (HSEQ) lies with the member of the Board of Management responsible for Human Resources, Technology and Sustainability. HSEQ management systems are integrated into business processes across the Bayer Group. Responsibility for steering and control lies with two corporate functions: “Corporate Health, Safety & Sustainability” and “Quality.” These stipulate responsibilities, targets, key performance indicators and framework conditions, such as the new corporate policy entitled “HSE Key Requirements.”

www.bayer.com/hse-key-requirements

As the HSE systems and standards at Bayer and the acquired agriculture business are comparable, we are able to report safety and environmental data for the Bayer Group including the acquired agriculture business from the closing date of June 7, 2018, unless otherwise indicated. Until the integration has been fully implemented, the existing HSE rules, systems and processes and the HSE audit system of the acquired agriculture business will remain in force.

Operational responsibility lies with the individual segments, which steer HSEQ via management systems, committees and working groups. All relevant HSEQ performance indicators from our environmentally relevant production sites are compiled in a Bayer-wide site information system (BaySIS). All sites with an annual energy consumption of more than 1.5 terajoules count as environmentally relevant. The continuous review and revision of corporate policies by the corporate functions, regular mandatory internal audits and external certification processes ensure that the systems at all production sites effectively meet the specific requirements in each case. The excellent performance of our HSEQ management systems also reduces running costs by avoiding damage and disruptions to work and production.

Unusual incidents such as hazards to the safety of our employees, plants or facilities are recorded and reported according to a globally applicable standard procedure, the Bayer Emergency Response System, which is part of the Group-wide safety and crisis management system in which the sites of the acquired agriculture business are already integrated. The handling of such incidents is the responsibility of the local crisis organization or emergency response team. For this purpose, organizational precautions with defined responsibilities and procedures have been implemented at the sites and/or in the countries. Depending on the situation, these involve business partners and the local community around the sites.

Standards and certifications

Environmentally relevant sites: see Glossary

Our HSE management systems are based on recognized international standards. With regard to coverage based on energy consumption, 85.0% of our environmentally relevant sites were certified externally to at least one internationally recognized standard for environmental and occupational safety management. Compliance with the statutory requirements and relevant standards is regularly audited by internal experts, regulatory authorities and external consultants.

A 1.6/1

Standards and Certifications

% of business activities based on energy consumption	2017	2018
Certification to external standards		
ISO 14001 certification/EMAS validation	92	82
ISO 45001/OHSAS 18001 certification	91	64
ISO 50001 certification	74	49
Degree of coverage with certification to at least one of the above standards	92	85

1.6.1 Product Stewardship

Product stewardship means for us that our products satisfy the highest quality standards and are safe for people, animals and the environment when properly used. We respect legal requirements, and our voluntary commitment and internal standards go beyond these in various areas.

The general processes and conditions of the acquired agriculture business are comparable with those of Bayer. Responsibilities and implementation are handled locally in many cases, however, and are not centrally documented. As a result, these processes are not directly comparable with those of Bayer, which is why the following cross-segment information does not include the acquired agriculture business. However, the sector-specific data for Crop Science does include the acquired agriculture business.

Assessments and testing

Our substances and finished products undergo extensive assessment and testing regarding product safety. We examine possible health and environmental risks along the entire value chain and use this to derive appropriate measures to mitigate risks.

We assess the properties of our substances and active ingredients already at the research and development stage. We discontinue the development of those with undesirable properties in application of the precautionary principle as defined in Principle 15 of the Rio Declaration of the United Nations and Communication COM (2000) 1 of the European Commission.

We also conduct environmental risk assessments or implement risk management measures for our active ingredients subsequent to their registration. Moreover, we help to tackle questions about the impact of active ingredients in the environment and ensure that concerns are addressed through sound risk assessments and analyses. To this end, we have established a risk-benefit assessment process for active ingredients that adequately considers customer needs relative to potential or known environmental risks.

We carry out the risk assessments for our substances according to recognized scientific methods such as those described in the Guidance on Information Requirements and Chemical Safety Assessment of the ECHA (European Chemicals Agency). Should the analysis reveal that the use of a certain substance is not safe, we take steps to mitigate risk. These can vary from revised application recommendations to substitution of a substance. In this case, a replacement that is economically and technically viable needs to be sought. The applicable assessment steps are established in a corporate policy.

We also monitor all our products that are already available on the market. For this purpose, we have established processes throughout the company aimed at addressing inquiries on product safety or problems with our products. This feedback is integrated into our risk assessment.

Information on substances and products

Bayer compiles safety data sheets for all chemical substances regardless of whether or not this is required by law. Targeting professional users, they contain information on a substance's properties and on its safe use. In addition, technical information is provided for professional use. All end consumer products contain appropriate information in their packaging, an example being package inserts for pharmaceuticals.

In accordance with the respective product safety and information obligations, we compile product information both for raw materials and for intermediates and end products and make this information available across the company worldwide.

General conditions

Extensive legal regulations apply to all Bayer products. Chemical substances are subject to the respective national chemical regulations (e.g. REACH in the European Union or TSCA in the United States). The classification and labeling of chemicals enables users to become informed about the risks associated with chemicals. Bayer implements the Globally Harmonized System (GHS) for the classification and labeling of chemicals worldwide.

www.echa.europa.eu/reach
www.epa.gov/chemicals-under-tsca

Furthermore, the finished products such as pharmaceuticals, crop protection products and biocides are subject to specific and detailed approval procedures.

Biocides: see Glossary

Authorities in the European Union enforce the implementation of obligations resulting from chemicals legislation through regular inspections. For this reason, we require our suppliers to acknowledge conformity with REACH for all supplied substances.

We voluntarily apply comparable standards around the world, independent of the respective national legislation. We are successively assessing the hazard potential of all substances (> 99%) we use in quantities exceeding one metric ton per annum. By the end of 2018, we had assessed 85% (2017: 76%) of these substances. Starting in 2019, the substances used in these quantities by the acquired agriculture business will be included in the assessment.

www.icca-chem.org/
responsible-care/

Commitment

We are actively engaged in product stewardship activities through our work in relevant associations and initiatives. Since 1994, Bayer has supported the voluntary Responsible Care™ initiative of the chemical industry and the associated Responsible Care™ Global Charter. We actively participate in the further development of scientific risk assessment and are involved in several associations, such as the European (CEFIC), U.S. (ACC) and international (ICCA) chemical industry associations and the OECD, as well as in initiatives such as European Centre for Ecotoxicology and Toxicology of Chemicals (ECETOC). We also support the Strategic Approach to International Chemicals Management (SAICM) with the goal of further minimizing negative effects of chemicals on the environment and human health through 2020.

Quality management

The Quality corporate function ensures uniform quality standards across all segments and functions along with the continuous improvement of all quality-related processes. The quality requirements derived from regulatory requirements, permits and authorizations, relevant standards of nongovernmental organizations and industry associations and customer expectations are regularly reviewed and integrated into an internal quality management system. Compliance with the statutory requirements, relevant standards in production and registered product specifications is regularly audited by internal experts, regulatory authorities and external assessors. These audits also cover institutes subcontracted by Bayer, service providers and our suppliers.

Our segments have quality management systems based on sector-specific international standards. We indicate the degree of coverage with this kind of certification in relation to the reference parameter energy consumption. In 2018, 67.9% of our production sites had a certified quality management system (2017: 75.4%, excluding the acquired agriculture business).

Quality management of segments

The quality management system of the Pharmaceuticals and Consumer Health segments forms the basis for the highest possible safety standards in the manufacturing of pharmaceuticals and medical devices, which are subject to strict quality requirements. It is based on internationally recognized standards such as ISO (e.g. ISO 9001, 17025 and 13485) and ICH (International Conference on Harmonization of Technical Requirements for Registration of Pharmaceuticals for Human Use), as well as on rules for good working practices (GxP) in the development and manufacture of pharmaceuticals, such as Good Manufacturing Practices (GMP), Good Distribution Practices (GDP) and Good Clinical Practices (GCP).

GxP: see Glossary

Our veterinary medicine products also comply with stringent GxP quality standards stipulated in the relevant statutory requirements applying to development, approval, manufacture, marketing and safety monitoring. According to these, safety is to be ensured for the animals to be treated, people and the environment alike.

Product manufacture at Crop Science (including the acquired agriculture business) is performed according to ISO 9001. Our products are authorized by the relevant national authorities and thus fulfill the respective requirements with regard to quality and user safety.

Responsible use of biotechnology

Bayer applies biotechnology both in the area of seeds and in pharmaceutical product development and production, such as for Kogenate™ and Kovaltry™. Further biotechnologically manufactured active ingredients are undergoing clinical development. In plant cultivation, we use genetic engineering as well as conventional breeding methods to improve crop yields, yield security and the stress tolerance of plants without increasing the input of resources.

For Bayer, safety for people and the environment is a priority in the use of biotechnology. In addition to meeting legal and regulatory requirements, Bayer has specified the responsible use of genetic engineering and strict, globally applicable safety measures in handling biological substances in corresponding corporate policies. We provide our stakeholders with information about our products and services in accordance with our Responsible Marketing & Sales Policy.

Our commitment to preserving biodiversity

In the course of our business activities, we aim to use natural resources responsibly and respect biodiversity. Our principles on biodiversity are set forth in both the Bayer Human Rights Policy and our own position on this issue. In this, we express our commitment to the United Nations Convention on Biological Diversity and the associated Nagoya Protocol, which regulates the balanced and fair sharing of the benefits arising from the use of genetic resources. Segment-specific measures are applied to implement this.

Biodiversity in the segments

Crop Science commits itself through a directive to acquire and use genetic resources only in harmony with international and national legislation. At the same time, Crop Science is committed to the preservation and improvement of crop plants and to the equitable distribution of access to their utilization. We support sustainable agriculture that takes account of people's nutritional needs and safeguards farmers' livelihoods, while at the same time conserving a healthy environment. In this context, Crop Science promotes and supports ecological enhancement measures in agriculture and the recovery and protection of natural and semi-natural habitats. Together with farmers and scientific experts, we are working to find solutions to preserve biodiversity. At the Bayer ForwardFarms, we demonstrate how sustainable agriculture can be realized in practice.

www.forward
farming.com

Bayer is a member of the Association of Research-Based Pharmaceutical Companies and supports its position on the U.N. Convention on Biological Diversity. An internal position on plant-based medications documents how natural substances can be used with respect to compliance with the Convention on Biological Diversity.

www.vfa.de

When planning new production sites, Bayer takes into account that they must not be set up in areas that are statutorily protected with regard to their natural characteristics, biodiversity or other factors. Due to our portfolio changes in 2018, we will undertake an updated comparison of the geographical coordinates of our production sites against those of internationally recognized protected areas in 2019.

Commitment to animal welfare

Animal studies are legally required and essential from a scientific viewpoint for assessing the safety and efficacy of our products. We aim to minimize the use of study animals and to employ alternative methods whenever possible. Responsibility for animal welfare at Bayer including in the acquired agriculture business lies with the Bayer Global Animal Welfare Committee. The acquired agriculture business's own animal welfare principles and processes will remain valid until the newly acquired sites have been fully integrated into Bayer's existing animal study and animal welfare processes. Unless indicated otherwise, the information below therefore refers to Bayer excluding the acquired agriculture business.

Bayer participates in international validation programs to find replacement methods, such as a process to record the estrogenic effects of crop protection products that forgoes the use of rats. In early drug screening, furthermore, Bayer continuously establishes different computer-based and in-vitro processes that help to reduce the number of animal studies or the impact on animals in subsequent testing.

We respect all legal requirements pertaining to animal welfare, compliance with which is verified both by regulatory authorities and through internal audits. In addition, Bayer's principles on animal welfare and animal studies apply. Bayer's Global Animal Welfare Committee monitors compliance with these principles within the Bayer Group and in external studies. Our principles also apply to both the research institutes we commission and our suppliers, whose compliance with our animal welfare requirements we regularly monitor.

www.animalstudies.
bayer.com

3Rs principle: see Glossary

Commitment to reducing animal studies

Based on performance indicators, we each year analyze the development of animal numbers, the distribution according to species and the impact on our test animals, while evaluating studies and discussing possible steps in accordance with the 3Rs principle (replace, reduce, refine). The number of study animals used (including animals in Bayer studies performed by contract research organizations) was reduced in the last 10 years from 64 animals per €1 million of research and development spending in 2009 to 30 animals in 2018. These figures include the acquired agriculture business since closing. We participate in several internationally renowned consortia and projects that aim to reduce the number of animals used in studies and to improve the studies' validity.

www.bayer.com/en/beware-of-counterfeits.aspx

www.bayer.com/en/counterfeits-in-agriculture.aspx

Protection against product counterfeiting

Counterfeit products harbor substantial risks for patients and consumers. Through the Beware of Counterfeits campaign, Bayer is taking up the fight against counterfeit pharmaceuticals together with public authorities in Germany and abroad. The website of the same name contains information on the risks of counterfeit pharmaceuticals and offers patients tips on how to protect themselves. Crop Science has also implemented a global strategy to combat product piracy that is based on close cooperation with crop protection and law enforcement authorities. On the Counterfeits in Agriculture website, we provide information on how to identify counterfeit and illegal crop protection products or seeds and what risks they harbor, while giving farmers tips on how to protect themselves against counterfeiting.

Product counterfeiting can only be addressed internationally through a joint approach by industry, associations, governmental agencies and nongovernmental organizations. We advocate the resolute application and, where necessary, the strengthening and expansion of existing laws and provisions that serve to enable the identification and confiscation of illegal products. We support these efforts through extensive measures of our own in the areas of production and packaging that are designed to enable users and customers to distinguish original from counterfeit products.

Pharmaceuticals and Consumer Health

Benefit-risk management for pharmaceuticals and medicinal products

The most important regulatory authorities for Bayer are:
- the U.S. Food and Drug Administration (FDA)
- the European Medicines Agency (EMA)
- the Pharmaceuticals and Medical Devices Agency in Japan (PMDA)
- the China Food and Drug Administration (CFDA)

The Pharmaceuticals and Consumer Health segments continuously assess the medical benefit-risk profile of their pharmaceuticals, medicinal products, dietary supplements and cosmetics throughout their entire product life cycle. The efficacy, safety and tolerability of pharmaceuticals are investigated in preclinical and Phase I to III clinical development studies. The documentation submitted to the regulatory authorities contains the results of these studies and a comprehensive benefit-risk assessment of the pharmaceutical. It is essential for the market authorization of a new pharmaceutical that it comply with regulatory safety requirements. The same applies to medicinal products, dietary supplements and cosmetics.

Pharmacovigilance: see Glossary

According to these regulations, we continue to compile safety-relevant information in a dedicated database following market launch of the product. This information is continuously assessed and the benefit-risk profile of pharmaceuticals, medicinal products, dietary supplements and cosmetics regularly evaluated by medical experts of various disciplines in the global Pharmacovigilance Department. In this process, we work closely with the regulatory and supervisory authorities at the international and national levels. Further safety-relevant information is compiled using Post-Authorization Safety Studies (PASS) conducted after approval. The results are entered into the PASS registry in compliance with E.U. pharmacovigilance legislation.

Global pharmaceutical monitoring system

Pharmaceuticals and Consumer Health have a global pharmaceutical monitoring system in which experts from various disciplines work together in safety management teams (SMTs). These teams evaluate internal benefit and safety data, clinical trials, post-marketing studies, external databases and scientific publications to identify potential safety concerns at an early stage and detect possible changes in the benefit-risk profile. All data evaluated is entered in our pharmacovigilance database. In particular, the evaluation includes potential side-effects reported both to us as a producer and to the health authorities via various communication channels and stakeholders such as physicians, pharmacists and patients themselves. Producers evaluate the steps resulting from these reports in close cooperation with the relevant health authorities.

Should risks be identified, we immediately take steps to safeguard the health of patients and consumers in coordination with the authorities. These measures range from updating product information for patients, users, pharmacists and physicians through patient education brochures and further training measures for medical specialists to direct communication with medical experts (Direct Healthcare Professional Communication, DHPC) and even product withdrawals. All of these processes are documented, regularly updated and integrated into the quality management system.

Implementation of risk mitigation activities is coordinated by our local SMTs in the country organizations. The information on the side-effects of medicines that we compile is reported to the national health authorities in the relevant countries, where it is processed. As processes in the European Union are centralized, European marketing authorization holders such as Bayer are now required to enter all suspected cases of undesired side-effects directly in EudraVigilance, the European Medicines Agency's electronic information system.

Analysis of residues of pharmaceuticals in the environment

Active pharmaceutical ingredients can enter the environment through human or animal excreta, through improper disposal or during production. Surface waters are particularly relevant here. For their own active ingredients, Pharmaceuticals and Consumer Health carry out ecotoxicological investigations of pharmaceutical residues and degradation products to assess the potential environmental impact of these products. In connection with the approval process for human and veterinary pharmaceuticals in Europe and the United States, an environmental risk assessment takes place for all new active ingredients. Furthermore, to our knowledge, the existing concentrations of individual active pharmaceutical ingredients in drinking water do not have any relevant adverse effects on human health. According to its report on mixtures of active pharmaceutical ingredients in drinking water published in 2017, the WHO currently does not identify any immediate health risks and consequently sees no need to act in the short term. To further guarantee the safety of drinking water resources partly against the background of a potential increase in the use of pharmaceuticals, the WHO recommends that all aspects of this issue be observed over a longer period of time.

Compliance with the relevant wastewater thresholds at our production sites worldwide is reviewed by supervisory authorities and external assessors and also at regular intervals through on-site audits by internal experts. To reduce or exclude the release of active ingredients into the environment, we take further action in our production facilities. We are also participating actively in various research projects to develop further reduction measures such as by acting as a coordinator in the "Intelligence-led Assessment of Pharmaceuticals in the Environment" project in Europe, which seeks new ways to improve environmental risk assessment. Moreover, Bayer is involved in the stakeholder dialogue initiated by the German government with the goal of developing a strategy for dealing with trace substances in bodies of water.

www.i-pie.org
www.dialog-spurenstoffstrategie.de

Crop Science

Focusing on product safety

Product safety and environmental compatibility play a key role in the development of crop protection products and technologies to ensure that their use is safe for people, wildlife and the environment. They therefore require official approval, which is governed by numerous international and national laws and regulations. Crop Science satisfies all the regulatory requirements of the countries in which our products are sold.

The development and commercialization of genetically improved seed is also subject to stringent international and national laws and regulations. We have additionally established internal processes to ensure the responsible use of biotechnologically manufactured products throughout their life cycle. Furthermore, in 2018, Crop Science maintained its membership in the Excellence Through Stewardship (ETS) organization. Audits by ETS-certified auditors are required to maintain ETS membership. In 2018, facilities involved in plant biotechnology product development in the United States and Brazil were recertified by ETS-certified external auditors.

www.isaaa.org

Processes in plant biotechnology

According to information from the nonprofit organization ISAAA (International Service for the Acquisition of Agri-biotech Applications), genetically modified crops are grown on more than 190 million hectares in over 24 countries. GMOs are developed using transgenesis, whereby a copy of a gene of interest from a nonrelated organism is added to improve the plant. They have delivered strong agronomic, economic and environmental benefits since they were introduced to agriculture in the 1990s. GMOs can help farmers manage difficult growing conditions better and increase productivity by protecting harvests from pests and weeds while using fewer natural resources. They offer economic growth opportunities for farmers, especially for small-scale producers in less developed parts of the world. The safety of biotech crops has been confirmed by more than a thousand studies and third-party peer reviews overseen by regulators in 67 countries.

Gene editing is another modern approach largely based on improving plants' existing genetics, for example by switching off a negative effect or amplifying a plant's ability to thrive in drought or nutrient-poor conditions or to produce more nutrient-rich vitamins. Modern plant breeding methods including CRISPR can be used to more efficiently and more precisely develop the new crop varieties needed to sustainably secure a safe, affordable and healthy food supply.

We already examine our crop protection products during the early development phase, with regard to their mode of action, their (eco)toxicological properties and the extent of potential residues in plants and the environment, in tests required by law. Each new crop protection active ingredient undergoes a thorough safety assessment and suitable scientific studies and testing. Furthermore, Bayer has made a voluntary commitment to market only those crop protection products whose active ingredients are registered in at least one OECD country or, in the case of new active ingredients, for which an OECD data package has been compiled.

www.cropscience-transparency.bayer.com

Bayer aims to strengthen our customers' and stakeholders' confidence in our products through transparency and is therefore the first company in its industry to make safety-relevant data on crop protection products publicly available. More than 230 summaries of scientific studies submitted in connection with the registration procedures for our active ingredients in the European Union are already available on an online platform. These reports include information on toxicological and ecotoxicological studies and investigations into degradability.

In its sale and application of crop protection products and technologies, Crop Science observes the International Code of Conduct on Pesticide Management of the United Nations Food and Agriculture Organization (FAO). The principles of our responsible product handling are established in our Product Stewardship Policy and implemented in the Product Stewardship Program.

Users of our products can contact Crop Science through a range of communication channels should they have complaints or feedback or wish to report any incidents. These include direct contact with our sales staff; our standard hotlines, which are printed on all our product packaging; and, in Germany for example, the “Agrar Telefon” expert hotline.

The targeted use of crop protection products is crucial when it is a matter of minimizing discharge outside of the treated crops. To support the safe use of its products in agricultural practice, Crop Science is particularly committed to protecting users and the environment.

Training customers and partners

In dedicated training courses, we teach farmers, seed treatment professionals and dealers how to use our products effectively and safely and thus increase the yield and quality of their harvested goods. Our objective is to increase the outreach of our training activities worldwide.

Training farmers and Bayer employees

In 2018, Bayer trained more than one million farmers around the world in the safe handling of crop protection products. The majority of these training activities took place as part of customer events, as safety training is an integral part of our business activities. The data for 2018 does not yet include the acquired agriculture business. Additional training was conducted in cooperation with partners such as local, regional and international associations.

Bayer focuses on training activities in countries where there are no statutory requirements or certification for users regarding the safe handling of crop protection products. Bayer also organizes safety training for its own employees and contract workers from outside companies, in particular for sales force employees. We also train farmers in various technical areas such as resistance management and the correct use of products such as XtendiMax™ with VaporGrip™ technology and dicamba. More than 25,000 users in the United States completed certification mandated by the U.S. Environmental Protection Agency (EPA) in 2018.

Impact of crop protection products on the environment

Bayer Bee Care: strengthening bee health

Bees and other pollinators are important for sustainable food production. Promoting the health of pollinators and sustainable agriculture is therefore of tremendous importance for our business. Our Bee Care Program is a central industry platform to promote bee health. Through this, we want to create a balance between promoting the health, safety and biodiversity of pollinators and optimizing agricultural productivity. We contribute our experience in crop protection and animal health to numerous projects and partnerships with the goal of protecting and improving pollinator health. We operate a global Bee Care network and a Bee Care Center in Germany to promote dialogue on the topic of pollinator protection with all stakeholder groups.

www.beecare.bayer.com

Bee safety and crop protection products

To minimize risks posed to bees by our crop protection products, we perform extensive safety testing, risk assessments and product stewardship measures and develop bee-friendly crop protection products and processes. The first tests to measure bee toxicity are conducted already at the development stage.

We are also convinced that neonicotinoids are insecticides with a favorable environmental safety profile and are not dangerous to bee colonies when used according to label instructions.

Neonicotinoids: see Glossary

Glyphosate helps to control weeds and contributes to sustainable farming

Glyphosate is a nonselective herbicide that is frequently used in several markets globally for effective and at the same time simple and cost-effective weed control management. This active ingredient was first introduced in 1974 and has since been marketed under a number of different tradenames in hundreds of crop protection products around the world by several dozen different companies. In Europe, most glyphosate-based herbicides are used according to the label to control weeds in production fields of a wide range of crops. Some glyphosate-based products can be used according to the label to control weeds in gardens and noncultivated areas, such as industrial complexes and along railway tracks.

Glyphosate works in plants by specifically inhibiting an enzyme that is essential to plant growth. This enzyme is not found in cells of humans or animals. Glyphosate has a 40-year history of safe use when used according to label directions. This is confirmed by science-based evaluations conducted by regulatory bodies and other scientific institutions such as the U.S. Environmental Protection Authority (EPA) as well as the Canadian Department of Health, Health Canada, which in January 2019 confirmed that “[n]o pesticide regulatory authority in the world currently considers glyphosate to be a cancer risk to humans at the levels at which humans are currently exposed.”

www.here-are-the-facts.com

See also Note 29 to B Consolidated Financial Statements

We offer extensive information on the public debate surrounding the safety of glyphosate for users and the environment on our website. More information on the lawsuits against Bayer in the United States can be found in the notes to the consolidated financial statements.

Model projects for water protection in agriculture

www.bayer.com/water-protection

Crop Science develops strategies and solutions to support the agriculture industry in sustainable water pollution mitigation. We recommend that farmers use biological remediation systems, for example, such as Phytobac™. We are also developing a digital geoinformation system for agriculture with external partners to prevent discharges into water bodies of substances through erosion and runoff processes on agricultural land and a closed discharge system for liquid crop protection products.

Animal Health

Safety standards for animal health products

In line with statutory requirements, strict safety and quality standards also apply to animal health products and biocides. Within the scope of the approval/authorization procedures, Animal Health carries out detailed studies in order to ensure the safety of its products for the treated animals, people and the environment.

A particular focus lies on monitoring veterinary pharmaceutical safety and on activities aimed at responsible product usage. In line with our Prudent Use Policy, we support the responsible use of antibiotics and promote their proper usage, for example through strict guidelines. We also work on the development of alternative strategies to antimicrobial treatment. We market Zelnate™, a nonantibiotic immunostimulant. We continuously compile all safety-relevant information such as reports of suspected adverse effects of pharmaceuticals in our global safety database. This information is evaluated and reported to the responsible authorities in accordance with national regulations.

1.6.2 Occupational, Plant and Transportation Safety

Bayer puts safety first and preventing accidents and incidents is a top priority – in day-to-day work, in the operation of production facilities, and on work-related travel and transportation routes where people or the environment may suffer harm or damage.

Occupational health and safety

Safeguarding the occupational health and safety of our employees, and of the employees of contractors and suppliers on our company premises and under the supervision of Bayer, is one of our core tasks. This entails preventing work-related accidents and occupational illnesses, assessing potential hazards, ensuring comprehensive risk management and creating a healthy working environment.

The basis of our reporting on occupational injuries is the Recordable Incident Rate (RIR), which covers all injuries to employees leading to medical treatment that goes beyond simple first aid. This includes injuries and occupational illnesses both with and without lost workdays. In 2018, the RIR fell to 0.39 cases per 200,000 hours worked, corresponding to 518 occupational injuries worldwide. This means that, in statistical terms, one recordable incident occurred for more than every 500,000 hours worked. Recordable injuries with lost workdays constituted 306 of the total of 518 occupational injuries, meaning that the corresponding parameter, the Lost Time Recordable Incident Rate (LTRIR), dropped to 0.24 in 2018.

Regrettably, two people lost their lives in work-related accidents in 2018. These comprised one Bayer employee and one employee of a subcontractor.

A 1.6.2/1

Recordable Occupational Injuries[1]

	2017	2018
Rate of occupational injuries (RIR[2])	0.45	0.39
Rate of occupational injuries with lost workdays (LTRIR[3])	0.28	0.24
Fatal injuries [4]	0	2

[1] The figures include employees working for third parties whose accidents occurred on our company premises and under Bayer supervision.
[2] RIR = Recordable Incident Rate
[3] LTRIR = Lost Time Recordable Incident Rate
[4] One Bayer employee and one employee of a subcontractor

Bayer AG key data: see also A 1.7

Occupational illnesses

Occupational illnesses are included in the parameters RIR and LTRIR, regardless of whether or not they are listed in national registers of occupational diseases. As lists of occupational diseases are not globally standardized and in many countries do not exist at all, we document all occupational illnesses, provided they have been diagnosed and recognized by a physician. In 2018, 34 new cases of occupational illnesses were reported throughout the Bayer Group. These were related to the musculoskeletal system and heat-related illnesses resulting from work outdoors, among other issues.

A 1.6.2/2

Rate of Occupational Injuries (RIR) by Region[1]

	2017	2018
Europe/Middle East/Africa	0.54	0.45
North America	0.70	0.71
Asia/Pacific	0.17	0.15
Latin America	0.54	0.28
Total	**0.45**	**0.39**

[1] The figures include employees working for third parties whose accidents occurred on our company premises and under Bayer supervision.

Workplaces at Bayer are regularly subject to a health-related risk assessment and a hazard analysis on a comprehensive basis. These analyses are used to derive measures that, in conjunction with targeted studies, are designed to prevent occupational illnesses. Alongside the country-specific regulations on mandatory examinations, we offer our employees regular medical examinations – in some cases on a mandatory basis – in all countries in which this is legally permissible. The focus here is on the risks that exist at each workplace.

In 2018, as in previous years, we hardly recorded any accidents (less than 3.0%) involving contact with chemicals. A significant proportion of the accidents and injuries suffered by our employees have behavior-linked causes. Our Behavioral Safety Program is addressing this challenge with suitable training measures. More than 12,000 employees have been trained at 139 sites worldwide since 2015. Significant behavioral improvements were achieved in areas in which the program has already been implemented, and the Recordable Incident Rate is therefore expected to decline across the Bayer Group in the medium term. The initiative is to be extended to the sites of the acquired agriculture business from 2019.

Process and plant safety

We aim to design and operate our processes and production facilities in such a way that they do not pose any inappropriate risks to employees, the environment or neighboring communities. Therefore, we are continually working to further develop the safety culture, the expertise of employees and the globally applicable corporate policies on process and plant safety, which prescribe uniform processes and standards for identifying risks and establishing safety measures, thus ensuring a comparable safety level at all production sites. Compliance with internal and external safety regulations is verified in internal audits.

The statements on and indicators for process and plant safety in this Annual Report also apply to the acquired agriculture business. The detailed harmonization of the systems will be implemented in the years ahead.

Our experts systematically identify the process risks in the production facilities and develop robust protective concepts that consider health, safety and environmental aspects. We validate these safety concepts every five years to maintain the high safety level of our facilities. Technical modifications are subject to a stringent change management process. Furthermore, maintenance and inspection programs are established for the safety facilities to ensure the necessary availability and functionality in case of need. Before a new production facility is brought on stream, our safety experts verify all defined safety measures and confirm their proper implementation through plant and equipment inspections.

Bayer AG key data: see also A 1.7

A globally standardized key performance indicator (KPI) – Loss of Primary Containment (LoPC material release / leakages) – is used at Bayer as an early indicator for plant safety incidents and is integrated into Group-wide safety reporting. LoPC incidents refer to the leakage of chemical substances or energy in amounts above defined thresholds from their primary containment, such as pipelines, pumps, tanks or drums. The LoPC Incident Rate (LoPC-IR) indicates the number of LoPC incidents per 200,000 hours worked. In 2018, the LoPC-IR was 0.09 (2017: 0.13). Bayer's LoPC reporting is based on the requirements of the European Chemical Industry Council (CEFIC), which apply uniformly throughout Europe. Starting in 2019, we will apply the reporting criteria of the International Council of Chemical Associations (ICCA) and classify the release of chemical substances or energies as Process Safety Incidents (PSIs).

To prevent comparable substance and energy releases in the future, the causes of PSIs will be analyzed and relevant findings communicated appropriately throughout the Bayer Group. The reporting thresholds were intentionally set at such a low level that even material and energy leaks that have no impact on employees, neighbors or the environment are systematically recorded and reported. This preventive approach is applied so that weaknesses can be identified and corrected before a more serious incident can occur.

A 1.6.2/3

Rate of Plant Safety Incidents (LoPC-IR)

	2017	2018
Loss of Primary Containment Incident Rate (LoPC-IR)[1]	0.13	0.09

[1] Number of LoPC incidents per 200,000 hours worked

Transportation safety

Transportation and storage safety is a part of HSE management and is implemented by a network of experts and users with practical experience who cooperate across divisional and regional boundaries. Details are specified in the corporate policies "Transportation Safety" and "Health, Safety, Environment and Quality (HSEQ) Audits." Apart from internal Bayer specifications, the international regulations of the WHO and Crop Life International also apply as standards. The acquired agriculture business has its own regulations on and processes for transportation safety that are not comparable with Bayer's. These will still apply until Bayer's transport and storage safety requirements have been introduced in the acquired business, starting in 2019. The qualitative information below does not yet include the acquired business. The number of transport incidents pertains to both Bayer and the acquired business.

Transportation safety plays a key role both in the transportation of our products on public routes and in loading, unloading, classification, labeling and packaging, particularly of hazardous goods. Our Procurement unit (excluding the acquired agriculture business) selects logistics partners according to strict safety, environmental and quality criteria. The implementation of our requirements ensures that the materials are handled and transported in line with applicable regulations and the potential hazard they pose. In addition to the legally required training courses for our employees, we offer special electronic training programs to convey specialist knowledge that are also accessible to our service providers.

On account of our extensive safety precautions and training activities, transport incidents are rare. These include accidents that cause personal injury or significant damage to property, environmental impact resulting from the release of substances, or leakage of hazardous goods. Such accidents are recorded in detail and assessed on the basis of defined criteria. All 10 transport incidents (including those of the acquired agriculture business) in 2018 (2017: 9) involved road transport accidents. Two of the transport incidents were also classed as environmental incidents.

www.bayer.com/en/safety.aspx

1.6.3 Environmental Protection

We meet our responsibility to protect the environment in many different ways. We continuously work to reduce the environmental impact of our business activities and develop product solutions that benefit the environment. For us, a resource-friendly and low-emissions approach to raw materials and energy is ecologically and economically expedient and efficient. These measures are designed to reduce environmental impact and, at the same time, cut the costs associated with materials, energy, emissions and disposal. As a pure life science company too, we remain committed to climate protection.

Responsibilities and framework conditions are stipulated at Group level, such as through corporate policies, targets and key performance indicators (KPIs). We use certified HSEQ management systems to control operational implementation. Our environmental standards apply worldwide.

Our commitment extends beyond the scope of legal requirements. We perform a voluntary ecological assessment for capital expenditure projects exceeding €10 million. As part of the integration process, the corresponding corporate policy will also be extended to the acquired agriculture business. In the case of acquisitions, we examine compliance with the applicable environmental and occupational safety regulations as well as fundamental employee rights at the production sites in question.

In connection with the acquired agriculture business, Bayer took over another 162 environmentally relevant sites. These are included in our environmental performance indicators as of the closing date of June 7, 2018. As a result, nearly all our environmental performance indicators are considerably higher year on year.

Environmentally relevant sites: see Glossary

Bayer AG key data: see also A 1.7

Energy consumption

Higher total energy consumption through inclusion of the acquired agriculture business

Compared with 2017, Bayer's total energy consumption rose by 53.4% to 39.6 petajoules in 2018. In connection with the acquisition of Monsanto, Bayer has taken over sites for seed production and for the extraction of raw materials for the manufacture of intermediates for crop protection products, which involves energy-intensive treatment and downstream processing. The integration of these process steps into the value chain substantially increases all performance indicators for energy consumption.

www.bayer.com/CDP-Climate

When calculating total energy consumption, we differentiate between primary and secondary energy consumption. Primary energy consumption mainly comprises fossil fuels for our own generation of electricity and steam for our own use and for sale to other companies. Secondary energy consumption reflects on the one hand the purchase of electricity, steam and cooling energy at our sites worldwide and, on the other, the proportion that is made available by our service provider Currenta at the Chempark sites in Germany to other companies. The proportion of renewable energies is determined by the energy mix of our energy suppliers. In our latest report to CDP (formerly the Carbon Disclosure Project), we address these topics in detail. (This report does not yet include the acquired agriculture business.)

A 1.6.3/1

Energy Consumption

TJ	2017	2018
Primary energy consumption	35,457	43,928
Natural gas	22,332	26,187
Coal	10,618	10,606
Liquid fuels [1]	230	3,491
Waste	539	985
Other [2]	1,738	2,660
Secondary energy consumption [3]	(9,625)	(4,300)
Electricity [3,4]	4,281	9,540
Steam [3]	(19,271)	(19,249)
Steam from waste heat (process heat)	6,274	6,711
Cooling energy [3]	(909)	(1,302)
Total energy consumption	**25,832**	**39,628**

2017 figures restated

[1] Liquid fuels include heating oil and fuels used in the Bayer Group vehicle fleet. The method for calculating the fuel consumption of the acquired agriculture business's vehicle fleet differs from that used for the remaining Bayer Group fleet. The calculation methods are to be harmonized in 2019.

[2] For example hydrogen

[3] Our service company Currenta operates its own highly energy-efficient combined heat and power plants at the Chempark sites in Germany and sells the electricity and steam generated there along with cooling energy additionally generated primarily to other companies with energy-intensive production processes. Offsetting this against the volumes we purchase can lead to negative totals.

[4] The proportion of primary energy sources used in generating the electricity consumed depends on the respective national electricity mix.

Energy efficiency

Bayer reports energy efficiency as the ratio of energy used to external sales. For 2018, we are including the acquired agriculture business in our reporting of energy efficiency for the first time. As a result, the value for this performance indicator is now much higher.

A 1.6.3/2

Energy Efficiency

kWh/€1,000 external sales	2017	2018
Energy efficiency	205	278

2017 figure restated

Air emissions

Climate protection

At Bayer, air emissions are caused mainly by the generation and consumption of electricity, steam and auxiliary energy for the production of our products and by our vehicle fleet.

Climate protection has been a priority at Bayer for decades. As reported in previous years, we were able to reduce our absolute greenhouse gas emissions between 1990 and 2015 through production and process innovations. This was possible in spite of production increases, particularly in the energy-intensive plastics businesses. Following the strategic realignment, we reduced our absolute greenhouse gas emissions as a pure life science company by a further 26.8% between 2015 and 2018 (excluding Currenta and the acquired agriculture business).

In integrating the acquired agriculture business, we are currently reviewing our climate program and, in the future, want to make positive contributions to protecting the climate and managing the effects of climate change on several levels. Our comprehensive approach also includes initiatives that seek to reduce the emissions of nonproduction operations. For example, we are looking at our vehicle fleet, the optimization of logistics, and the further development of our information and communications technologies in terms of environmental aspects (Green IT).

www.bayer.com/en/environmental-protection.aspx

Transparency on greenhouse gas emissions

In selecting and measuring greenhouse gas emissions, we consider recommendations of the Greenhouse Gas (GHG) Protocol. Direct emissions from our own power plants, vehicles, waste incineration plants and production facilities (Scope 1) and indirect emissions from the procurement of electricity, steam and cooling energy (Scope 2) are determined at all environmentally relevant sites.

GHG Protocol: see Glossary

In line with the GHG Protocol, indirect emissions (Scope 2) are reported according to both the location-based and the market-based methods.

Because we are reporting emission data for the acquired agriculture business for the first time, all Bayer Group emissions are considerably higher year on year.

A 1.6.3/3

Greenhouse Gas Emissions

Million metric tons of CO_2 equivalents	2017	2018
Direct emissions [1,2,3]	2.50	3.90
Indirect emissions [4] according to the location-based method	1.28	1.64
Indirect emissions [4] according to the market-based method [5]	1.13	1.55
Total greenhouse gas emissions according to the market-based method [5]	**3.63**	**5.45**
Specific greenhouse gas emissions (kg CO_2e/€1,000 external sales) according to the market-based method [5,6]	104	138

Bayer AG key data: see also A 1.7

2017 figures restated

[1] In 2018, 94.9% of direct greenhouse gas emissions were CO_2 emissions. Other greenhouse gases such as nitrous oxide, partially fluorinated hydrocarbons and methane made a negligible contribution to direct greenhouse gas emissions.

[2] In line with the GHG Protocol, we also report the direct emissions of our service company Currenta, which also generates electricity for other companies at the German Chempark sites in Leverkusen, Krefeld-Uerdingen and Dormagen. Consequently, the figures for the direct emissions of the Bayer Group are higher than the actual emissions resulting from the business activities of Bayer excluding Currenta alone.

[3] The calculation of direct CO_2 emissions from the acquired agriculture business's vehicle fleet differs in 2018 from that used for the remaining Bayer Group fleet. The calculation methods are to be harmonized in 2019.

[4] Typically, CO_2 accounts for 98% of all energy-related greenhouse gas emissions. The remainder comprises methane and nitrous oxide. When determining indirect emissions, our calculations are therefore limited to these greenhouse gases and indicate all emissions in CO_2 equivalents.

[5] For Bayer, the market-based method of the GHG Protocol most reliably reflects the values for Scope 2 emissions and the success of emissions reduction measures, so we apply emissions volumes calculated using this method when calculating the total and specific greenhouse gas emissions.

[6] Specific Bayer Group emissions are calculated from the total volume of direct emissions and indirect emissions calculated using the market-based method of the GHG Protocol (Scope 2), divided by the external sales volume. Quantities attributable to the supply of energy to external companies are deducted from the direct and indirect emissions.

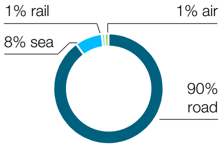
In 2018, the Bayer Group was involved in European emissions trading with 13 plants in total. The CO_2 emissions of these plants amounted to approximately 2.27 million metric tons.

www.bayer.com/
CDP-Climate

The reporting of all relevant indirect emissions from the value chain is bindingly regulated by the GHG Protocol Corporate Value Chain (Scope 3) Accounting & Reporting Standard. Bayer has identified eight key Scope 3 categories that we describe in detail in the current CDP report (excluding the acquired agriculture business and Currenta).

A 1.6.3/4

Means of Transport



Excluding the acquired agriculture business

Efficient logistics strategies

Logistics at Bayer comprises not just the transport and warehousing of goods, but also the steering and monitoring of flows of goods and logistics data for the Bayer Group. The acquired agriculture business will use its own legacy systems and processes until integration is completed. For this reason, the following information and data on means of transport apply only to Bayer excluding the acquired agriculture business.

Utilizing digital technologies, we work continually to develop logistics strategies that take account of safety, environmental and cost aspects. Areas of environmental focus include the reduction of CO_2 emissions, for example by minimizing air transport or using logistics strategies that include railways and waterways.

Increase in other direct air emissions

Particulate emissions rose considerably in 2018, from 60 to 2,370 metric tons, on account of the first-time inclusion of the sites of the acquired agriculture business in reporting. This is due in part to the mining and processing of raw materials for the manufacture of intermediates for crop protection products. In addition, seed production (corn and soybeans) results in relatively large quantities of particulates.

The increase in CO emissions and in volatile organic compounds (VOC) excluding methane is largely attributable to the inclusion of the vehicle fleet of the acquired agriculture business.

A 1.6.3/5

Other Direct Air Emissions

1,000 metric tons	2017	2018
ODS[1]	0.0085	0.0093
VOC[2]	0.87	1.41
CO	0.61	4.42
NO_x	1.52	4.36
SO_x	0.92	1.36
Particulates	0.06	2.37

2017 figures restated
[1] Ozone-depleting substances (ODS) in CFC-11 equivalents
[2] Volatile organic compounds (VOC) excluding methane

Environmental incidents

There were two environmental incidents – i.e. incidents that resulted in the release of substances into the environment – in 2018 (2017: two). Factors that determine whether there is a reporting obligation include, in particular, the nature and quantity of the substance, the amount of damage caused and any consequences for nearby residents. In accordance with our internal voluntary commitment, we report any leakage of substances with a high hazard potential from a quantity of 100 kilograms upward. Both environmental incidents were also transport incidents. Regrettably, one person lost their life in one of these incidents. You will find details of the environmental and transport incidents in 2018 on our sustainability website.

www.bayer.com/en/
safety.aspx

Water

Responsible water usage is a cornerstone of our commitment to sustainable development. Clean water in sufficient quantities is essential for the health of people, animals and plants. That is why it is crucial that, in the future too, industrial water usage will not lead to local problems such as a shortage of water for the people living in the catchment areas of our production sites. We therefore commit in our Water Position to comply with international, national and local legislation to protect water resources, use them as sparingly as possible and further reduce emissions into water. We have introduced a water management system at our sites in water-scarce areas or areas identified as being threatened by water scarcity. For 2019, we plan to examine the production sites of our acquired agriculture business in this regard.

In our water stewardship strategy we address a variety of factors connected with water, from operational water use and innovative products such as seeds that do not need as much water to our commitment in the value chain and cooperation with partners. We support the CEO Water Mandate of the U.N. Global Compact with the goal of working with key stakeholders to develop sustainable strategies for water usage. In our annual response to the CDP Water Disclosure, we report in detail and transparently on our water management approach. In recent years, we have repeatedly been included in the CDP Water A List (leadership status).

www.bayer.com/CDP-Water

Water use

In 2018, total water use in the Bayer Group was 124 million cubic meters (2017: 98 million cubic meters). This year-on-year increase in use is due to the first-time inclusion of the sites of the acquired agriculture business.

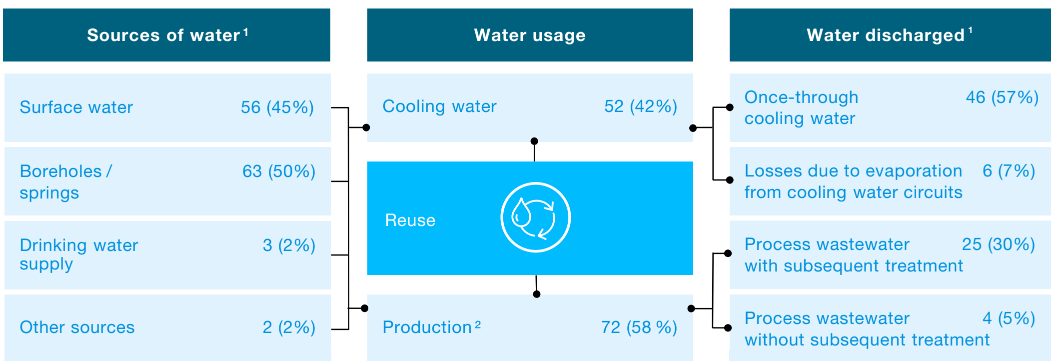
Bayer AG key data: see also A 1.7

Some 42% of all water used by Bayer is cooling water that is only heated in this process and does not come into contact with products. It can be returned to the water cycle without further treatment in line with the relevant official permits.

At our production facilities, we endeavor to use water several times and to recycle it. Water is currently recycled at 51 sites, accounting for 52.4% of the total water used. The various forms of recycling include closed cooling cycles, reuse of treated wastewater and recirculation of steam condensates as process water. We use water several times, in particular at our recently acquired production sites at locations such as Antwerp in Belgium and Muscatine, Iowa; St. Louis, Missouri; and especially Luling, Louisiana, in the United States. The total volume of 124 million cubic meters of water originally deployed is used approximately 1.8 times on average.

A 1.6.3/6

Water Use in the Bayer Group 2018 (million m³)



[1] The differences between volumes of water consumed and water discharged can be explained, for example, by quantities of water used as raw materials in products, unquantified losses due to evaporation, leaks and volumes of condensate generated through the use of steam as a source of energy.
[2] Sum from production processes, sanitary wastewater and cleaning processes in production

Wastewater

The total quantity of wastewater, including process and sanitary wastewater, was 29 million cubic meters in 2018, which is 25.2% more than in 2017. This increase in use is due especially to the first-time inclusion of the sites of the acquired agriculture business.

All wastewater is subject to strict controls before it is discharged into the various disposal channels. In 2018, 85.1% of Bayer's wastewater worldwide was purified in wastewater treatment plants (Bayer or third-party facilities). Following careful analysis, the remaining volume was categorized as environmentally safe according to official provisions and returned to the natural water cycle.

We aim to minimize our emissions into water. In 2018, we therefore also applied alternative means of disposing of product-containing wastewater such as incineration, distillation and chemical treatment.

In 2018, most of the higher emissions into water were attributable to the first-time inclusion of the sites of the acquired agriculture business. Additional factors were more precise methods of data acquisition at the site in Kansas City, Missouri, United States, and production adjustments at the site in Dormagen, Germany.

A 1.6.3/7

Emissions into Water

1,000 metric tons	2017	2018
Phosphorus	0.04	0.18
Nitrogen	0.40	0.45
TOC [1]	0.39	0.62
Heavy metals	0.0019	0.0034
Inorganic salts	188	169
COD [2]	1.17	1.86

[1] Total organic carbon
[2] Chemical oxygen demand; calculated value based on TOC figures (TOC x 3 = COD)

Waste and recycling

We want to minimize material consumption and disposal volumes through systematic waste management. Safe disposal channels with separation according to the type of waste and economically expedient recycling processes serve this purpose. Production fluctuations, building refurbishment and land remediation work also influence waste volumes and recycling paths. In accordance with Bayer's corporate policies, all production sites are obliged to prevent, recycle and reduce waste and to dispose of it safely and in line with good environmental practices.

Waste volumes decline slightly

The total quantity of waste generated declined slightly by 3.3% in 2018.

The volume of hazardous waste decreased by 13.3%, primarily on account of the conclusion of demolition work at the site in Belford Roxo, Brazil. The volume of hazardous waste from production fell by around 6.9%, mainly due to changes in the production portfolio at the Dormagen site in Germany.

The volume of nonhazardous waste, on the other hand, rose by 10.3% compared with the previous year, due primarily to the first-time inclusion of the sites of the newly acquired agriculture business.

A 1.6.3/8

Waste Generated

1,000 metric tons	2017	2018
Total waste generated	846	818
Nonhazardous waste	361	398
Hazardous waste [1]	485	421
Hazardous waste from production	417	388

2017 figures restated
[1] Definition of hazardous waste in accordance with the local laws in each instance

Bayer AG key data: see also A 1.7

Reflecting the reduction in the volume of waste generated, the amount of waste disposed of decreased by 2.6%. In turn, this made it possible to reduce by 33.1% the volume of hazardous waste disposed of in landfills. Of the waste disposed of, 35.9% was successfully recycled.

A 1.6.3/9

Waste by Means of Disposal

1,000 metric tons	2017	2018
Total volume of waste disposed of [1]	**840**	**818**
Volume removed to landfill	314	212
Volume incinerated	211	227
Volume recycled [2]	214	293
Others [3]	102	86
Hazardous waste disposed of [4]	**485**	**421**
Volume removed to landfill	99	66
Volume incinerated/recycled	386	354

2017 figures restated
[1] Waste can also be stored at sites as an intermediate step. For this reason, the volume of waste disposed of can differ slightly from the volume of waste generated by Bayer.
[2] Recycling refers to processes through which waste is reused or treated for reutilization.
[3] For example passed on to third parties (e.g. providers/waste disposal companies)
[4] Waste generated by Bayer only; definition of hazardous waste in accordance with the local laws in each instance

Recycling

Legislation prohibits the recycling and processing/treatment of a large proportion of our materials, especially pharmaceuticals and crop protection products. In our segments, we make use of opportunities for recycling within the framework of legal regulations. Production-specific and substance-specific recycling is carried out in compliance with the individual requirements of a given production site. Packaging materials are recycled in line with national regulations as part of the country-specific infrastructure for waste disposal.

www.bayer.com/en/environmental-protection.aspx

1.7 Nonfinancial and Other Disclosures by Bayer AG

Due to the importance of Bayer AG within the Bayer Group, further disclosures are required. This pertains especially to reporting on significant nonfinancial information, which also became mandatory for the parent company Bayer AG as a result of the CSR Directive Implementation Act that came into effect in 2017.

The integrated presentation was selected in the management report for the nonfinancial statement to be issued in 2018 pursuant to Section 289b through e of the German Commercial Code (HGB). All disclosures, provisions, described processes and key data contained in the preceding statements in the management report apply to the Bayer Group including Bayer AG. No additional aspects were identified pursuant to the CSR Directive Implementation Act that apply exclusively to Bayer AG.

The following table contains significant nonfinancial and other key data of Bayer AG. Further information on the business performance and the situation of the company is found in A 2.3 "Earnings; Asset and Financial Position of Bayer AG."

A 1.7/1

Significant Nonfinancial and Other Key Data of Bayer AG

	2017	2018
R&D expenses (€ million)	2,186	2,331
Employees[1]	17,072	17,276
Employees by function[1]		
Production	8,858	9,188
Marketing and distribution	936	887
R&D	5,468	5,368
Administration	1,810	1,833
Employees by gender[1]		
Women	6,104	6,248
Men	10,968	11,028
Personnel expenses (€ million)	2,045	2,571
Pension obligations (€ million)	4,251	4,514
Short-term incentive program (€ million)	194	277
Procurement spend (€ million)	3.9	4.2
Safety		
Recordable Incident Rate (RIR)	0.53	0.50
Lost Time Recordable Incident Rate (LTRIR)	0.35	0.37
Loss of Primary Containment Incident Rate (LoPC-IR)	0.21	0.25
Environmental protection		
Total energy consumption (terajoules)	7,878	7,239
Total greenhouse gas emissions (million metric tons of CO_2 equivalents)	0.69	0.55
Water use (million cubic meters)	4.74	4.92
Total waste generated (1,000 metric tons)	302	268

2017 figures restated
[1] Full-time equivalents (FTEs)

2. Report on Economic Position

2.1 Overview of Business Performance

2.1.1 Target Attainment 2018

A 2.1.1/1

Target Attainment 2018

	Forecast 2018[1]		Revised forecast 2018[2]		Target attainment	
	Closing rates on Dec. 31, 2017	Currency-adjusted	Closing rates on June 30, 2018	Currency-adjusted	nominal	Currency-adjusted
Group Sales	Level with previous year	Low- to mid-single-digit percentage increase[3]	More than €39 billion	Mid-single-digit percentage increase[3]	13.1% increase	4.5%[3] increase
	€35 billion		More than €39 billion		€39.6 billion	
EBITDA before special items	Level with previous year	Mid-single-digit percentage increase	Low- to mid-single-digit percentage increase	High-single-digit percentage increase	2.8% increase	7.7% increase
Core earnings per share	Level with previous year	Mid-single-digit percentage increase	€5.70 – €5.90	High-single-digit percentage decrease	€5.94	

[1] Issued in February 2018; excluding Monsanto
[2] Issued in September 2018; including Monsanto from June 7, 2018 (closing date of the acquisition)
[3] Currency- and portfolio-adjusted

2.1.2 Economic Position of the Bayer Group

We registered growth in our operational business in 2018. Sales increased by 4.5% on a currency- and portfolio-adjusted basis (Fx & portfolio adj.). EBITDA before special items rose by 2.8%, despite negative currency effects. Pharmaceuticals once again posted sales gains (Fx & portfolio adj.), thanks mainly to the strong overall development of our key growth products Xarelto™, Eylea™, Xofigo™, Stivarga™ and Adempas™, while reported earnings were down. In a challenging business year, sales of Consumer Health were level with the prior year (Fx & portfolio adj.), while earnings declined. Crop Science posted an increase in sales (Fx & portfolio adj.), while earnings rose significantly, mainly due to the contribution from the newly acquired business. At Animal Health, the operational business was level with the prior year. Earnings per share of the Bayer Group reflected a one-time gain of €4.1 billion (before taxes) from divestments, along with impairment losses of €2.8 billion, acquisition costs of €1.9 billion, and restructuring costs in the amount of €1.3 billion. Core earnings per share of the Bayer Group amounted to €5.94 (–10.5%). We met our full-year outlook for Group sales and EBITDA before special items, as adjusted in September 2018. Core earnings per share came in slightly above our expectations.

2.1.3 Key Events

We made significant progress in implementing our strategic objectives in 2018 with the closing of the Monsanto acquisition. The portfolio, efficiency and structural measures announced in connection with the Bayer 2022 program will further strengthen our core life science businesses.

On June 7, 2018, Bayer acquired 100% of the outstanding shares of Monsanto Company, St. Louis, Missouri, United States (Monsanto), thus completing the biggest acquisition in its history.

In connection with the conditional approval granted by the European Commission in March 2018, Bayer concluded an agreement with BASF SE on April 26, 2018, concerning the sale of Bayer's global vegetable seed business, certain seed treatments and its digital farming activities for approximately €1.7 billion. This agreement expanded on the agreement already concluded between Bayer and BASF in October 2017, which included the sale of the global glufosinate ammonium business and the related LibertyLink™ technology for herbicide tolerance, as well as a substantial part of the field crop seed business, for a base purchase price of €5.9 billion. The divestments to BASF were completed on August 1, 2018, for all businesses earmarked for divestment excluding the vegetable seed business, which was divested as of August 16, 2018. The closing of these transactions led to the previously imposed hold separate order being lifted. The final purchase price provisionally amounted to approximately €7.4 billion. The transactions resulted in divestment proceeds of approximately €4.1 billion before taxes.

Upon closing of the transaction on June 7, 2018, an amount of US$128 per share was paid out to the Monsanto stockholders, and trading of Monsanto shares on the New York Stock Exchange ceased. The purchase price of US$63 billion included Monsanto's net debt of approximately US$6 billion. In September 2016, Bayer secured bridge financing from a consortium of 26 banks for the remaining amount of US$57 billion. The required bridge financing, which was drawn on June 7, 2018, was reduced in 2018 through a range of measures that included the following:

- In January, Bayer sold 10.4% of Covestro shares at a price of €86.25 per share, resulting in total proceeds of €1.8 billion. In May, a further 14.2% of Covestro shares were sold at a price of €75.50 per share. The volume of this transaction amounted to €2.2 billion. Bayer AG now holds just 7.5% of Covestro shares to repay the exchangeable bond that matures in 2020. Bayer AG acquired these shares, which are recognized at fair value through profit or loss as a financial asset, from Bayer Pension Trust, which no longer holds any Covestro shares.
- In April, the Republic of Singapore subscribed to 31 million new Bayer shares through a subsidiary. This corresponded to around 3.6% of the increased capital stock and generated total gross proceeds of €3 billion.
- In June, we raised around €6.0 billion in net proceeds from a capital increase against cash contributions with subscription rights for existing Bayer stockholders. For this purpose, approximately 74.6 million new registered (no-par value) shares with entitlement to dividends from January 1, 2018, were issued.
- In June 2018, Bayer issued bonds of US$15 billion via its subsidiary Bayer U.S. Finance II LLC, Pittsburgh, United States, and bonds of €5 billion via its subsidiary Bayer Capital Corporation B.V., Mijdrecht, Netherlands. All the bonds are guaranteed by Bayer AG.

In addition, Bayer used the operating cash flow and income from the aforementioned divestments to BASF to reduce the bridge financing from an initial US$43 billion on June 7, 2018, to €4.9 billion as of the closing date.

On July 27, 2018, Bayer signed an agreement to divest the prescription dermatology business of Consumer Health. The transfer of the business to LEO Pharma A/S, Ballerup, Denmark, is taking place in two stages. After the closing conditions were satisfied, the U.S. business was transferred on September 4, 2018, while the remaining global prescription dermatology business is expected to be transferred to the acquirer LEO Pharma A/S during the second half of 2019. The portfolio being divested comprises prescription brands including Advantan™, Skinoren™ and Travocort™. The purchase price amounted to €58 million for the U.S. business and €555 million for the rest of the global business, and is subject to customary purchase price adjustments.

In August 2018, a state court jury in San Francisco, United States, awarded approximately US$39 million in compensatory damages and US$250 million in punitive damages to a plaintiff who claimed that a Monsanto product caused his non-Hodgkin lymphoma (NHL). Although the court later reduced the punitive damages to approximately US$39 million, we continue to consider this decision to be incorrect and have filed an appeal with the responsible court. Based on the body of scientific evidence available and the assessments of regulatory authorities worldwide, we continue to believe that we have meritorious defenses and intend to defend ourselves vigorously in this and other product liability lawsuits relating to products containing glyphosate. The next two trials are currently scheduled for February and March 2019 before a federal court jury in San Francisco and a state court jury in California, respectively. A further five proceedings are currently scheduled in California and Missouri for 2019. However, trial dates in all venues remain subject to change depending on court schedules and rulings.

See Note 32 to B Consolidated Financial Statements for further details of this set of transactions

On November 29, 2018, Bayer announced a series of portfolio, efficiency and structural measures in connection with the Bayer 2022 program to further strengthen the core life science businesses. Portfolio measures earmarked for implementation in the coming years pertain not only to the Animal Health business and the sale of our interest in German site services provider Currenta, but also to certain product categories of the Consumer Health segment, including in particular our sun care and foot care product lines. In addition, Bayer intends to significantly improve cost structures through the planned efficiency and structural measures.

See also A 1.2

2.1.4 Economic Environment

Global economic growth matches prior-year level

The pace of global economic growth in 2018 matched the level of the previous year. In the United States, tax cuts in particular helped the economy perform considerably better than in 2017. In Europe, however, economic growth slowed, hampered in part by the uncertainty surrounding the form of the United Kingdom's exit from the European Union. In Germany, economic growth declined significantly, primarily due to weaker exports. The Chinese economy continued to grow rapidly, though at a reduced pace compared with the previous year. By contrast, the overall growth of the Emerging Markets was level with the prior year.

See also A 2.2.2

A 2.1.4/1

Economic Environment

	Growth[1] 2017	Growth[1] 2018
World	+ 3.3%	+ 3.2%
European Union	+ 2.6%	+ 2.0%
of which Germany	+ 2.5%	+ 1.5%
United States	+ 2.2%	+ 2.9%
Emerging Markets[2]	+ 4.9%	+ 4.8%

2017 figures restated
[1] Real GDP growth, source: IHS Markit
[2] Including about 50 countries defined by Global Insight as Emerging Markets in line with the World Bank
As of January 2019

Currency development

Negative currency effects diminished sales of the Bayer Group by €1,464 million (– 4.1%) and EBITDA before special items by €457 million in 2018. These currency effects do not include those relating to the acquired business. The effects pertained to the currencies shown in the following table.

A 2.1.4/2

Currency Development Bayer Group

€ million	2017	2018	Delta Fx effect on sales	Delta Fx effect on clean EBITDA	Of which delta Fx effect from hedging
ARS	18.53	30.95	(135)	31	0
BRL	3.59	4.29	(115)	11	(20)
CAD	1.46	1.53	(95)	(38)	26
CNY	7.61	7.80	(76)	(49)	(10)
JPY	126.39	130.38	(68)	(46)	(14)
MXN	21.28	22.69	(44)	(24)	2
RUB	65.71	73.87	(100)	(21)	45
TRY	4.10	5.56	(123)	(69)	0
USD	1.13	1.18	(401)	(116)	(40)
Other currencies			(307)	(136)	8
All currencies			**(1,464)**	**(457)**	**(3)**

Source: Bloomberg, annual average closing rates

2.2 Earnings; Asset and Financial Position of the Bayer Group

2.2.1 Earnings Performance of the Bayer Group

A 2.2.1/1

Bayer Group Key Data

€ million	Q4 2017	Q4 2018	Change %[1] Reported	Change %[1] Fx & p adj.	2017	2018	Change %[1] Reported	Change %[1] Fx & p adj.
Sales	**8,596**	**11,062**	**+ 28.7**	**+ 5.8**	**35,015**	**39,586**	**+ 13.1**	**+ 4.5**
Change in sales[1]								
Volume	+ 5.1%	+ 5.5%			+ 2.3%	+ 5.3%		
Price	– 2.4%	+ 0.3%			– 0.8%	– 0.8%		
Currency	– 5.3%	– 0.2%			– 1.4%	– 4.1%		
Portfolio	0.0%	+ 23.1%			+ 0.1%	+ 12.7%		
Sales by region								
Europe/Middle East/Africa	3,115	3,288	+ 5.6	+ 2.4	13,388	14,143	+ 5.6	+ 3.9
North America	2,219	3,394	+ 53.0	+ 4.3	10,143	11,569	+ 14.1	+ 0.8
Asia/Pacific	1,774	2,084	+ 17.5	+ 12.6	7,637	8,115	+ 6.3	+ 7.3
Latin America	1,488	2,296	+ 54.3	+ 7.0	3,847	5,759	+ 49.7	+ 11.0
EBITDA[1]	**1,460**	**46**	**– 96.8**		**8,563**	**10,266**	**+ 19.9**	
Special items[1]	(323)	(2,019)			(725)	719		
EBITDA before special items[1]	**1,783**	**2,065**	**+ 15.8**		**9,288**	**9,547**	**+ 2.8**	
EBITDA margin before special items[1]	20.7%	18.7%			26.5%	24.1%		
EBIT[1]	**625**	**(4,142)**	**.**		**5,903**	**3,914**	**– 33.7**	
Special items[1]	(632)	(5,251)			(1,227)	(2,566)		
EBIT before special items[1]	**1,257**	**1,109**	**– 11.8**		**7,130**	**6,480**	**– 9.1**	
Earnings per share (total) (€)	**0.17**	(4.00)	**.**		**8.29**	1.80	**–78.3**	
Core earnings per share[1] (€)	**1.39**	**1.10**	**– 20.9**		**6.64**	**5.94**	**–10.5**	

2017 figures restated
Fx & p adj. = currency- and portfolio-adjusted
[1] For definition see A 2.4 "Alternative Performance Measures Used by the Bayer Group."

Group sales increased by 4.5% (Fx & portfolio adj.)

Sales of the Bayer Group rose by 4.5% (Fx & portfolio adj.) to €39,586 million (reported: + 13.1%) in 2018, including €3,819 million in Germany.

Sales of Pharmaceuticals advanced by 3.4% (Fx & portfolio adj.) to €16,746 million, with our key growth products once again delivering strong performance overall. At Consumer Health, sales were level with the prior year, at €5,450 million (Fx & portfolio adj. – 0.7%). Sales of Crop Science increased by 6.1% (Fx & portfolio adj.) to €14,266 million, mainly due to the normalization of inventories in the Brazilian crop protection market and the service agreements with BASF – especially product supply and distribution agreements – in connection with the divested businesses. On a reported basis, sales climbed by 49.0%, mainly as a result of portfolio effects of 47.2% (€4,521 million). Sales of Animal Health were level with the previous year, at €1,501 million (Fx & portfolio adj. + 0.5%). In the Reconciliation, we increased sales by 40.4% to €1,623 million, primarily through our business with Covestro, which in the prior year was only included here from the third quarter of 2017, the date the company was deconsolidated.

Earnings

+2.8%
increase in EBITDA before special items

See also A 2.4

EBITDA before special items of the Bayer Group advanced by 2.8% to €9,547 million (2017: €9,288 million). Negative currency effects diminished earnings by €457 million (excluding the acquired business). EBITDA before special items of Pharmaceuticals rose by 2.5% (Fx adj.) to €5,598 million (2017: €5,711 million; reported – 2.0%), primarily due to substantially higher volumes and income of approximately €190 million from a development collaboration with Janssen Research & Development, LLC, a subsidiary of Johnson & Johnson. EBITDA before special items of Consumer Health declined by 5.5% (Fx adj.) to €1,096 million (2017: €1,231 million; reported: – 11.0%), mainly as a result of lower volumes and a decrease in one-time gains from the divestment of noncore brands. At Crop Science, EBITDA before special items advanced by 29.8% on a reported basis, to €2,651 million (2017: €2,043 million). This increase is primarily attributable to the earnings contribution from the newly acquired business (€705 million) and the recognition in the prior year of significantly higher provisions for product returns in Brazil. EBITDA before special items of Animal Health increased by 0.8% (Fx adj.) to €358 million (2017: €381 million; reported: – 6.0%).

See also A 2.4

EBITDA in 2018 came in at €10,266 million (2017: €8,563 million). **Depreciation, amortization and impairment losses** amounted to €6,352 million (2017: €2,660 million), with intangible assets accounting for €4,455 million (2017: €1,679 million) and property, plant and equipment for €1,897 million (2017: €981 million). Impairment losses amounted to €3,353 million (2017: €512 million). These included €2,673 million (2017: €455 million) in impairments on intangible assets, primarily at Consumer Health, where we recorded impairment losses on goodwill and on other intangible assets in the amounts of €1.5 billion and €1.1 billion, respectively. Impairment losses on property, plant and equipment amounted to €680 million (2017: €57 million). An impairment loss of €0.5 billion was recognized at Pharmaceuticals following the decision not to use a newly constructed production facility. Impairment losses of €3,282 million (2017: €474 million), net of impairment loss reversals, and accelerated depreciation of €3 million (2017: €28 million) were included in special items.

EBIT decreased by 33.7% in 2018 to €3,914 million (2017: €5,903 million) after special charges of €2,566 million (2017: €1,227 million). These mainly resulted from the aforementioned impairment losses included for the most part in special items, from special charges in connection with the acquired business (€1,980 million, including €1,256 million in prorated reversals of inventory step-ups), from restructuring (€1,289 million) and from litigations and legal risks (€613 million). These charges were offset by a one-time special gain from divestments (€4,124 million). **EBIT before special items** declined by 9.1% to €6,480 million (2017: €7,130 million).

In 2018, the following special effects were taken into account in calculating EBIT and EBITDA before special items.

A 2.2.1/2

Special Items by Segment and Category[1]

€ million	EBIT Q4 2017	EBIT Q4 2018	EBIT 2017	EBIT 2018	EBITDA Q4 2017	EBITDA Q4 2018	EBITDA 2017	EBITDA 2018
Special items by segment								
Pharmaceuticals	**(187)**	**(1,289)**	**(340)**	**(1,362)**	**(128)**	**(771)**	**(135)**	**(801)**
Consumer Health	**(258)**	**(2,781)**	**(300)**	**(2,776)**	**(54)**	**(68)**	**(86)**	**(61)**
Crop Science	**(155)**	**(984)**	**(408)**	**1,841**	**(111)**	**(984)**	**(327)**	**1,849**
Animal Health	**(23)**	**(1)**	**(31)**	**(7)**	**(21)**	**(1)**	**(29)**	**(7)**
Reconciliation	**(9)**	**(196)**	**(148)**	**(262)**	**(9)**	**(195)**	**(148)**	**(261)**
Restructuring	(15)	(139)	(57)	(171)	(15)	(138)	(57)	(170)
Litigations/legal risks	37	(38)	(60)	(41)	37	(38)	(60)	(41)
Acquisition costs/divestments	(31)	(19)	(31)	(51)	(31)	(19)	(31)	(51)
Other	–	–	–	1	–	–	–	1
Special items by category								
Impairment losses/reversals	(304)	(2,745)	(450)	(2,788)	(2)	(32)	(3)	(32)
Litigations/legal risks	(88)	(604)	(188)	(613)	(88)	(604)	(188)	(613)
Acquisition costs	(134)	(855)	(304)	(1,980)	(134)	(855)	(304)	(1,972)
Restructuring	(103)	(1,197)	(227)	(1,289)	(97)	(678)	(197)	(768)
Divestments	(3)	155	(58)	4,124	(2)	155	(33)	4,124
Other	–	(5)	–	(20)	–	(5)	–	(20)
Total special items	**(632)**	**(5,251)**	**(1,227)**	**(2,566)**	**(323)**	**(2,019)**	**(725)**	**719**

[1] For definition see A 2.4 "Alternative Performance Measures Used by the Bayer Group."

See also A 2.2.4

Core earnings per share of €5.94

Earnings per share (total) amounted to €1.80 in 2018 (2017: €8.29). The decline was mainly attributable to the aforementioned special items in connection with impairments, along with acquisition and integration costs, restructuring costs and litigations. There was a one-time gain from divestments in 2018, while an important factor in the prior year was positive income after income taxes from discontinued operations in connection with Covestro. **Core earnings per share from continuing operations** were below the prior year as expected, at €5.94 (2017: €6.64; – 10.5%). The financing costs for the Monsanto acquisition stood against the earnings contribution from the acquired business, which was lower for seasonal reasons. In addition, the aforementioned equity measures implemented in the second quarter of 2018 had a dilutive effect.

A 2.2.1/3

Core Earnings per Share[1]

€ million	Q4 2017	Q4 2018	2017	2018
EBIT (as per income statements)	**625**	**(4,142)**	**5,903**	**3,914**
Amortization and impairment losses/loss reversals on goodwill and other intangible assets	602	3,193	1,679	4,455
Impairment losses/loss reversals on property, plant and equipment, and accelerated depreciation included in special items	16	664	84	683
Special items (other than accelerated depreciation, amortization and impairment losses/loss reversals)	323	2,019	725	(719)
Core EBIT	**1,566**	**1,734**	**8,391**	**8,333**
Financial result (as per income statements)	(258)	(726)	(1,326)	(1,596)
Special items in the financial result	250	287	611	323
Income taxes (as per income statements)	(435)	946	(1,329)	(607)
Special items in income taxes	455	91	455	175
Tax effects related to amortization, impairment losses/loss reversals and special items	(342)	(1,255)	(922)	(1,022)
Income after income taxes attributable to noncontrolling interest (as per income statements)	(2)	(2)	1	(16)
Above-mentioned adjustments attributable to noncontrolling interest	–	(1)	–	(1)
Core net income from continuing operations	**1,234**	**1,074**	**5,881**	**5,589**
Shares (million)				
Weighted average number of shares[2]	**885.55**	**980.15**	**885.19**	**940.75**
€				
Core earnings per share from continuing operations	**1.39**	**1.10**	**6.64**	**5.94**

2017 figures restated
[1] For definition see A 2.4 “Alternative Performance Measures Used by the Bayer Group.”
[2] The weighted average number of shares (basic and diluted) was restated for all periods prior to June 2018 to reflect the effect of the bonus component of the subscription rights issued as part of the June 2018 capital increase.

Bayer Group Other Parameters

A 2.2.1/4

Bayer Group Summary Income Statements

€ million	Q4 2017	Q4 2018	Change %	2017	2018	Change %
Net sales	8,596	11,062	+28.7	35,015	39,586	+13.1
Cost of goods sold	(3,047)	(6,102)	−100.3	(11,382)	(17,010)	−49.4
Selling expenses	(3,074)	(4,317)	−40.4	(11,116)	(12,751)	−14.7
Research and development expenses	(1,234)	(1,738)	−40.8	(4,504)	(5,246)	−16.5
General administration expenses	(588)	(864)	−46.9	(2,026)	(2,728)	−34.6
Other operating income (+) and expenses (–)	(28)	(2,183)	.	(84)	2,063	.
EBIT[1]	**625**	**(4,142)**	**.**	**5,903**	**3,914**	**−33.7**
Financial result	**(258)**	**(726)**	**−181.4**	**(1,326)**	**(1,596)**	**−20.4**
Income before income taxes	**367**	**(4,868)**	**.**	**4,577**	**2,318**	**−49.4**
Income taxes	(435)	946	.	(1,329)	(607)	+54.3
Income from continuing operations after taxes	(68)	(3,922)	.	3,248	1,711	−47.3
Income from discontinued operations after taxes	218	0	−100	4,846	0	−100
Income after income taxes (total)	**150**	**(3,922)**	**.**	**8,094**	**1,711**	**−78.9**
of which attributable to noncontrolling interest	2	2	–	758	16	−97.9
of which attributable to Bayer AG stockholders (net income)	**148**	**(3,924)**	**.**	**7,336**	**1,695**	**−76.9**

[1] For definition see A 2.4 “Alternative Performance Measures Used by the Bayer Group.”

Functional costs

The cost of goods sold increased by 49.4% to €17,010 million in 2018, partly as a result of the aforementioned prorated reversals of inventory step-ups and additional amortization in connection with the newly acquired business. The ratio of the cost of goods sold to total sales therefore rose to 43.0% (2017: 32.5%). The selling expenses of €12,751 million (+ 14.7%) amounted to 32.2% of sales (2017: 31.7%). Research and development (R&D) expenses rose by 16.5% to €5,246 million. The ratio of R&D expenses to sales was 13.3% (2017: 12.9%). General administration expenses climbed by 34.6% to €2,728 million. The ratio of general administration expenses to total sales therefore increased to 6.9% (2017: 5.8%). The balance of other operating expenses and other operating income amounted to €2,063 million (2017: minus €84 million). This included the aforementioned gain from divestments and the impairment losses recognized on the goodwill of Consumer Health.

The special effects accounted for in EBIT and EBITDA before special items were attributable to the functional costs as shown in the following table.

A 2.2.1/5

Special Items Reconciliation by Functional Cost[1]

€ million	EBIT Q4 2017	EBIT Q4 2018	EBIT 2017	EBIT 2018	EBITDA Q4 2017	EBITDA Q4 2018	EBITDA 2017	EBITDA 2018
Special items by functional cost								
Cost of goods sold	(48)	(1,610)	(163)	(2,312)	(44)	(959)	(105)	(1,651)
Selling expenses	(249)	(1,090)	(305)	(1,160)	(47)	(56)	(71)	(126)
Research and development expenses	(116)	(331)	(232)	(406)	(13)	(330)	(22)	(362)
General administration expenses	(131)	(223)	(339)	(633)	(131)	(223)	(339)	(633)
Other operating income/expenses	(88)	(1,997)	(188)	1,945	(88)	(451)	(188)	3,491
Total special items	**(632)**	**(5,251)**	**(1,227)**	**(2,566)**	**(323)**	**(2,019)**	**(725)**	**719**

[1] For definition see “Alternative Performance Measures Used by the Bayer Group.”

Financial result and income before income taxes

Including a financial result of minus €1,596 million (2017: minus €1,326 million), income before income taxes was €2,318 million (2017: €4,577 million). Among other items, the financial result comprised a loss from investments in affiliated companies of €87 million (2017: income of €30 million), net interest expense of €1,065 million (2017: €413 million), an exchange loss of €271 million (2017: €326 million), interest cost of €202 million (2017: €189 million) for pension and other provisions, and net other financial income of €29 million (2017: expenses of €428 million). The financial result included net special charges of €323 million (2017: €611 million), including special charges of €228 million (2017: €210 million) in connection with the financing of the Monsanto acquisition, special gains of €230 million (2017: special charges of €172 million) relating to the exchangeable bond issued in June 2017, special gains of €341 million from the sale of Covestro shares and special charges of €459 million reflecting changes in the fair value of the remaining interest in Covestro.

Income tax expense

Income tax expense amounted to €607 million (2017: €1,329 million) after special charges of €175 million (2017: €455 million) in connection with the integration of Monsanto into the corporate structures of Bayer (2017: U.S. tax reform).

Income after income taxes from discontinued operations

There was no income after income taxes from discontinued operations in 2018 (2017: €4,846 million). The prior-year figure was mainly attributable to Covestro, which accounted for €4,468 million. The latter amount mainly comprised the gain from deconsolidation, the remeasurement of the remaining interest, and operating income in the first nine months of 2017.

Net income

After income tax expense, income from discontinued operations after taxes and noncontrolling interest, net income in 2018 came to €1,695 million (2017: €7,336 million).

2.2.2 Business Development by Segment

Pharmaceuticals

Pharmaceuticals market continues to grow

The pharmaceuticals market grew by 5% in 2018 (2017: 3%). Stronger growth momentum in the Americas, Europe and Asia more than offset the continuing decline in Japan. The overall market trend was boosted by higher volumes due to an aging population and improved access to medical care, and also by growth fueled by innovative – often high-end – products. Opposing factors persisted, including heightened price pressure from generics and reforms to national health care systems.

A 2.2.2/1

Key Data – Pharmaceuticals

			Change %[1]				Change %[1]	
€ million	Q4 2017	Q4 2018	Reported	Fx & p adj.	2017	2018	Reported	Fx & p adj.
Sales	**4,215**	**4,291**	**+1.8**	**+2.6**	**16,847**	**16,746**	**−0.6**	**+3.4**
Change in sales[1]								
Volume	+6.4%	+3.9%			+5.2%	+5.7%		
Price	−2.8%	−1.3%			−0.9%	−2.3%		
Currency	−4.8%	−0.7%			−1.7%	−3.7%		
Portfolio	−0.2%	−0.1%			0.0%	−0.3%		
Sales by region								
Europe/Middle East/Africa	1,720	1,699	−1.2	0.0	6,521	6,590	+1.1	+3.2
North America	1,027	1,019	−0.8	−2.7	4,229	3,965	−6.2	−2.0
Asia/Pacific	1,188	1,312	+10.4	+10.1	5,013	5,206	+3.8	+7.3
Latin America	280	261	−6.8	+6.8	1,084	985	−9.1	+6.7
EBITDA[1]	**1,107**	**495**	**−55.3**		**5,576**	**4,797**	**−14.0**	
Special items[1]	(128)	(771)			(135)	(801)		
EBITDA before special items[1]	**1,235**	**1,266**	**+2.5**		**5,711**	**5,598**	**−2.0**	
EBITDA margin before special items[1]	29.3%	29.5%			33.9%	33.4%		
EBIT[1]	**795**	**(302)**	**.**		**4,325**	**3,213**	**−25.7**	
Special items[1]	(187)	(1,289)			(340)	(1,362)		
EBIT before special items[1]	**982**	**987**	**+0.5**		**4,665**	**4,575**	**−1.9**	
Net cash provided by operating activities	**1,330**	**1,587**	**+19.3**		**3,867**	**4,376**	**+13.2**	

Fx & p adj. = currency- and portfolio-adjusted
[1] For definition see A 2.4 “Alternative Performance Measures Used by the Bayer Group.”

Increase in sales

Sales of Pharmaceuticals rose by 3.4% (Fx & portfolio adj.) to €16,746 million in 2018. This was again due primarily to a strong performance overall by our key growth products Xarelto™, Eylea™, Stivarga™, Xofigo™ and Adempas™, sales of which increased by 13.5% (Fx & portfolio adj.) to €6,838 million (2017: €6,196 million), and to substantial sales gains in China. Combined sales of our 15 best-selling Pharmaceuticals products advanced by 6.1% (Fx & portfolio adj.). Sales of Pharmaceuticals were held back in 2018 by the termination of a distribution agreement for Kogenate™ at the end of 2017. After adjusting for this effect, sales rose by 4.1% (Fx & portfolio adj.). As expected, temporary supply disruptions for some of our established products, such as Adalat™ and Aspirin™ Cardio, weighed on sales.

A 2.2.2/2

Best-Selling Pharmaceuticals Products

€ million	Q4 2017	Q4 2018	Change %[1] Reported	Change %[1] Fx & p adj.	2017	2018	Change %[1] Reported	Change %[1] Fx & p adj.
Xarelto™	914	993	+8.6	+9.6	3,298	3,631	+10.1	+12.8
of which U.S.A.[2]	178	159	−10.7	−10.6	519	508	−2.1	−2.1
Eylea™	507	600	+18.3	+19.1	1,880	2,185	+16.2	+19.6
of which U.S.A.[3]	0	0	.	.	0	0	.	.
Adempas™	72	96	+33.3	+29.9	295	356	+20.7	+24.1
of which U.S.A.	30	45	+50.0	+43.4	144	167	+16.0	+20.9
Xofigo™	101	81	−19.8	−21.0	408	351	−14.0	−10.3
of which U.S.A.	59	53	−10.2	−13.2	242	210	−13.2	−9.1
Stivarga™	80	86	+7.5	+8.3	315	315	0.0	+5.3
of which U.S.A.	41	42	+2.4	+2.0	166	149	−10.2	−6.2
Subtotal key growth products	**1,674**	**1,856**	**+10.9**	**+11.4**	**6,196**	**6,838**	**+10.4**	**+13.5**
Mirena™ product family	255	270	+5.9	+5.2	1,126	1,143	+1.5	+6.9
of which U.S.A.	161	164	+1.9	−1.2	746	750	+0.5	+6.2
Kogenate™/Kovaltry™/Jivi™	217	216	−0.5	−1.4	967	855	−11.6	−8.8
of which U.S.A.	68	80	+17.6	+15.8	322	313	−2.8	+2.4
Nexavar™	204	177	−13.2	−12.7	834	712	−14.6	−10.7
of which U.S.A.	67	54	−19.4	−21.9	294	216	−26.5	−23.4
YAZ™/Yasmin™/Yasminelle™	153	161	+5.2	+7.6	648	639	−1.4	+4.9
of which U.S.A.	14	17	+21.4	+17.6	83	74	−10.8	−7.0
Glucobay™	130	150	+15.4	+17.2	563	623	+10.7	+13.8
of which U.S.A.	0	1	.	.	2	2	0.0	−1.8
Adalat™	147	127	−13.6	−12.9	648	611	−5.7	−2.4
of which U.S.A.	0	0	.	.	0	0	.	.
Aspirin™ Cardio	137	137	0.0	+2.1	581	557	−4.1	−0.1
of which U.S.A.	0	0	.	.	0	0	.	.
Betaferon™/Betaseron™	152	139	−8.6	−8.7	651	544	−16.4	−13.0
of which U.S.A.	80	63	−21.3	−22.4	357	269	−24.6	−20.8
Gadavist™/Gadovist™	89	87	−2.2	−0.7	365	366	+0.3	+4.7
of which U.S.A.	25	20	−20.0	−22.7	116	112	−3.4	+2.0
Stellant™	84	92	+9.5	+8.3	336	342	+1.8	+5.8
of which U.S.A.	59	64	+8.5	+5.1	238	239	+0.4	+5.0
Total best-selling products	**3,242**	**3,412**	**+5.2**	**+5.8**	**12,915**	**13,230**	**+2.4**	**+6.1**
Proportion of Pharmaceuticals sales	77%	80%			77%	79%		
Total best-selling products in U.S.A	**782**	**762**	**−2.6**	**−4.6**	**3,229**	**3,009**	**−6.8**	**−2.9**

Fx & p adj. = currency- and portfolio-adjusted
[1] For definition see A 2.4 “Alternative Performance Measures Used by the Bayer Group.”
[2] Marketing rights owned by a subsidiary of Johnson & Johnson, U.S.A.; transactional effects had a positive impact of around €5 million in the fourth quarter and a negative impact of approximately €16 million in the full year.
[3] Marketing rights owned by Regeneron Pharmaceuticals Inc., U.S.A.

+13.5%

increase in sales of our key growth products (Fx & portfolio adj.)

Sales by product

- // We once again registered significant growth in sales of our oral anticoagulant **Xarelto™** in 2018, which was primarily attributable to higher volumes in Europe, China and Canada. In the United States, where Xarelto™ is marketed by a subsidiary of Johnson & Johnson, license revenues – recognized as sales – were down year on year.
- // The significant expansion of business with our eye medicine **Eylea™** resulted mainly from higher volumes in Europe, Japan and Canada.
- // We posted strong growth in sales of our pulmonary hypertension treatment **Adempas™**, primarily as a result of expanded volumes in the United States. As in the past, sales of the product also reflected the proportionate recognition of upfront and milestone payments resulting from the sGC collaboration with Merck & Co., United States.

- Sales of our cancer drug **Xofigo™** declined substantially. The decrease was mainly attributable to lower demand in the United States and Europe, which was due in particular to the Phase III trial of radium-223 dichloride in combination with abiraterone acetate and prednisone/prednisolone being halted prematurely in November 2017.
- We registered an increase in sales of our cancer drug **Stivarga™**, primarily in China and Japan, where we continued to benefit from the market launches undertaken in previous years. In the United States, however, sales were down due to a highly competitive market environment.
- Sales of the hormone-releasing intrauterine devices of the **Mirena™ product family** (Mirena™, Kyleena™ and Jaydess™/Skyla™) increased, mainly as a result of the successful commercialization of Kyleena™ in the United States. We also registered considerably higher volumes in China and Canada.
- Sales of our blood-clotting medicines **Kogenate™/Kovaltry™/Jivi™** fell considerably, due mainly to the discontinuation of an agreement with a distribution partner. The encouraging recent sales growth (Fx & portfolio adj.) in the United States was not sufficient to offset this effect.
- We registered a sharp decline in sales of our cancer drug **Nexavar™** that was again the result of strong competitive pressure in the United States and Japan. The significant expansion of business in China only partly compensated for this development.
- Sales of our **YAZ™/Yasmin™/Yasminelle™** line of oral contraceptives increased on a currency- and portfolio-adjusted basis, primarily due to higher demand in China and the successful marketing of YazFlex™ in Japan. However, business in the United States was once again impacted by generic competition.
- We posted significant sales gains for our diabetes treatment **Glucobay™**, driven by a robust expansion of volumes in China.
- Sales of **Adalat™**, our product to treat hypertension and coronary heart disease, were down overall. Volumes declined overall, especially in Japan and Canada, but were significantly higher in China.
- Sales of our **Aspirin™ Cardio** product for the secondary prevention of heart attacks were level with the prior year. Sales gains in China stood against declines in Europe.
- The decrease in sales of our multiple sclerosis treatment **Betaferon™/Betaseron™** was again attributable to the competitive market environment in the United States.
- We recorded encouraging sales gains for our MRI contrast agent **Gadavist™/Gadovist™**, primarily due to the positive development of business in Europe.
- Sales of our **Stellant™** contrast agent injection system increased due to higher volumes, particularly in the United States.

Earnings

EBITDA before special items declined by 2.0% to €5,598 million in 2018. Adjusted for negative currency effects of €256 million, earnings were up by 2.5%. Earnings were held back mainly by an increase in the cost of goods sold, the effects of temporary supply disruptions, and higher selling expenses. Positive earnings contributions primarily resulted from a substantial increase in volumes – especially for Xarelto™ und Eylea™ – and income of approximately €190 million from a development collaboration with Janssen Research & Development, LLC, a subsidiary of Johnson & Johnson.

EBIT of Pharmaceuticals fell by a substantial 25.7% to €3,213 million after special charges of €1,362 million (2017: €340 million). These primarily comprised expenses for restructuring programs (€991 million), largely in connection with the impairment loss recognized for a newly constructed production facility in Germany, along with provisions for litigations (€323 million) and expenses for impairment losses on intangible assets (€43 million).

A 2.2.2/3

Special Items[1] Pharmaceuticals

€ million	EBIT Q4 2017	EBIT Q4 2018	EBIT 2017	EBIT 2018	EBITDA Q4 2017	EBITDA Q4 2018	EBITDA 2017	EBITDA 2018
Restructuring	(2)	(971)	(9)	(991)	(2)	(453)	(8)	(473)
Litigations	(124)	(323)	(124)	(323)	(124)	(323)	(124)	(323)
Impairment losses/loss reversals	(61)	(32)	(207)	(75)	(2)	(32)	(3)	(32)
Divestments	–	41	–	41	–	41	–	41
Other	–	(4)	–	(14)	–	(4)	–	(14)
Total special items	**(187)**	**(1,289)**	**(340)**	**(1,362)**	**(128)**	**(771)**	**(135)**	**(801)**

[1] For definition see A 2.4 “Alternative Performance Measures Used by the Bayer Group.”

Consumer Health

Stable market growth

Growth of the global consumer health market in 2018 was just under 4% (2017: 4%). Strong fundamentals of a growing, aging population and the self-care trend were slightly offset by the soft allergy season in the United States.

A 2.2.2/4

Key Data – Consumer Health

€ million	Q4 2017	Q4 2018	Change %[1] Reported	Change %[1] Fx & p adj.	2017	2018	Change %[1] Reported	Change %[1] Fx & p adj.
Sales	**1,399**	**1,331**	**– 4.9**	**– 1.7**	**5,862**	**5,450**	**– 7.0**	**– 0.7**
Changes in sales[1]								
Volume	– 4.2%	– 3.1%			– 3.0%	– 1.5%		
Price	0.0%	+ 1.4%			+ 1.3%	+ 0.8%		
Currency	– 4.9%	– 1.5%			– 1.2%	– 5.7%		
Portfolio	0.0%	– 1.7%			0.0%	– 0.6%		
Sales by region								
Europe/Middle East/Africa	491	474	– 3.5	– 0.9	1,962	1,857	– 5.4	– 1.5
North America	581	534	– 8.1	– 6.5	2,480	2,263	– 8.8	– 2.6
Asia/Pacific	145	163	+ 12.4	+ 13.8	738	730	– 1.1	+ 3.5
Latin America	182	160	– 12.1	– 0.4	682	600	– 12.0	+ 4.2
EBITDA[1]	**197**	**211**	**7.1**		**1,145**	**1,035**	**– 9.6**	
Special items[1]	(54)	(68)			(86)	(61)		
EBITDA before special items[1]	**251**	**279**	**+ 11.2**		**1,231**	**1,096**	**– 11.0**	
EBITDA margin before special items[1]	17.9%	21.0%			21.0%	20.1%		
EBIT[1]	**(110)**	**(2,607)**	**.**		**518**	**(2,077)**	**.**	
Special items[1]	(258)	(2,781)			(300)	(2,776)		
EBIT before special items[1]	**148**	**174**	**+ 17.6**		**818**	**699**	**– 14.5**	
Net cash provided by operating activities	**297**	**196**	**– 34.0**		**1,059**	**727**	**– 31.4**	

Fx & p adj. = currency- and portfolio-adjusted
[1] For definition see A 2.4 “Alternative Performance Measures Used by the Bayer Group.”

Sales level year on year

Sales were level year on year in 2018, at €5,450 million (Fx & portfolio adj. – 0.7%). Growth in the Latin America and Asia/Pacific regions on a currency- and portfolio-adjusted basis stood against declines in North America and Europe/Middle East/Africa. As expected, temporary supply disruptions weighed on sales.

A 2.2.2/5

Best-Selling Consumer Health Products

€ million	Q4 2017	Q4 2018	Change %[1] Reported	Change %[1] Fx & p adj.	2017	2018	Change %[1] Reported	Change %[1] Fx & p adj.
Claritin™	113	96	–15.0	–17.1	585	516	–11.8	–6.3
Aspirin™	124	118	–4.8	–2.6	462	418	–9.5	–3.3
Bepanthen™/Bepanthol™	96	90	–6.3	–3.9	379	371	–2.1	+3.0
Aleve™	103	94	–8.7	–9.9	375	351	–6.4	–1.8
Canesten™	68	61	–10.3	–7.8	278	245	–11.9	–8.2
Alka-Seltzer™ product family	73	74	+1.4	–1.0	244	225	–7.8	–3.9
Elevit™	42	49	+16.7	+19.2	189	209	+10.6	+16.9
One A Day™	63	55	–12.7	–15.2	222	203	–8.6	–4.3
Dr. Scholl's™[2]	54	46	–14.8	–17.4	211	198	–6.2	–1.7
MiraLAX™	41	49	+19.5	+17.7	163	176	+8.0	+12.4
Total	**777**	**732**	**–5.8**	**–6.5**	**3,108**	**2,912**	**–6.3**	**–1.8**
Proportion of Consumer Health sales	56%	55%			53%	53%		

Fx & p adj. = currency- and portfolio-adjusted
[1] For definition see A 2.4 "Alternative Performance Measures Used by the Bayer Group."
[2] Trademark rights and distribution only in certain countries outside the European Union

Sales by product

// Sales of our antihistamine **Claritin™** were down year on year. This was mainly due to our primary sales market, the United States, which was impacted by the weak season in this market segment and by intensified competition. Sales also declined in Japan, due in part to statutory price adjustments.

// Sales of our analgesic **Aspirin™** were down year on year, primarily as a result of temporary supply disruptions. Including business with Aspirin™ Cardio, which is reported under Pharmaceuticals, sales fell by 1.5% (Fx & portfolio adj.) to €975 million (2017: €1,043 million).

// Business with our **Bepanthen™/Bepanthol™** wound and skin care products developed positively, benefiting from product line extensions in Brazil and Turkey, among other factors.

// Sales were down slightly for our analgesic **Aleve™**. We primarily registered declines in the United States, where a product line extension was discontinued.

// We recorded a decrease in sales of our **Canesten™** skin and intimate health products as a result of temporary supply disruptions.

// Sales of our **Alka-Seltzer™** family of products to treat gastric complaints and cold symptoms were down against the prior year, particularly in the United States. By contrast, business developed positively in the Europe/Middle East/Africa and Latin America regions.

// We again registered encouraging sales gains for our prenatal vitamin **Elevit™**. Adjusted for currency and portfolio effects, sales increased by a double-digit percentage, driven by the Asia/Pacific and Europe/Middle East/Africa regions, where we benefited from continuing strong demand and product line extensions. In addition, the expansion of our e-commerce activities had a positive effect in Asia/Pacific.

// Our **One A Day™** vitamin product saw a decline in sales that resulted primarily from stronger pressure on prices in the United States, while volumes were level with the previous year.

// Sales of our **Dr. Scholl's™** foot care products declined slightly, primarily in the United States.

// We posted encouraging sales gains for **MiraLAX™**, our product to treat occasional constipation, largely due to higher demand in the United States.

Earnings

EBITDA before special items was down by a significant 11.0% in 2018, at €1,096 million. Adjusted for negative currency effects of €67 million, earnings were 5.5% lower than in 2017. The decline was primarily attributable to lower volumes and a decrease in one-time gains that predominantly related to the divestment of noncore brands. A decline in selling and general administration expenses had an opposing effect.

EBIT of Consumer Health amounted to minus €2,077 million (2017: €518 million). This was due to special items of €2,776 million (2017: €300 million) that mostly related to impairment losses recognized on goodwill (approximately €1.5 billion) and on other intangible assets (approximately €1.0 billion).

A 2.2.2/6

Special Items[1] Consumer Health

€ million	EBIT Q4 2017	EBIT Q4 2018	EBIT 2017	EBIT 2018	EBITDA Q4 2017	EBITDA Q4 2018	EBITDA 2017	EBITDA 2018
Restructuring	(56)	(59)	(98)	(85)	(54)	(59)	(86)	(83)
Impairment losses/loss reversals	(202)	(2,713)	(202)	(2,713)	–	–	–	–
Divestments	–	(8)	–	25	–	(8)	–	25
Other	–	(1)	–	(3)	–	(1)	–	(3)
Total special items	**(258)**	**(2,781)**	**(300)**	**(2,776)**	**(54)**	**(68)**	**(86)**	**(61)**

[1] For definition see A 2.4 "Alternative Performance Measures Used by the Bayer Group."

Crop Science

Market expands slightly

The global seed and crop protection market as a whole expanded slightly in 2018, growing by around 2% (2017: 2%), with demand for high-quality seeds rising faster than worldwide volumes of crop protection products. Growth momentum was strongest in the Asia/Pacific, North America and Latin America regions. Latin America, in particular, saw an above-average increase in market volume following the normalization of inventory levels for crop protection products in the Brazilian market and an expansion of soybean acreages. On the other hand, the market in Central and Western Europe stagnated due to a very hot, dry summer.

A 2.2.2/7

Key Data – Crop Science

			Change %[1]				Change %[1]	
€ million	Q4 2017	Q4 2018	Reported	Fx & p adj.	2017	2018	Reported	Fx & p adj.
Sales	**2,263**	**4,661**	**+106.0**	**15.4**	**9,577**	**14,266**	**+49.0**	**+6.1**
Change in sales[1]								
Volume	+5.3%	+14.2%			+0.3%	+5.9%		
Price	−4.2%	+1.2%			−2.5%	+0.2%		
Currency	−7.0%	+1.3%			−1.2%	−4.3%		
Portfolio	0.0%	+89.3%			0.0%	+47.2%		
Sales by region								
Europe/Middle East/Africa	440	592	+34.5	+4.2	3,335	3,689	+10.6	−3.0
North America	479	1,703	.	+32.8	2,772	4,696	+69.4	+7.5
Asia/Pacific	358	530	+48.0	+24.2	1,563	1,858	+18.9	+9.7
Latin America	986	1,836	+86.2	+8.7	1,907	4,023	+111.0	+17.1
EBITDA[1]	**193**	**(441)**	**.**		**1,716**	**4,500**	**+162.2**	
Special items[1]	(111)	(984)			(327)	1,849		
EBITDA before special items[1]	**304**	**543**	**+78.6**		**2,043**	**2,651**	**+29.8**	
EBITDA margin before special items[1]	13.4%	11.6%			21.3%	18.6%		
EBIT[1]	**64**	**(934)**	**.**		**1,235**	**3,138**	**+154.1**	
Special items[1]	(155)	(985)			(408)	1,841		
EBIT before special items[1]	**219**	**51**	**−76.7**		**1,643**	**1,297**	**−21.1**	
Net cash provided by operating activities	**552**	**1,549**	**+180.6**		**1,884**	**3,743**	**+98.7**	

Fx & p adj. = currency- and portfolio-adjusted
[1] For definition see A 2.4 "Alternative Performance Measures Used by the Bayer Group."

Sales up significantly against prior year

Crop Science posted sales of €14,266 million in 2018. The businesses divested to BASF contributed approximately €1,500 million to sales prior to the closing of the respective transactions in August. Sales increased by 49.0% on a reported basis, thanks mainly to a positive portfolio effect of 47.2% due to the acquisition of Monsanto (€5,288 million) less the prorated contribution from the divested businesses in the prior year (€767 million). Sales were also impacted by negative currency effects of 4.3%. The 6.1% increase on a currency- and portfolio-adjusted basis largely resulted from the normalization of crop protection inventories in Brazil, where the prior-year figure had been impacted by the required measures in this context, and from positive sales development in the Asia/Pacific and North America regions. Sales also benefited from service agreements – especially product supply and distribution agreements – with BASF in connection with the divested businesses. By contrast, sales were down in Europe due to unfavorable weather conditions and regulatory changes affecting certain SeedGrowth products in France.

A 2.2.2/8

Sales by Strategic Business Unit

			Change %[1]				Change %[1]	
€ million	Q4 2017	Q4 2018	Reported	Fx & p adj.	2017	2018	Reported	Fx & p adj.
Crop Science	**2,263**	**4,661**	**+106.0**	**+15.4**	**9,577**	**14,266**	**+49.0**	**+6.1**
Herbicides	526	1,172	+122.8	+12.3	2,633	4,171	+58.4	+1.5
Corn Seed & Traits	4	1,036	.	–19.2	87	1,808	.	–12.2
Soybean Seed & Traits	57	602	.	+26.2	210	1,200	.	+11.4
Fungicides	755	757	+0.3	–2.0	2,597	2,647	+1.9	+4.8
Insecticides	268	364	+35.8	+34.4	1,246	1,345	+7.9	+12.3
Environmental Science	183	229	+25.1	+9.3	671	732	+9.1	–3.3
Vegetable Seeds	102	91	–10.8	–0.2	434	629	+44.9	+1.0
Other	368	410	+11.4	+47.8	1,699	1,734	+2.1	+16.0

Fx & p adj. = currency- and portfolio-adjusted
[1] For definition see A 2.4 "Alternative Performance Measures Used by the Bayer Group."

Sales by region

// Sales in the **Europe/Middle East/Africa** region improved by 13.7% (Fx adj.) to €3,689 million. There was a portfolio effect of €557 million. On a currency- and portfolio-adjusted basis, sales fell by 3.0%. The SeedGrowth business (Other) in particular saw a decline due to the loss of registrations in France. We also posted slightly lower sales at Fungicides and Herbicides, primarily due to unfavorable weather conditions in Central and Western Europe.

// In the **North America** region, we posted a 75.4% (Fx adj.) increase in sales to €4,696 million. The portfolio effect was €1,881 million. The 7.5% increase on a currency- and portfolio-adjusted basis was chiefly attributable to sales generated by the service agreements with BASF in connection with the divested SeedGrowth business (Other) and to strong growth of the subsequently divested canola seed business (Other) in Canada in the first half of the year. We also saw encouraging sales gains at Fungicides, in part due to new product launches. The decline in sales at Environmental Science resulted from planned lower product deliveries to the acquirer of the consumer business divested in 2016.

// Sales in **Asia/Pacific** increased by 25.0% (Fx adj.) year on year to €1,858 million. The portfolio effect amounted to €238 million. Sales expanded by 9.7% on a currency- and portfolio-adjusted basis. We registered sales gains in all business units, especially Herbicides, Fungicides and Insecticides due to higher volumes. The expansion of business was particularly strong in China, Japan, India and Southeast Asia.

// Sales in **Latin America** advanced by 113.8% (Fx adj.) to €4,023 million, with the portfolio effect amounting to €1,844 million. We posted a 17.1% sales increase on a currency- and portfolio-adjusted basis. This development was largely attributable to the effects in the previous year of significantly higher provisions recognized for product returns and of lower sales of crop protection products due to high inventory levels in Brazil. The measures undertaken to normalize inventories of crop protection products were successfully completed at the end of the season, during the second quarter of 2018. Excluding Brazil, sales were down slightly in the other Latin American countries.

Earnings

EBITDA before special items of Crop Science advanced by 29.8% to €2,651 million in 2018. This increase is primarily attributable to the earnings contribution from the newly acquired business (€705 million) and the recognition in the second quarter of 2017 of significantly higher provisions for product returns in Brazil. By contrast, earnings were diminished by the prior-year prorated earnings contribution from the businesses divested to BASF, a decrease in volumes in Europe and a negative currency effect of €101 million (excluding the acquired business).

EBIT increased by 154.1% to €3,138 million, and included special gains of €1,841 million (2017: special charges of €408 million) primarily resulting from divestment proceeds of approximately €4.1 billion before taxes in connection with the sale of businesses to BASF. However, earnings were held back by special charges relating to the acquisition of Monsanto in the amount of €1,931 million, of which €1,256 million pertained to reversals of inventory step-ups, and by defense costs for litigations. Also included in EBIT were additional depreciation and amortization in the amount of €645 million resulting from remeasurements or the first-time recognition of assets in the course of the purchase price allocation.

A 2.2.2/9

Special Items[1] Crop Science

€ million	EBIT Q4 2017	EBIT Q4 2018	EBIT 2017	EBIT 2018	EBITDA Q4 2017	EBITDA Q4 2018	EBITDA 2017	EBITDA 2018
Restructuring	(7)	(27)	(32)	(35)	(5)	(27)	(17)	(35)
Litigations	(1)	(243)	(4)	(249)	(1)	(243)	(4)	(249)
Acquisition costs	(103)	(839)	(273)	(1,931)	(103)	(839)	(273)	(1,924)
Impairment losses/loss reversals	(41)	–	(41)	–	–	–	–	–
Divestments	(3)	125	(58)	4,060	(2)	125	(33)	4,061
Other	–	–	–	(4)	–	–	–	(4)
Total special items	**(155)**	**(984)**	**(408)**	**1,841**	**(111)**	**(984)**	**(327)**	**1,849**

[1] For definition see A 2.4 “Alternative Performance Measures Used by the Bayer Group.”

Pro-forma sales by strategic business entity (unaudited)

Due to the scope of the acquired activities and the seasonality of the business, we are presenting sales by strategic business entity on an unaudited, pro-forma basis in order to more transparently reflect the underlying operational business development for the combined business of Crop Science and Monsanto, among other reasons. In this context, sales are presented as if both the acquisition of Monsanto and the associated divestments had already taken place as of January 1, 2017. Sales from the aforementioned service agreements with BASF after the divestments closed are not taken into account.

A 2.2.2/10

Pro-Forma Sales by Strategic Business Unit[1]

€ million	Q4 2017	Q4 2018	Change %[2] Reported	Change %[2] Fx adj.	2017	2018	Change %[2] Reported	Change %[2] Fx adj.
Crop Science	**4,379**	**4,511**	**+3.0**	**+3.1**	**20,063**	**19,332**	**–3.6**	**+3.1**
Herbicides	1,071	1,125	+5.0	+5.0	5,104	5,014	–1.8	+3.8
Corn Seed & Traits	1,022	1,036	+1.4	+1.7	5,112	4,871	–4.7	+3.9
Soybean Seed & Traits	690	651	–5.7	–1.0	2,645	2,378	–10.1	–0.5
Fungicides	755	753	–0.3	–2.0	2,597	2,643	+1.8	+5.3
Insecticides	268	366	+36.6	+35.5	1,248	1,346	+7.9	+12.7
Environmental Science	216	228	+5.6	+4.3	1,041	955	–8.3	–3.0
Vegetable Seeds	107	91	–15.0	–15.3	706	670	–5.1	–0.7
Other	250	261	+4.4	0.8	1,610	1,455	–9.6	–1.8

Fx adj. = currency-adjusted

[1] The unaudited pro-forma data is presented as if both the acquisition of Monsanto and the associated divestments had taken place as of January 1, 2017. Sales of Monsanto are presented in periods as per the Bayer fiscal year. One-time effects of business operations, the accounting for discontinued operations and the recognition and measurement of sales from certain business transactions have been adjusted in line with our accounting. Due to this simplified procedure, they explicitly do not reflect sales according to IFRS or IDW RH HFA 1.004.

[2] For definition see A 2.4 “Alternative Performance Measures Used by the Bayer Group.”

Sales increased by 3.1% (Fx adj.) in 2018 on a pro-forma basis.

// The increase at Herbicides resulted mainly from higher prices and expanded volumes in Latin America, as well as the aforementioned measures undertaken in the previous year to normalize inventories in Brazil. By contrast, sales were down slightly in North America, due primarily to unfavorable weather conditions in the first half of the year.

// Higher sales in the Corn Seed & Traits business were largely attributable to shifts in sales from the previous year in North America due to later purchasing, and to a special effect in Latin America and the associated license revenues in Brazil.

// Sales at Soybean Seed & Traits came in at the prior-year level. We recorded a decline in North America due to a slight decrease in market share, lower acreages and seasonal shifts from 2018 into 2019. By contrast, sales increased in Latin America, mainly due to increased acreages and higher market penetration by Intacta RR2 PRO™.

// Sales growth at Fungicides and Insecticides was largely attributable to the aforementioned situation in Brazil in the prior year.

// The strategic business units subsumed under Other were down overall, primarily due to the decline at SeedGrowth as a result of the aforementioned loss of registrations in France. On the other hand, we saw very encouraging growth at Cotton Seed & Traits due to increased acreages in Latin America and in North America, where higher market penetration by XtendFlex™ also had a positive effect.

Animal Health

Stable market growth

The animal health market grew by a solid 5% in 2018 (2017: 2%). Both the companion and farm animals businesses experienced a significant upturn in the first half of the year, which then normalized over the course of the second half of the year. Market expansion was driven by dynamic growth in the Asia/Pacific and Latin America regions, while the markets in Europe/Middle East/Africa and North America grew at a slow pace.

A 2.2.2/11

Key Data – Animal Health

€ million	Q4 2017	Q4 2018	Change %[1] Reported	Change %[1] Fx & p adj.	2017	2018	Change %[1] Reported	Change %[1] Fx & p adj.
Sales	**322**	**330**	**+2.5**	**+2.6**	**1,571**	**1,501**	**−4.5**	**+0.5**
Change in sales[1]								
Volume	+2.1%	+1.0%			+0.4%	+0.8%		
Price	−0.3%	+1.6%			+1.6%	−0.3%		
Currency	−6.1%	−0.1%			−0.9%	−5.0%		
Portfolio	+2.2%	0.0%			+2.1%	0.0%		
Sales by region								
Europe/Middle East/Africa	82	80	−2.4	−2.9	442	409	−7.5	−6.5
North America	126	136	+7.9	+4.4	655	628	−4.1	+1.6
Asia/Pacific	79	78	−1.3	+0.1	317	317	0.0	+5.0
Latin America	35	36	+2.9	+12.1	157	147	−6.4	+5.7
EBITDA[1]	**28**	**46**	**+64.3**		**352**	**351**	**−0.3**	
Special items[1]	(21)	(1)			(29)	(7)		
EBITDA before special items[1]	**49**	**47**	**−4.1**		**381**	**358**	**−6.0**	
EBITDA margin before special items[1]	15.2%	14.2%			24.3%	23.9%		
EBIT[1]	**10**	**36**	**.**		**307**	**312**	**+1.6**	
Special items[1]	(23)	(1)			(31)	(7)		
EBIT before special items[1]	**33**	**37**	**+12.1**		**338**	**319**	**−5.6**	
Net cash provided by operating activities	**75**	**71**	**−5.3**		**209**	**271**	**+29.7**	

Fx & p adj. = currency- and portfolio-adjusted
[1] For definition see A 2.4 "Alternative Performance Measures Used by the Bayer Group."

Sales level year on year, with growth in Asia/Pacific and Latin America

Sales of Animal Health came in at €1,501 million in 2018, matching the prior-year level (Fx & portfolio adj. +0.5%). Business in the Asia/Pacific region developed positively due to higher demand and minor price increases. We also posted growth in sales in Latin America on a currency- and portfolio-adjusted basis as a result of higher selling prices. Business in North America expanded slightly after adjusting for currency and portfolio effects, while sales in the Europe/Middle East/Africa region declined significantly due to a sharp fall in demand. Sales were also negatively impacted by amended financial reporting standards (IFRS 15).

A 2.2.2/12

Best-Selling Animal Health Products

€ million	Q4 2017	Q4 2018	Change %[1] Reported	Change %[1] Fx & p adj.	2017	2018	Change %[1] Reported	Change %[1] Fx & p adj.
Advantage™ product family	87	74	−14.9	−14.9	488	421	−13.7	−9.3
Seresto™	32	52	+62.5	+58.3	218	268	+22.9	+28.5
Drontal™ product family	30	30	0.0	−0.9	132	123	−6.8	−3.7
Baytril™	31	38	+22.6	+21.9	113	112	−0.9	+3.9
Total	**180**	**194**	**+7.8**	**+6.9**	**951**	**924**	**−2.8**	**+1.7**
Proportion of Animal Health sales	56%	59%			61%	62%		

Fx & p adj. = currency- and portfolio-adjusted
[1] For definition see A 2.4 "Alternative Performance Measures Used by the Bayer Group."

+28.5%
growth in sales of Seresto™ (Fx & portfolio adj.)

Sales by product

- Sales of our **Advantage™** family of flea, tick and worm control products were down significantly year on year, due mainly to increased competitive pressure and the related decline in demand in Europe/Middle East/Africa, especially in the United Kingdom, and in North America.
- We achieved continued strong growth with our **Seresto™** flea and tick collar that resulted chiefly from higher volumes in the United States and Europe.

// Business with our **Drontal™** line of dewormers declined due to lower demand in the Europe/Middle East/Africa and North America regions.
// The increase in sales of our **Baytril™** antibiotic resulted particularly from higher volumes in the United States and Latin America.

Earnings
EBITDA before special items declined by 6.0% to €358 million in 2018. Adjusted for negative currency effects of €26 million, earnings matched the prior-year level (+0.8%). An increase in the cost of goods sold and a negative impact on earnings from the application of IFRS 15 were offset by lower expenses in all functional areas – primarily general administration and selling expenses – and other factors.

EBIT of Animal Health increased by 1.6% to €312 million after special charges of €7 million (2017: €31 million) in connection with efficiency improvement measures.

A 2.2.2/13

Special Items[1] Animal Health

€ million	EBIT Q4 2017	EBIT Q4 2018	EBIT 2017	EBIT 2018	EBITDA Q4 2017	EBITDA Q4 2018	EBITDA 2017	EBITDA 2018
Restructuring	(23)	(1)	(31)	(7)	(21)	(1)	(29)	(7)
Total special items	**(23)**	**(1)**	**(31)**	**(7)**	**(21)**	**(1)**	**(29)**	**(7)**

[1] For definition see A 2.4 "Alternative Performance Measures Used by the Bayer Group."

2.2.3 Value-Based Performance

A 2.2.3/1

Value-Based Performance by Segment

	Pharmaceuticals		Consumer Health		Crop Science		Animal Health		Group[1]	
€ million	**2017**	**2018**	**2017**	**2018**	**2017**	**2018**	**2017**	**2018**	**2017**	**2018**
EBIT[1]	4,325	3,213	518	(2,077)	1,235	3,138	307	312	5,903	3,914
Taxes[1,3]	(1,038)	(771)	(124)	498	(296)	(753)	(74)	(75)	(1,417)	(939)
NOPAT[1]	3,287	2,442	394	(1,579)	939	2,385	233	237	4,486	2,975
Average capital employed[1]	15,630	14,721	14,404	12,278	9,814	37,614	495	623	41,600	67,537
ROCE[1]	21.0%	16.6%	2.7%	(12.9)%	9.6%	6.3%	47.1%	38.0%	10.8%	4.4%
WACC[1]	6.9%	6.7%	6.9%	6.7%	6.9%	6.7%	6.9%	6.7%	6.9%	6.7%

[1] For definition see A 2.4 "Alternative Performance Measures Used by the Bayer Group."
[2] Including Reconciliation
[3] 24% on EBIT; based on historical average of tax rates

Bayer's ROCE in 2018 amounted to 4.4%, which was 2.3 percentage points below the Bayer Group's cost of capital of 6.7%. The year-on-year changes were driven primarily by special items, which had a significant impact on all segments. Special gains from one-time divestment proceeds, such as those from the divestments of Crop Science businesses made to satisfy anti-trust requirements, had a positive impact on ROCE. By contrast, the results of annual impairment tests (Pharmaceuticals and Consumer Health) and a significantly higher capital employed basis as a result of the Monsanto acquisition (Crop Science) weighed heavily on the ROCE of the respective segments.

The following overview shows the composition of the average capital employed that was used to calculate ROCE.

A 2.2.3/2

Components of Capital Employed[1]

€ million	Dec. 31, 2017	Dec. 31, 2018
Goodwill	14,751	38,146
Other intangible assets	11,674	36,746
Property, plant and equipment	7,633	12,944
Other financial assets[2]	47	42
Inventories	6,550	10,961
Trade accounts receivable	8,582	11,836
Other receivables[2]	1,293	1,850
Deferred tax assets[2]	2,371	1,666
Claims for income tax refunds	474	809
Assets held for sale	2,081	234
Gross capital employed	**55,456**	**115,234**
Other provisions[2]	(5,602)	(6,807)
Trade accounts payable	(5,129)	(5,414)
Other liabilities[2]	(2,093)	(1,685)
Refund liabilities	–	(3,789)
Contract liabilities	–	(4,221)
Financial liabilities[2]	(4)	(1)
Deferred tax liabilities[2]	(910)	(4,532)
Income tax liabilities	(917)	(2,465)
Liabilities directly related to assets held for sale	(111)	(12)
Capital employed	**40,690**	**86,308**
Average capital employed	**41,600**	**67,537**

[1] For definition see A 2.4 "Alternative Performance Measures Used by the Bayer Group."
[2] Selected items of the component: nonoperative or non-interest-bearing items eliminated within capital employed

The Monsanto acquisition closed in June 2018, and thus during the year. This is taken into account in the average capital employed calculation through a month-based weighting of the capital employed values for the Crop Science segment and thus, on a prorated basis, for the Group as well. This approach serves to illustrate the corresponding impact on average capital employed over the course of the year due to the point in time the acquisition occurred.

2.2.4 Asset and Financial Position of the Bayer Group

Financial management of the Bayer Group

see also A 1.2.2

The financial management of the Bayer Group is conducted by Bayer AG. Capital is a global resource, generally procured centrally and distributed within the Bayer Group. The foremost objectives of our financial management are to help bring about a sustained increase in corporate value and to ensure the Bayer Group's liquidity and creditworthiness. This involves optimizing the capital structure and effectively managing risks. The management of currency, interest-rate, commodity-price and default risks helps to reduce the volatility of our earnings.

The contracted rating agencies revised their ratings following the acquisition of Monsanto and now assess Bayer as follows:

A 2.2.4/1

Rating

	Long-term rating	Short-term rating	Outlook
S & P Global Ratings	BBB	A2	stable
Moody's	Baa1	P2	negative
Fitch Ratings	A–	F2	stable

These investment grade ratings from all three agencies reflect the company's high solvency and ensure access to a broad investor base for financing purposes. Our stated aim is to also achieve A-category long-term ratings from S & P Global Ratings and Moody's.

As a matter of principle, we pursue a prudent debt management strategy to ensure flexibility, drawing on a balanced financing portfolio. This is fundamentally based on bonds in various currencies, syndicated credit facilities, bilateral loan agreements and a global commercial paper program.

We use financial derivatives to hedge against risks arising from business operations or financial transactions, but do not employ contracts in the absence of an underlying transaction. It is our policy to diminish default risks by selecting trading partners with a high credit standing. We closely monitor the execution of all transactions, which are conducted in accordance with Bayer Group policies.

See also A 3.2.2

Liquidity and Capital Expenditures of the Bayer Group

A 2.2.4/2

Bayer Group Summary Statements of Cash Flows

€ million	Q4 2017	Q4 2018	2017	2018
Net cash provided by (used in) operating activities, continuing operations	**2,256**	**2,968**	**6,611**	**7,917**
Net cash provided by (used in) operating activities, discontinued operations	13	–	1,523	–
Net cash provided by (used in) operating activities (total)	**2,269**	**2,968**	**8,134**	**7,917**
Net cash provided by (used in) investing activities (total)	**1,709**	**(571)**	**(432)**	**(34,152)**
Net cash provided by (used in) financing activities (total)	**(1,906)**	**(3,172)**	**(1,881)**	**23,432**
Change in cash and cash equivalents due to business activities	**2,072**	**(775)**	**5,821**	**(2,803)**
Cash and cash equivalents at beginning of period[1]	**5,555**	**4,850**	**1,899**	**7,435**
Change due to exchange rate movements and to changes in scope of consolidation	(46)	(23)	(139)	(580)
Cash and cash equivalents at end of period	**7,581**	**4,052**	**7,581**	**4,052**

[1] The difference in cash and cash equivalents at end of period 2017 and beginning of period 2018 is due to a reclassification through the application of IFRS 9.

Net cash provided by operating activities

The net cash provided by operating activities in continuing operations increased by 19.8% to €7,917 million thanks to a reduction in cash tied up in working capital. However, net cash provided by operating activities (total) fell by 2.7% as Covestro was still included here in the previous year.

Net cash used in investing activities

The net cash outflow for investing activities in 2018 amounted to €34,152 million. Cash outflows for property, plant and equipment and intangible assets were 9.6% higher at €2,593 million (2017: €2,366 million). Divestments resulted in an inflow of €7,563 million and included the proceeds from the divestment of part of the crop protection business to BASF. Cash outflows for acquisitions in the amount of €45,316 million related to the acquisition of Monsanto. Net cash inflows from current and noncurrent financial assets totaled €5,717 million (2017: €1,230 million), and included €2,909 million in proceeds from the sale of Covestro shares.

Net cash provided by (used in) financing activities

In 2018, there was a net cash inflow of €23,432 million for financing activities, including net borrowings of €17,819 million (2017: net loan repayments of €2,479 million). Net interest payments were 25.5% higher at €919 million (2017: €732 million). The cash outflow for dividends amounted to €2,407 million (2017: €2,364 million).

Capital increases resulted in an inflow of €8,986 million.

Free cash flow

Free cash flow, which is total operating cash flow less capital expenditures plus interest and dividends received less interest paid, amounted to €4,652 million in 2018.

Capital Expenditures

A 2.2.4/3

Capital Expenditures for Property, Plant and Equipment and for Intangible Assets[1]

€ million	2017	2018
Pharmaceuticals	915	964
Consumer Health	178	204
Crop Science	553	1,000
Animal Health	38	55
Corporate functions and Reconciliation	400	370
Group[2]	**2,366**	**2,593**

[1] Capital expenditures as per statement of cash flows
[2] 2017 Group total includes Covestro

The highest expenditures for property, plant, and equipment at **Pharmaceuticals** were modernization programs for the production network of our product supply organization (€46 million) and for our research activities (€39 million) in Wuppertal and Berlin, Germany; the expansion of production capacities for recombinant products (€37 million) in Leverkusen and Wuppertal, Germany, and for Eylea™ (€25 million) at our sites in Berlin, Germany, and Shiga, Japan; and the construction of a pilot plant for continuous solids production (€6 million) in Leverkusen, Germany.

Capital expenditures for intangible assets included a milestone payment of US$275 million to Loxo Oncology, Inc. in connection with the FDA approval of Vitrakvi™ in the United States.

At approximately €45 million, **Consumer Health's** largest investment was the GMP upgrade program across its global production sites, including €23 million for the production site in Guatemala City, Guatemala, and €12 million for the production site in Cleveland, Tennessee, United States.

Crop Science continuously invests in its global production network for crop protection products and seeds as well as in research, development and digital transformation. The largest projects in 2018 included capital expenditures for the production of herbicides and fungicides in Luling, Louisiana, United States, and Kansas City, Missouri, United States, as well as for seed processing sites in Lubbock, Texas, United States (cotton) and Pochuyki, Ukraine (corn). In 2018, Bayer also initiated substantial capital spending on research facilities in Chesterfield, Missouri, United States, and invested in digital farming.

In 2018, **Animal Health** invested €19 million in the expansion of the site in Kiel, Germany, where we manufacture some 60% of the Animal Health products we market worldwide.

A 2.2.4/4

Strategic Investments in Property, Plant and Equipment

		2017	2018
Pharmaceuticals	Expansion of Eylea™ production capacities in Berlin, Germany, and Shiga, Japan	started	ongoing
	Pilot facility for continuous solids production in Leverkusen, Germany	started	ongoing
	Modernization of production facilities at sites across the production network (Leverkusen, Germany; Garbagnate, Italy; etc.)	ongoing	ongoing
	Construction of a new research building in Wuppertal (Aprath), Germany	ongoing	ongoing
	Modernization of research facilities in Berlin, Germany	ongoing	ongoing
	Back-up active ingredient production for Xarelto™ in Bergkamen, Germany	ongoing	ongoing
Consumer Health	Upgrade of global production site facilities to new GMP standards	ongoing	ongoing
Crop Science	Capacity expansions for herbicide production in Muskegon, Michigan, and Mobile, Alabama, U.S.A., and Frankfurt and Knapsack, Germany	ongoing	divested[2]
	Construction of a production facility for insecticides in Dormagen, Germany	ongoing	completed
	Expansion of production capacities for fungicides in Dormagen, Germany	ongoing	completed
	Expansion of research and development facilities in Monheim, Germany	ongoing	ongoing
	Construction of breeding stations for various plant species worldwide	ongoing	divested[2]
	Expansion of R&D facilities in Raleigh, North Carolina, U.S.A.	ongoing	divested[2]
	Expansion of production and research greenhouses in Nunhem, Netherlands	ongoing	divested[2]
	Establishment of a production site for fungicides in Kansas City, Missouri, U.S.A.	ongoing	ongoing
	Expansion of production capacities for insecticides in Vapi, India	ongoing	ongoing
	Construction of a production facility for herbicides in Luling, Louisiana, U.S.A.[1]	ongoing	ongoing
	Construction of a corn seed production site in Pochuyki, Ukraine[1]	ongoing	ongoing
	Construction of a corn breeding station in Marana, Arizona, U.S.A.[1]	ongoing	ongoing
	Expansion of R&D facilities in Chesterfield, Missouri, U.S.A.[1]	ongoing	started
	Construction of a cotton seed production site in Lubbock, Texas, U.S.A.[1]	ongoing	ongoing
	IT solutions to support digital transformation[1]	ongoing	ongoing
Animal Health	Expansion of production capacities for Seresto™ in Kiel, Germany	ongoing	ongoing

[1] Monsanto was responsible for these projects until the closing of the acquisition.
[2] In conjunction with the divestments to BASF

Liquid assets and net financial debt

See also A 2.4

A 2.2.4/5

Net Financial Debt[1]

€ million	Dec. 31, 2017	Dec. 31, 2018	Change in %
Bonds and notes/promissory notes	12,436	35,402	+ 184.7
of which hybrid bonds[2]	4,533	4,537	+ 0.1
Liabilities to banks	534	4,865	.
Liabilities under finance leases	238	399	+ 67.6
Liabilities from derivatives[3]	240	172	− 28.3
Other financial liabilities	970	556	− 42.7
Receivables from derivatives[3]	(244)	(137)	− 43.9
Financial debt	**14,174**	**41,257**	**+ 191.1**
Cash and cash equivalents	(7,581)	(4,052)	− 46.6
Current financial assets[4]	(2,998)	(930)	− 69.0
Noncurrent financial assets[5]	–	(596)	.
Net financial debt	**3,595**	**35,679**	**.**

[1] For definition see A 2.4 “Alternative Performance Measures Used by the Bayer Group.”
[2] Classified as debt according to IFRS
[3] These include the market values of interest-rate and currency hedges of recorded transactions.
[4] These include short-term loans and receivables with maturities between 3 and 12 months outstanding from banks and other companies as well as financial investments in debt and equity instruments that were recorded as current on first-time recognition.
[5] These solely comprise the remaining interest in Covestro that is to be used to repay the convertible bond issued in 2017 that will mature in 2020.

Net financial debt of the Bayer Group increased by €32 billion in 2018, due primarily to the acquisition of Monsanto.

In addition to equity measures totaling €9 billion, bonds amounting to US$15 billion and €5 billion were issued to finance the acquisition. These bonds were issued by the subsidiaries Bayer U.S. Finance II LLC, Pittsburgh, Pennsylvania, United States, and Bayer Capital Corporation B.V., Mijdrecht, Netherlands, respectively.

As part of the acquisition, outstanding bonds with a nominal volume of US$6.9 billion were taken over from Monsanto. In July 2018, Bayer initiated an exchange offer for all 16 debt instruments, granting Monsanto bondholders the option of acquiring securities guaranteed by Bayer AG. Some 83% of the outstanding bond volume was exchanged in total.

Financial debt includes three subordinated hybrid bonds with a total volume of €4.5 billion, 50% of which is treated as equity by the rating agencies. As such, the hybrid bonds have a positive impact on the Group's rating-specific debt indicators.

The increase in liabilities to banks mainly resulted from the use of the bridge financing for the acquisition of Monsanto. As of December 31, 2018, the outstanding acquisition loan amounted to US$4.9 billion.

The other financial liabilities as of December 31, 2018, contained €309 million related to the mandatory convertible notes issued in November 2016.

Asset and Capital Structure of the Bayer Group

A 2.2.4/6

Bayer Group Summary Statements of Financial Position

€ million	Dec. 31, 2017	Dec. 31, 2018	Change (%)
Noncurrent assets	**45,014**	**95,352**	**+111.8**
Assets held for sale	2,081	234	−88.8
Other current assets	27,992	30,699	+9.7
Current assets	**30,073**	**30,933**	**+2.9**
Total assets	**75,087**	**126,285**	**+68.2**
Equity	**36,861**	**46,148**	**+25.2**
Noncurrent liabilities	**24,633**	**57,314**	**+132.7**
Current liabilities	13,482	22,811	+69.2
Provisions directly related to assets held for sale	111	12	−89.2
Total current liabilities	**13,593**	**22,823**	**+67.9**
Liabilities	**38,226**	**80,137**	**+109.6**
Total equity and liabilities	**75,087**	**126,285**	**+68.2**

Total assets as of December 31, 2018, amounted to €126.3 billion, up €51.2 billion from December 31, 2017. This increase was mainly due to the acquisition of Monsanto.

Noncurrent assets rose by €50.3 billion to €95.4 billion. Intangible assets of €26.9 billion – mainly comprising patents and technologies (€17.2 billion), research projects (€4.6 billion) and trademarks (€3.9 billion) – and property, plant and equipment of €5.7 billion were acquired in connection with the acquisition. In addition, goodwill of €24.5 billion was recognized. Investments accounted for using the equity method declined by €3.5 billion, mainly due to the sale of Covestro shares.

Total current assets increased by €0.9 billion to €30.9 billion. Among the items acquired from Monsanto were receivables of €7.3 billion and inventories of €4.8 billion. Other financial assets declined by €2.4 billion to €1.2 billion, mainly due to their utilization in financing the acquisition. Assets held for sale, which in 2017 related to the acquisition of Monsanto, decreased by

€1.8 billion. In 2018, they included the divestment of the prescription dermatology business of Consumer Health.

Equity rose by €9.3 billion compared with December 31, 2017, to €46.1 billion. In April 2018, the Republic of Singapore subscribed to 31 million new Bayer shares through a subsidiary, for total gross proceeds of €3 billion. In June 2018, we raised €6.0 billion in net proceeds from a capital increase out of authorized capital against cash contributions and with subscription rights for existing Bayer stockholders. Equity was also increased by income after income taxes of €1.7 billion. By contrast, the dividend payment of €2.4 billion reduced equity. The equity ratio declined to 36.5% as of December 31, 2018 (December 31, 2017: 49.1%).

Liabilities as of December 31, 2018, rose by €41.9 billion to €80.1 billion. Financial liabilities (€8.7 billion), refund liabilities (€3.3 billion) and other liabilities (€2.9 billion) were assumed in connection with the acquisition. Furthermore, deferred tax liabilities of €7.9 billion were recognized in connection with the acquisition due to the measurement of the acquired assets and liabilities at fair value. Noncurrent liabilities rose by €32.7 billion overall to €57.3 billion. Current liabilities increased by €9.2 billion to €22.8 billion.

2.3 Earnings; Asset and Financial Position of Bayer AG

Business lease agreements between Bayer AG on the one hand, and Bayer Pharma AG and Bayer CropScience AG – the former parent companies of the respective divisions – on the other, have been in place since the start of 2017. These agreements transferred the two companies' operational businesses to Bayer AG. As a result, the business of Bayer AG – previously confined to a holding company function – expanded considerably to include the parent company functions of the two divisions. The financial statements of Bayer AG are prepared in accordance with the German Commercial Code (HGB), Stock Corporation Act (AktG) and German Energy Act (EnWG).

Bayer AG performs principal management functions for the Bayer Group.

Bayer AG supplies third parties with electricity and gas at individual facilities. In accordance with Section 3, No. 18 of the German Energy Act (EnWG), it is therefore classified as an energy provider within the meaning of the EnWG. Furthermore, as the vertically integrated energy provider and site services provider Currenta GmbH & Co. OHG is a subsidiary of Bayer AG, Bayer AG is classed as a vertically integrated energy provider pursuant to Section 3, No. 38 of the EnWG.

2.3.1 Earnings Performance of Bayer AG

A 2.3.1/1

Bayer AG Summary Income Statements according to the German Commercial Code

€ million	2017	2018
Net sales	14,730	14,647
Cost of goods sold	(7,914)	(8,219)
Gross profit	**6,816**	**6,428**
Selling expenses	(3,898)	(4,509)
Research and development expenses	(2,186)	(2,331)
General administration expenses	(908)	(1,056)
Other operating income	85	268
Other operating expenses	(102)	(115)
Operating income	**(193)**	**(1,315)**
Income from investments in affiliated companies – net	5,794	4,739
Interest income/expense – net	(369)	(562)
Other financial income/expense – net	(354)	(511)
Nonoperating income	**5,071**	**3,666**
Income taxes	(335)	(234)
Income after taxes/net income	**4,543**	**2,117**
Profit carried forward from the previous year	–	498
Allocation to other retained earnings	(1,643)	(4)
Distributable profit	**2,900**	**2,611**

Earnings decline, impacted by restructuring measures

Sales of Bayer AG were level with the previous year at €14.6 billion (2017: €14.7 billion). Sales of Pharmaceuticals were slightly higher but remained at around €8.5 billion, while Crop Science registered a decline to €6.0 billion (2017: €6.1 billion). Nondivisional sales were unchanged at €0.1 billion.

At Pharmaceuticals, Xarelto™ remained the division's best-selling product by far, registering sales of €2.5 billion. We recorded sales gains for Adempas™ (+€159 million), Glucobay™ (+€114 million) and Aspirin™ Cardio (+€103 million), among others, but declines for Adalat™ (–€144 million), Levitra™ (–€37 million) and Ciprobay™ (–€36 million). Of the total sales, business with Bayer Group companies accounted for 91% and business with third parties for 9%.

The slight decline in sales at Crop Science was largely attributable to the divestments to BASF. Declines of €95 million at Herbicides and €21 million at SeedGrowth stood against positive development at Insecticides (+€79 million) and Fungicides (+36 million). Cost reimbursements from other Bayer Group companies fell by €70 million. From a regional perspective, North America was responsible for the decline in sales, with sales in that region down by €0.3 billion. Latin America, in particular, showed a year-on-year recovery, with sales there advancing by €0.1 billion. The lion's share of sales, at 96%, was attributable to intra-Group business with Bayer companies.

The cost of goods sold increased to €8.2 billion, mainly due to expenses of €320 million for the restructuring measures initiated in 2018. After deducting the cost of goods sold from sales, gross profit was €6.4 billion (2017: €6.8 billion), or 44% of sales (2017: 46%). The gross margin was 57% (2017: 58%) at Pharmaceuticals and 31% (2017: 34%) at Crop Science. Selling expenses rose by €611 million to €4.5 billion, largely due to a €402 million increase in lease payments arising from Bayer AG's business lease agreements with Bayer Pharma AG and Bayer CropScience AG. In addition to lease payments, selling expenses mainly comprised €3.3 billion in royalties, €2.3 billion of which was paid to Bayer Intellectual Property GmbH for the use of patents, trademarks and other intellectual property. Research and development expenses included €287 million for restructuring measures, and therefore climbed by €145 million to €2.3 billion, of which Pharmaceuticals accounted for €1.6 billion (+€90 million) and Crop Science for €0.5 billion (+€56 million). General administration expenses were up by €148 million year on year at €1.1 billion, due primarily to salary increases. The balance of other operating expenses and other operating income was positive at €153 million (2017: negative balance of €17 million), mainly due to the intra-Group compensation payments received for restructuring expenses incurred in connection with the impairment losses recognized for the newly constructed Factor VIII plant in Wuppertal.

The operating loss widened by a substantial €1,122 million to €1,315 million in 2018 (2017: €193 million), mainly as a result of special charges relating to the initiated restructuring measures and higher expenses for the business lease.

Income from investments in affiliated companies fell by €1,055 million to €4,739 million. This was primarily due to a decline of €667 million in dividends and similar income from subsidiaries to €152 million (2017: €819 million) and a €908 million decline in income from profit and loss transfer agreements to €1,337 million (2017: €2,245 million). The decline in dividends and similar income from subsidiaries largely pertained to Bayer Hispania, S.L., Spain, which did not pay a dividend in 2018 after a dividend of €591 million in the previous year. Furthermore, a dividend payment of only €63 million (2017: €146 million) was received from Covestro AG due to the lower number of shares. The decline in income from profit and loss transfer agreements was primarily attributable to a lower profit transfer from Bayer Pharma AG (€1,438 million in 2018, compared with €2,248 million in 2017). Following the assumption of operational activities by Bayer AG, earnings of that company mainly result from dividends and similar income as well as income from the business lease and intra-Group financing measures. There was also a year-on-year decline in income transferred from Bayer Real Estate GmbH (€30 million in 2018, compared with €130 million in 2017) and from Siebte Bayer VV GmbH, which receives regular dividends from a U.S. subsidiary that handles export business in the United States for Bayer Health Care LLC (€6 million in 2018, compared with €94 million in 2017). The €127 million loss recorded by Bayer Business Services GmbH, which was offset by Bayer AG, was well below the 2017 figure of €201 million that arose due to project costs. The divestment of shares in Covestro AG resulted in proceeds of €3,314 million in 2018 (2017: €2,720 million).

Net interest expense increased from €369 million to €562 million. This was primarily the result of an €847 million increase in net expense from the interest portion of the allocation to noncurrent provisions, particularly for pensions and other post-employment benefits, and from the valuation of the fund assets, to €677 million (2017: net gain of €170 million). The increased expense was due to higher interest-related actuarial losses on obligations and the negative development of assets. There was also higher net interest expense of €291 million (2017: €4 million) from bank loans that mainly related to the Monsanto financing. The balance of interest expense and income attributable to intra-Group transactions improved significantly for the same reason: after net interest expense of €246 million in the previous year, net interest income of €204 million was recognized in 2018. An improvement in the balance of interest expense and income also resulted from hedging transactions in connection with the financing of the Monsanto acquisition, which led to income of €368 million upon their respective maturities in May and June 2018. The remaining net interest expense of €166 million (2017: €290 million) comprised the balance of €169 million (2017: €186 million) in interest paid on bonds, €28 million (2017: €109 million) for interest-rate swaps and options, and €31 million (2017: €5 million) in miscellaneous income items.

The negative balance of other financial income and expenses widened in 2018, to €511 million (2017: €354 million), mainly due to impairment losses of €459 million recognized on the interest in Covestro AG that is now reflected as securities under noncurrent assets. Earnings were also diminished by charges of €97 million in connection with the public capital increase in June 2018 and charges of €50 million resulting from the derecognition of Monsanto shares held by Bayer AG following their acquisition-related retirement. However, the substantial €289 million improvement in income from currency translation to €77 million (2017: loss of €212 million) had an opposing effect. Bank charges for credit facilities were also €83 million lower at €138 million, including €126 million (2017: €210 million) in connection with the financing of the Monsanto acquisition. Earnings were also buoyed by a €76 million decrease in pension expenses (excluding the interest portion recognized in the balance of interest expense and income) for retirees remaining with Bayer AG following the hive-down of the operating business in 2002 and 2003.

Income before income taxes amounted to €2,351 million overall in 2018, down €2,527 million from the prior-year figure of €4,878 million. After deduction of €234 million (2017: €335 million) in taxes, net income was €2,117 million (2017: €4,543 million). Including €498 million in profit carried forward from the previous year and after an allocation of €4 million to other retained earnings, the distributable profit was €2,611 million.

The Board of Management and Supervisory Board will propose to the Annual Stockholders' Meeting on April 26, 2019, that the distributable profit be used to pay a dividend of €2.80 per share on the capital stock entitled to the dividend.

2.3.2 Asset and Financial Position of Bayer AG

A 2.3.2/1

Bayer AG Summary Statements of Financial Position According to the German Commercial Code

€ million	Dec. 31, 2017	Dec. 31, 2018
ASSETS		
Noncurrent assets		
Intangible assets, property, plant and equipment	152	163
Financial assets	47,071	73,530
	47,223	73,693
Current and other assets		
Inventories	2,109	2,197
Trade accounts receivable	2,002	2,113
Receivables from subsidiaries	2,585	1,829
Other assets and deferred charges	901	492
Cash and cash equivalents, marketable securities	4,272	3,178
	11,869	9,809
Total assets	**59,092**	**83,502**
EQUITY AND LIABILITIES		
Equity	**18,875**	**27,659**
Provisions	**2,201**	**3,159**
Other liabilities		
Bonds and notes, liabilities to banks	7,618	10,496
Trade accounts payable	1,750	1,913
Payables to subsidiaries	28,078	39,680
Remaining liabilities and deferred income	570	595
	38,016	52,684
Total equity and liabilities	**59,092**	**83,502**

See also A 2.3.2/1

Change in financial position attributable to financing measures for Monsanto

The asset and liability structure of Bayer AG is dominated by the management functions for the Bayer Group, even following the integration of the parent company functions of the Pharmaceuticals and Crop Science divisions at the beginning of 2017. The financial position is shaped particularly by the management of subsidiaries and the financing of corporate activities. This is primarily reflected in the high level of investments in affiliated companies and of the receivables from, and payables to, Group companies.

The acquisition of the Monsanto Group and the related financing measures resulted in considerable changes to the financial position of Bayer AG in 2018. Total assets increased by €24.4 billion, or 41.3%, to €83.5 billion. This was due to a €26.5 billion rise in noncurrent assets to €73.7 billion, while current assets fell by €2.1 billion to €9.8 billion.

Within noncurrent assets, investments in affiliated companies increased by €3.5 billion. Intra-Group capital increases totaling €4.9 billion stood against a €1.3 billion decrease from the sale of shares in Covestro AG, among other items. Investments in affiliated companies came in at €49.6 billion overall (2017: €46.2 billion), and continued to account for the largest item in total assets by far, at 59.4% (2017: 78.2%). Due to the granting of intra-Group loans totaling €22.4 billion in connection with the financing of the Monsanto acquisition, total loans increased by €0.9 billion to €23.3 billion. The remaining interest held in Covestro AG, valued at €0.6 billion, is now reflected as securities under noncurrent assets. Intangible assets, property, plant and equipment were practically unchanged at €0.2 billion.

Among the current asset items, inventories and trade accounts receivable increased slightly, each rising by €0.1 billion to €2.2 billion and €2.1 billion, respectively. There were also only minor changes in this regard within the divisions. Trade accounts receivable of €1.8 billion (2017: €1.6 billion) pertained mainly to Group companies. Receivables from subsidiaries amounted to €1.8 billion (2017: €2.6 billion) and accounted for 2.2% of total assets. The other receivables reflected in current assets (including deferred charges) decreased by €0.4 billion to €0.5 billion; the previous year's total included €284 million in shares of Covestro AG divested to banks while exposure to the related economic risks and opportunities was retained. Cash and cash equivalents, which in the previous year exclusively comprised bank deposits except for the small amount of €25 million in commercial paper, fell by €1.1 billion to €3.2 billion in 2018.

Bayer AG's equity rose by €8.8 billion, or 46.5%, to €27.7 billion (2017: €18.9 billion). This increase resulted from the net income of €2,117 million and inflows of €9,069 million from the two capital increases implemented in 2018, while the dividend payment of €2,402 million for 2017 had a diminishing effect. The equity ratio increased to 33.1% (2017: 31.9%) due to the proportionately smaller increase in total assets.

Provisions increased by €1.0 billion to €3.2 billion. In addition, provisions of €606 million were established in 2018 for the restructuring measures announced in November 2018. Pension provisions increased by a net amount of €432 million, of which €278 million was attributable to a higher discount rate and €211 million to lower fund assets. Additional increases in provisions for incentive payments (+€66 million) and income taxes (+€60 million) stood against decreases in other provisions, including a decrease of €217 million in those for impending losses from hedging transactions.

Liabilities (including deferred income) increased by €14.7 billion to €52.7 billion due to financing measures for the Monsanto acquisition. The growth in liabilities resulted entirely from higher financial debt. The main increases were in intra-Group financial debt (by €11.8 billion to €40.1 billion) and liabilities to banks (by €3.4 billion to €4.2 billion). A bond with a volume of €517 million was redeemed at maturity. Total financial debt as of the closing date was €50.7 billion (2017: €36.0 billion). After deduction of cash and cash equivalents of €3.2 billion (2017: €4.3 billion), net debt rose by €15.8 billion to €47.5 billion (2017: €31.7 billion). Within operating liabilities, trade accounts payable rose by €0.2 billion to €1.9 billion, while liabilities to Group companies declined by the same amount to €0.8 billion (gross of deductible receivables).

2.3.3 Outlook for Bayer AG

For Bayer AG we expect sales of approximately €15 billion and an operating loss in the region of €2 billion in 2019. These numbers comprise both Bayer AG's own operational business and the businesses leased from Bayer Pharma AG and Bayer CropScience AG. In addition, the earnings of most Bayer subsidiaries in Germany are transferred directly to Bayer AG under profit and loss transfer agreements. Also, specific intra-company dividend measures ensure the availability of sufficient distributable income. On account of the interdependencies between Bayer AG and its subsidiaries, the outlook for the Bayer Group thus largely also reflects the expectations for Bayer AG. In the coming year, based on these factors, we expect Bayer AG to report a distributable profit that will again enable our stockholders to adequately participate in the Bayer Group's earnings.

2.4 Alternative Performance Measures Used by the Bayer Group

See also "About this Report" and Note 2 to B Consolidated Financial Statements

The Combined Management Report and the consolidated financial statements of the Bayer Group are prepared according to the applicable financial reporting standards. In addition to the disclosures and metrics these require, Bayer publishes alternative performance measures (APMs) that are not defined or specified in these standards and for which there are no generally accepted reporting formats. Bayer calculates APMs to enable a comparison of performance indicators over time and against those of other companies in its industry sector. These APMs are calculated by making certain adjustments to items in the statement of financial position or the income statement prepared according to the applicable financial reporting standards. Such adjustments may result from differences in calculation or measurement methods, nonuniform business activities or special factors affecting the information value of these items. The APMs determined in this way apply to all periods and are used both internally for business management purposes and externally by analysts, investors and rating agencies to assess the company's performance. Bayer determines the following APMs:

- Change in sales (reported, currency-adjusted, currency- and portfolio-adjusted)
- Pro-forma sales
- EBITDA
- EBITDA before special items
- EBITDA margin before special items
- EBIT
- EBIT before special items
- Core earnings per share
- Net financial debt
- Return on capital employed (ROCE)
- Net operating profit after tax (NOPAT)
- Capital employed
- WACC
- Free cash flow
- Forecast key financial data

The **(reported) change in sales** is a relative indicator. It shows the percentage by which sales varied from the previous year.

The **currency-adjusted or currency- and portfolio-adjusted change in sales** shows the percentage change in sales excluding the impact of exchange rate effects and, in the latter case, disregarding material acquisitions and divestments as well. Exchange rate effects are generally calculated on the basis of the functional currency valid in the respective country. Exceptions existed in Brazil and Argentina, primarily at Crop Protection, where the currency effect was calculated on the basis of the U.S. dollar instead of the functional (national) currency. From 2019, these exceptions will no longer apply.

See A 2.2.2/10 for further details of the calculation of pro-forma sales

Due to the scope of the activities acquired through the Monsanto acquisition and the seasonality of the business, we are also presenting sales by strategic business entity on an unaudited, pro-forma basis to better show the operational business development for the combined business of Crop Science and Monsanto, among other reasons. The **pro-forma sales** are presented as if both the acquisition of Monsanto and the associated divestments had taken place as of January 1, 2017.

EBITDA stands for earnings before interest, taxes, depreciation and impairment losses/loss reversals on property, plant and equipment, impairment losses on goodwill, and amortization and impairment losses/loss reversals on other intangible assets. This performance indicator neutralizes the effects of the financial result along with distortions of operational performance that result from divergent depreciation and amortization methods and the exercise of measurement discretion.

EBITDA is EBIT plus the amortization of intangible assets and the depreciation of property, plant and equipment, plus impairment losses and minus impairment loss reversals, recognized in profit or loss during the reporting period.

EBIT (earnings before interest and taxes) serves to present a company's performance while eliminating the effects of differences among local taxation systems and different financing activities.

See B 1 of the Notes to the Consolidated Financial Statements for the reconciliation to EBIT

EBITDA before special items and **EBIT before special items** show the development of the operational business irrespective of the effects of special items, i.e. special effects for the Bayer Group with regard to their nature and magnitude. These may include acquisition costs, divestments, litigations, restructuring, integration costs, impairment losses and impairment loss reversals. In the calculation of EBIT before special items and EBITDA before special items, special charges are added and special gains subtracted.

The **EBITDA margin before special items** is a relative indicator used by Bayer for internal and external comparisons of operational earnings performance. It is the ratio of EBITDA before special items to net sales.

Core earnings per share (core EPS) from continuing operations is an APM based on the concept of **earnings per share (EPS)** as defined in IAS 33. Core earnings per share form the basis of the Bayer Group's dividend policy.

See A 2.2.1/3 for the calculation of core EPS, and A 2.2.1 for further details

Core EPS are calculated using the following method: Based on **EBIT (as per the income statements)**, the special items, impairment losses on goodwill, amortization/impairment losses/loss reversals on other intangible assets, impairment losses/loss reversals on property, plant and equipment and the accelerated depreciation included in special items are neutralized to determine **core EBIT**. This enables a comparison of performance over time. **Core EBIT** is reconciled to **core net income from continuing operations**, and **core EPS** are then calculated by dividing core net income by the weighted average number of shares.

As core earnings per share are calculated for each interim reporting period, core earnings per share for the fiscal year or for each interim reporting period up to the respective closing date may deviate from the cumulated core earnings per share for the individual interim reporting periods.

Net financial debt is an important financial management indicator for the Bayer Group and is used both internally and externally in assessing its liquidity, capital structure and financial flexibility.

See A 2.2.4/5 for the calculation of net financial debt, and A 2.2.4 for further details

The **return on capital employed (ROCE)** indicates the capital return over a specified period and is a value-based indicator used in long-term business and portfolio analyses. It is the ratio of **net operating profit after taxes (NOPAT)** to the average capital employed. NOPAT represents the operating result after taxes and is calculated by subtracting income taxes from EBIT. Income taxes are calculated by multiplying EBIT by a uniform tax rate that is based on a historical average of tax rates.

See A 2.2.3 for the calculation of ROCE

The **capital employed** by Bayer is the total carrying amount of operational noncurrent and current assets, minus liabilities that are largely non-interest-bearing in character and/or would distort the capital base. An average value, calculated from the values at the end of the prior year and of the reporting year, is used to depict the change in capital employed during the reporting year. The definition of capital employed was updated in 2018 to reflect the changes resulting from IFRS 15 (Revenue from Contracts with Customers) and relevant line items in the statement of financial position were expanded.

See A 2.2.3 for the calculation of capital employed

The ROCE is compared to the **weighted average cost of capital (WACC)**, which is the return expected by the providers of equity and debt. If the ROCE exceeds the WACC, return expectations have been exceeded, indicating that enterprise value has been created.

The **WACC** is based on an after-tax approach and calculated at the start of the year as the weighted average of the equity and debt cost factors. The cost of equity is determined using the Capital Asset Pricing Model (CAPM), while the debt-capital cost factor is calculated based on the average returns of ten-year Eurobonds issued by industrial companies. Further information on the segment-specific capital cost factors used in impairment testing is provided in Note [4] to the consolidated financial statements.

Free cash flow (FCF) is an alternative performance measure that is based on the cash flow from operating activities under IAS 7. FCF illustrates the cash flows available for paying dividends and reducing debt as well as for investing in innovation and acquisitions. It is calculated by subtracting cash outflows for additions to property, plant and equipment and intangible assets from the cash flow from operating activities, adding interest and dividends received along with interest received from interest-rate swaps, and deducting interest paid including interest-rate swaps.

The forward-looking key performance indicators published in the **forecast for key financial data** are based on data that is determined in the course of our planning process. The key financial data in the forecast is determined in accordance with the applied accounting policies and with the calculation models for alternative performance measures described in this chapter.

3. Report on Future Perspectives and on Opportunities and Risks

3.1 Future Perspectives

3.1.1 Economic Outlook

A 3.1.1/1

Economic Outlook

	Growth[1] 2018	Growth forecast[1] 2019
World	+3.2%	+2.9%
European Union	+2.0%	+1.5%
of which Germany	+1.5%	+1.4%
United States	+2.9%	+2.5%
Emerging Markets[2]	+4.8%	+4.6%

[1] Real growth of gross domestic product, source: IHS Markit
[2] Including about 50 countries defined by IHS Markit as emerging markets in line with the World Bank
As of February 2019

Declining growth in the global economy

Global economic growth looks set to slow in 2019 compared with 2018. In addition, the risk of a global economic downturn – triggered by an escalation of trade tensions or other factors – has increased. In the European Union, uncertainty over the form Brexit will take and political developments in a number of member states are likely to hamper the economy. In addition, Germany and France are not expected to provide any major economic stimulus. In the United States, higher tariffs in particular will probably hold back foreign trade, and the impetus from the tax cuts introduced in 2018 is expected to gradually fade. We also expect growth to weaken somewhat in the Emerging Markets as a whole. In Latin America, political uncertainty in a number of countries is likely to weigh on growth. Although Chinese economic growth has remained very high, it now appears increasingly fragile and will likely continue to slow in 2019 despite the government's stimulus measures.

A 3.1.1/2

Economic Outlook – Segments

	Growth[1] 2018	Growth forecast[1] 2019
Pharmaceuticals market	+5%	+5%
Consumer health market	+4%	+4%
Seeds and crop protection market	+2%	+3%
Animal health market	+5%	+4%

[1] Bayer's estimate, except pharmaceuticals. Source for pharmaceuticals market: IQVIA Market Prognosis (September 2018); all rights reserved; currency-adjusted; 2018 data provisional
As of February 2019

For the **pharmaceuticals market**, we anticipate that growth in 2019 will match the prior-year level (5%). We expect minor declines in growth rates in the Americas, Europe and Asia. However, we see the Japanese market returning to positive market growth in 2019. Growth drivers will likely continue to be new, high-end products and volume increases.

We anticipate that growth of the **consumer health** market in 2019 will match the 2018 level. The market is likely to experience rising price pressure from e-commerce and continued consolidation of the retail sector.

We expect the global **seed and crop protection market** to continue its positive development in 2019. In our view, the principal growth momentum will come from Latin America, mainly due to a further increase in soybean acreages, and from the Asia/Pacific region. We expect growth in North America to lag behind overall global development due to persistently low prices for agricultural commodities and to uncertainty in connection with the trade dispute between the United States and China. In Europe, growth is likely to be sluggish, held back partly by the ongoing tense financial situation for farmers and more stringent regulatory requirements.

Our base assumption for the **animal health market** in 2019 is for stable growth at a slightly slower pace than in 2018.

3.1.2 Corporate Outlook

The following forecast is based on the current business development and our internal planning.

To enhance the comparability of operating performance, the forecasts are adjusted for currency effects[5]. We do not anticipate any material changes in our forecast if the closing rates as of December 31, 2018, are used as a basis. A 1% appreciation (depreciation) of the euro against all other currencies would decrease (increase) sales on an annual basis by some €340 million and EBITDA before special items by about €100 million.

We confirm the forecasts for 2019 and the medium-term targets for 2022 that we provided in conjunction with our Capital Markets Day on December 5, 2018. For 2019, we expect sales to amount to around €46 billion. This corresponds to an increase of approximately 4% on a currency- and portfolio-adjusted basis. We aim to increase EBITDA before special items to approximately €12.2 billion on a currency-adjusted basis, while core earnings per share are seen rising to approximately €6.80 on a currency-adjusted basis.

[5] The average monthly exchange rates from 2018 (see B 3/1) were applied.

A 3.1.2/1

Bayer Group Key Data – Forecast for 2019

	2018 figures		2019 forecast	
	€ billion	Fx & p adj. change (%)	€ billion	Fx & p adj. change (%)
Sales	**39.6**	**+4.5**	**~46**	**~+4**
Crop Science	14.3	+6.1		~+4
Pharmaceuticals	16.7	+3.4		~+4
Consumer Health	5.5	−0.7		~+1
Animal Health	1.5	+0.5		~+4
		Margin (%)		**Margin (%)**
EBITDA before special items[1]	**9.5**	**24.1**	**~12.2**	**~27**
Crop Science	2.7	18.6		~25
Pharmaceuticals	5.6	33.4		~34
Consumer Health	1.1	20.1		~21
Animal Health	0.4	23.9		~24
Financial result (core)[2]	**(1.3)**		**~(1.8)**	
Tax rate (core)[3]	**20.6%**		**~23%**	
Free cash flow[1]	**4.7**		**~3–4**	
Net financial debt[1,4]	**35.7**		**~36.0**	
	(€)		**(€)**	
Core EPS[1]	**5.94**		**~6.80**	

Fx & p adj. = currency- and portfolio-adjusted
[1] For definition see A 2.4 "Alternative Performance Measures Used by the Bayer Group."
[2] Financial result before special items
[3] (Income taxes + special items in income taxes + tax effects on adjustments)/(core EBIT + financial result + special items in financial result)
[4] For 2019, including a lease liability of approximately €1.1 billion under IFRS 16

We expect substantial special charges in 2019, mainly in connection with restructuring measures.

The first-time application of IFRS 16 is expected to result in an around €0.3 billion increase in EBITDA before special items compared with the previous year. We also anticipate that free cash flow will rise by approximately €0.3 billion and net financial debt by approximately €1.1 billion due to this effect.

3.2 Opportunity and Risk Report

3.2.1 Group-wide Opportunity and Risk Management System

As a global life science enterprise, the Bayer Group is constantly exposed to a wide range of internal or external developments and events that could significantly impact the achievement of our financial and nonfinancial objectives. Opportunity and risk management is therefore an integral part of corporate management at Bayer. We regard opportunities as positive deviations, and risks as negative deviations, from projected or target values for potential future developments.

In conjunction with the acquisition of Monsanto in the second quarter of 2018 and its subsequent integration into the Crop Science segment, we are in the process of integrating Monsanto's risk management system into our own. For the first time, Bayer's risk situation also covers the risk situation of the newly acquired business, which was outlined in a separate chapter in the 2017 Annual Report.

Opportunity management system

We identify opportunities as part of the annual strategic planning cycle, during which we analyze internal and external factors that may affect the development of our business. These may be factors of a social, economic or environmental nature. The core phase of our strategic planning process normally takes place in the first half of the year and starts with a comprehensive analysis of the markets. We build on this by analyzing the respective market environments to identify opportunities. These analyses are based on different time periods since trends or developments may impact our business over the short, medium or long term. In addition, opportunities are identified by the management and employees through daily observation of internal processes and markets. Opportunities that we regard as highly probable to materialize have already been taken into account in our planning.

Risk management system

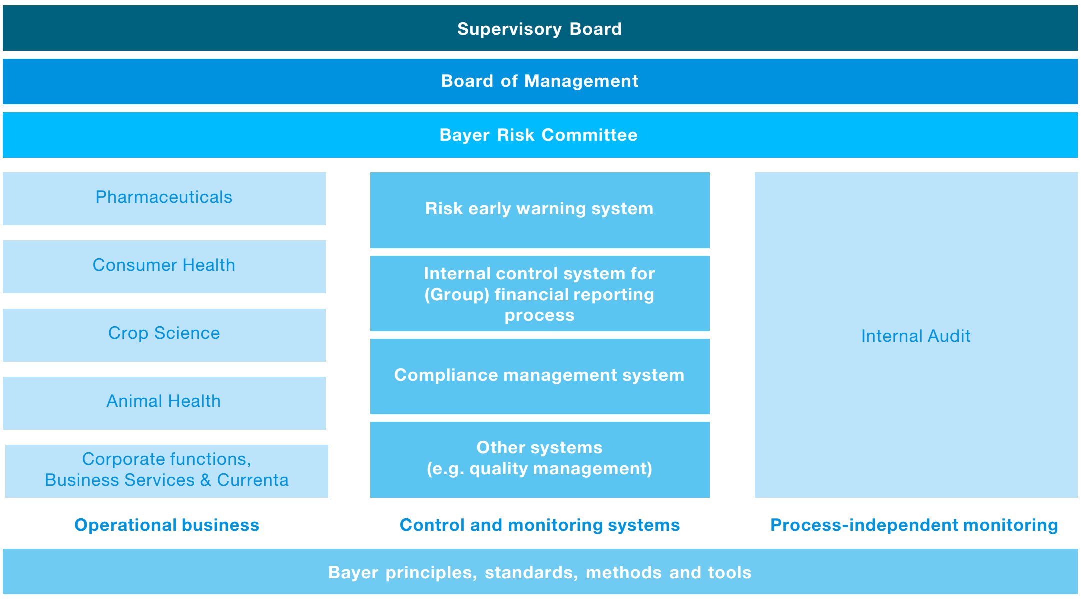
The Bayer Group has implemented a holistic and integrated risk management system designed to ensure the continued existence and future target attainment of the Group through the early identification, assessment and treatment of risks.

The Bayer Group's risk management system is aligned to internationally recognized standards and principles such as the ISO 31000 risk management standard of the International Organization for Standardization.

Structure of Bayer's Risk Management System

A 3.2.1/1

Structure of the Risk Management System



Board of Management / Supervisory Board

The Board of Management of Bayer AG holds overall responsibility for an effective risk management system. The Audit Committee of the Supervisory Board examines the appropriateness and effectiveness of the risk management system at least once a year.

Bayer Risk Committee

The Bayer Risk Committee, which is chaired by the Chief Financial Officer, is a subcommittee of the Board of Management. It ensures that all substantial risks are addressed (through suitable mitigation measures), and also regularly discusses and evaluates the risk portfolio and the mitigation status.

Operational business

Responsibility for the identification, assessment, treatment and reporting of risks lies with the operational business units in the segments and corporate functions.

Control and monitoring systems

To enable the Board of Management and the Supervisory Board to monitor material business risks as required by law, we have implemented a risk early warning system pursuant to Section 91, Paragraph 2 of the German Stock Corporation Act (AktG), an internal control system for (Group) accounting and financial reporting processes, and a compliance management system. Various corporate functions are responsible for these systems.

As the main corporate function for control and monitoring systems, the Risk Management function assumes governance and coordination responsibilities in relation to the risk management system. It provides overarching standards, methods and tools, is responsible for the risk early warning system, steers the annual Enterprise Risk Management (ERM) process, and ensures reporting to the Bayer Risk Committee and the Board of Management. The three systems in place at Bayer are described in the following paragraphs.

Risk early warning system

Our ERM system meets the requirement set out in Section 91, Paragraph 2 of the German Stock Corporation Act that a risk early warning system be implemented and used to identify at an early stage developments that are material and/or could endanger the company's continued existence. It establishes a consistent framework and uniform standards for the risk early warning system throughout the Bayer Group.

Internal control system for (Group) accounting and financial reporting

(Report pursuant to Sections 289, Paragraph 4 and 315, Paragraph 4 of the German Commercial Code)

As part of the comprehensive risk management system, Bayer has an internal control system (ICS) in place for the (Group) accounting and financial reporting process. This system comprises suitable structures and workflows that are defined and implemented throughout the organization. The purpose of our ICS is to ensure proper and effective accounting and financial reporting in accordance with Section 289, Paragraph 4 and Section 315, Paragraph 4 of the German Commercial Code. The ICS is designed to guarantee timely, uniform and accurate accounting for all business transactions based on applicable statutory regulations, accounting and financial reporting standards and the internal Group policies that are binding upon all consolidated companies. Risks are identified and assessed, and mitigated using suitable countermeasures. Mandatory, Group-wide ICS standards (or standards required by the Sarbanes-Oxley Act [SOX] for the newly acquired Monsanto companies) such as system-based and manual reconciliation processes and functional separation have been derived from these frameworks and promulgated throughout the Bayer Group by the Risk Management function on behalf of the Chief Financial Officer of Bayer AG. The ICS standards (and the SOX standards) are implemented by the Bayer Group companies and their compliance is overseen by the respective management teams. Using Bayer's shared service centers, these companies prepare their financial statements locally and transmit them with the aid of a standard Bayer Group data model. The former Monsanto companies are using a converter to transfer their financial statements to the Bayer data model. This data model is based on the Group accounting policy and thus ensures the regulatory compliance of the consolidated financial statements. The Board of Management has confirmed the effective functioning of the ICS and the relevant criteria (as well as the SOX standards) for the 2018 fiscal year. However, it should be noted that an internal control system, irrespective of its design, cannot provide absolute assurance that material misstatements in the financial reporting will be avoided or identified.

Compliance management system

Our compliance management system is aimed at ensuring lawful and responsible conduct by our employees. It is designed to identify potential violations in advance and systematically prevent their occurrence. The compliance management system thus contributes significantly to the integration of compliance into our operating units and their processes. Details of compliance management can be found in Chapter A 4.2 "Compliance," which describes in particular the process used to identify risks and measures taken to mitigate them. Monsanto had its own compliance management system prior to the start of the integration process. This system, which mitigates compliance risks and addresses largely the same risk areas as Bayer, will remain in place until full integration into Bayer's compliance processes and systems has been achieved. The integration process has already begun and is scheduled to be completed in 2019.

See also A 4.2

Process-independent monitoring

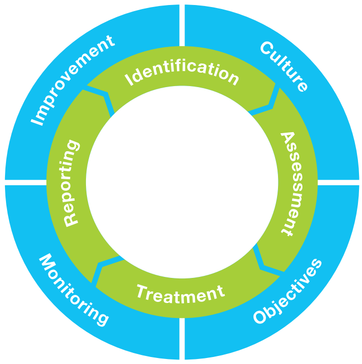
Internal Audit supports Bayer's attainment of the Group targets by employing a systematic and targeted approach in order to assess and help improve the effectiveness of corporate management, risk management and monitoring processes.

In addition, the external auditor, as an independent external body, assesses the fundamental suitability of the early warning system as part of its audit of the annual financial statements.

Basic Elements of the Bayer Risk Management System

A 3.2.1/2

Basic Elements of the Bayer Risk Management System



The basic elements of the risk management system are described below and established in binding documents.

Risk culture and objectives of the risk management system
The incorporation of all levels of the company into this process heightens the awareness and understanding of risks, which is essential for creating a risk culture. Furthermore, the clearly defined roles and responsibilities, principles, standards, methods, tools and training measures create the foundation for the independent, proactive and systematic management of risks.

The aims of the risk management system are to achieve risk transparency, support risk-based (treatment) decisions and ensure compliance with legal requirements. This establishes a basis for the proper and responsible management of risks.

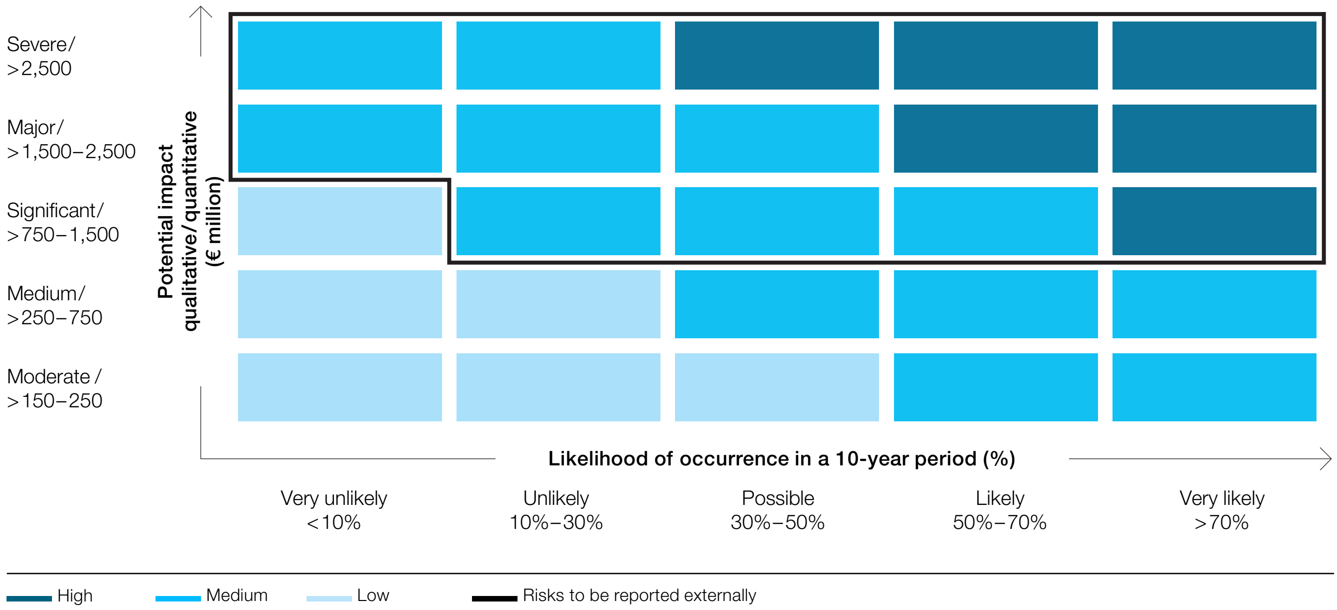
See “About this Report” for more information on the implementation of the CSR Directive Implementation Act

Risk management process
Identification: Risks are identified by risk owners in the segments and functions. To support the fullest possible identification of risks, the Bayer Group maintains a Risk Universe that reflects the potential risk categories of Bayer as a life science company. The Bayer Risk Universe also expressly accounts for risks of a nonfinancial nature that are linked to our business activity or to our business relationships, products and services. These may include risks pursuant to the CSR Directive Implementation Act that relate to environmental, employee and social issues, as well as human rights, and corruption and bribery (compliance). The Bayer Risk Universe is regularly examined and updated if necessary, as was the case in 2018.

Assessment: Where possible, the identified risks are evaluated with regard to their potential impact and likelihood of occurrence in line with following matrix, taking into account established mitigation measures.

A 3.2.1/3

Risk Assessment Matrix



Risks are classified as high, medium or low to assess their materiality regarding the overall risk portfolio. The extent of the impact is rated according to quantity and/or quality. A quantitative assessment reflects the possible loss of cash flows. A qualitative assessment of damage is based on criteria such as the impact on our strategy or reputation, the potential loss of stakeholder confidence, and potential incomplete compliance with sustainability principles (e.g. in the area of safety, environmental protection or human rights). The higher rating – qualitatively or quantitatively – determines the overall assessment. The likelihood of occurrence is calculated based on a maximum period of 10 years. Risk categories may potentially influence the materialization of risks in other categories, a factor that we take into account when assessing the likelihood of occurrence. For example, developments in the “Social and macroeconomic trends” risk category may have an influence on the “Regulatory changes,” “Legal/compliance” and “Product safety and stewardship” categories.

Risks with a potential impact of over €4,000 million are examined separately by the Bayer Risk Committee to determine their potential to endanger the company’s continued existence.

Treatment: The risk owners decide on a targeted risk level based on a cost-benefit analysis and define a risk management strategy as well as risk management measures. These include risk avoidance, risk reduction, risk transfer and risk acceptance.

Reporting: The results are reported to the Bayer Risk Committee by the Risk Management function. In addition, new risks above a defined threshold are reported to the Risk Management function on an ad-hoc basis and, if relevant, to the Bayer Risk Committee and the Chief Financial Officer. A report on the risk portfolio is submitted to the Board of Management and the Audit Committee of the Supervisory Board at least once a year.

Monitoring and improvement
The Group Risk Management function continuously evaluates the appropriateness and timeliness of the principles, standards, methods and tools.

3.2.2 Opportunity and Risk Status

In this section, we report on material, reportable risks pursuant to German Accounting Standard No. 20. These include all high and medium financial and nonfinancial risks that are at least significant in terms of potential impact, while taking into account established mitigation measures (net risk). They encompass risks falling within the black outline in the rating matrix A 3.2.1/3. In addition, we report on relevant risks that, from a financial point of view, may not be sufficiently or meaningfully quantifiable, if at all. We also report on the principal opportunities identified in the course of our opportunity management.

Comparable risks existing in different segments of the company are bundled where applicable. The order in which the risks are listed does not imply any order of importance. We also describe opportunities and risks of a segment-specific nature where relevant.

See also A 3.2.1 and "About this Report"

According to our understanding, risks relating to the aspects outlined in the CSR Directive Implementation Act that would have to be reported separately would have to have at least a "severe" potential impact and their likelihood of occurrence would have to be classified as "very likely." We did not identify any such risks in 2018.

The following table provides an overview of the individual risk categories together with risk classes and the affected segments. The categorization of risks was adjusted in 2018. This was partly due to the Monsanto acquisition and the resulting shift in alignment of our business model toward the agriculture business. Furthermore, we leveraged the experiences we gained from the classification introduced in 2017 to optimize our Risk Universe. This process is merely a reclassification among the risk categories, without disregarding any risks. Risks previously assessed under "external risks" have primarily been reallocated as follows: risks in the category "Business markets" have been assigned to the categories "Market developments" or "Sales, marketing and distribution"; risks in the category "Political, social and macroeconomic environment" have been allocated to "Regulatory changes" or "Social and macroeconomic trends"; and risks in the "Natural disasters and crises" category have been included in the "Supply of products" or "Security" categories. Risks in the "External network and partnerships" category have been transferred to "Supply of products," "Marketing, sales and distribution" or "External partner compliance."

A 3.2.2/1

Overview of Material Risk Areas

Risk category	Risk class	Affected segment(s) or Group[1]
Strategic risks		
Social and macroeconomic trends	High	CS
Market developments	Medium	CH, CS
Regulatory changes	Medium	PH, CS, Group
Business strategy	Medium	PH, CS, Group
Operational risks		
Research and development	High	PH, CS[2]
Supply of products (procurement, production, logistics)	Medium	PH, CS
Marketing, sales and distribution	Medium	PH
Human resources	Medium	Group
Information technology	High	Group
Finance and tax	Medium	Group
Safety, quality and compliance risks		
External partner compliance	Medium	Group
Health, safety and environment	Medium	Group
Intellectual property	Medium	PH
Legal/compliance[3]	See A 3.2.2 "Legal/compliance"	Group
Product safety and stewardship	High	PH[2], CS
Quality and regulatory requirements	Medium	PH, CS, Group
Security	Medium	Group

PH: Pharmaceuticals; CS: Crop Science; CH: Consumer Health

[1] Listed are those segments that have identified material risks. Other segments may also be affected to a lesser extent. The Group has been indicated where material risks have been reported by corporate functions.

[2] Risk class: medium

[3] The primary developments with respect to legal risks compared with the Annual Report 2017 (Note [32]) are outlined in the "Legal Risks" section of the Notes (Note [29]) to the Consolidated Financial Statements of the Bayer Group.

Social and macroeconomic trends

Changes in political, social and macroeconomic factors such as economic growth, life expectancy, population size and consumer behavior as well as societal trends, political crises and instability result in opportunities for us, but are also associated with risks.

The growing world population and the resulting higher demand for food offer further opportunities for our Crop Science segment. Partially changing consumer behavior is driving an increase in demand for food products of animal origin. Agricultural productivity therefore needs to increase in view of declining per-capita acreages, the challenges presented by climate change, and increasing resistance. We therefore expect demand for high-quality seeds and crop protection products to rise.

Furthermore, the increase in quality of life and life expectancy is leading to a heightened focus on the medical care needs of elderly patients. To take advantage of the opportunities arising from the growing demand for innovative health care products to treat age-related diseases, Bayer's Pharmaceuticals segment is concentrating its research and development activities on relevant therapeutic areas, among other measures.

See also A 1.2 Strategy

In the Crop Science segment, seasonal and macroeconomic factors in particular can unfavorably impact our business. Our markets are cyclical and are shaped by economic developments and factors including fluctuating weather conditions and pest pressure. We address these influences through our globally diversified business, flexible supply chain and comprehensive monitoring activities.

Modern agricultural methods, such as the application of certain classes of crop protection products and the use of genetic engineering, are regularly the subject of intense public debate and can negatively impact our reputation. The increased risk of an increasingly negative public debate that is not primarily based on science may lead to legislative and regulatory decisions that significantly limit the use of our products or even result in voluntary or mandated product withdrawals. We are

GRI 102-43

engaged in constant dialogue with interest groups and regulators to promote a scientifically founded, rational and responsible discussion and decision-making process.

See also A 1.2.3 Sustainability Management

We are committed to responsible corporate governance. Our aim is to generate not just economic, but also ecological and societal benefits. Through our commitment to the U.N. Global Compact and the Responsible Care™ initiative, for instance, we underline our mission as a company that acts in a sustainable manner.

Market developments

See also A 3.2.3

In the Crop Science segment, we could face increased competition in the seed and crop protection industry. Consolidation processes as well as aggressive marketing and pricing strategies – not only for generic products – could negatively impact our profitability. In addition, increasing digitalization in the agriculture sector, such as the growing use of robotics, could lead to the rise of new players. We are addressing this development by realigning our business models, engaging in scientific and commercial partnerships, and utilizing our own R&D capabilities.

The risk of existing business models undergoing rapid change as a result of digitalization and new digital products is also present in the Consumer Health segment. Digitalization is a key factor in gaining a competitive advantage. If we fail to adequately integrate this development into our existing business models, we could lose customers and market share. We monitor the market very closely, and devise strategies and measures to address developments in our business models.

Regulatory changes

Our business activity is subject to extensive regulations that may change. For example, further restrictions could be imposed on the sale and use of various crop protection products, or the pricing of pharmaceutical products could be more strictly regulated. Residues of agrochemical products in the environment could also be subject to more stringent regulation. In addition, decisions could also affect agricultural imports from other parts of the world and therefore our business in those regions. Moreover, regulatory changes may generally give rise to uncertainty regarding our future patent protection. They can also lead to higher product development costs and times or even necessitate adjustments to our product portfolio, which may in turn negatively impact our reputation.

See also A 1.6.1

We counter these risks by monitoring changes in regulatory requirements, as we look to ensure they are adequately addressed within the company. Moreover, we respond to the changing situation through in-house research and development capacities, acquisitions and collaborations and we align our product portfolio to reflect anticipated changes.

Business strategy

As a globally operating, innovation-oriented and diversified company, we are exposed to various strategic risks. Where it appears strategically advantageous, we look to supplement our organic growth through measures such as acquisitions and/or inlicensing.

Such strategic measures may give rise to greater challenges at our Pharmaceuticals segment in connection with the inlicensing and/or the acquisition of new products required to achieve the inorganic growth targeted, in part due to the increasing difficulty in identifying suitable candidates on economically acceptable conditions.

In connection with the increasing digitalization of farming, our Crop Science segment faces the challenge of developing – and successfully marketing – optimal products and tools. Our activities in this area are bundled in our subsidiary, The Climate Corporation. Where necessary, they are supplemented by strategic partnerships with leading IT companies.

We counter these risks by aligning our organization and our processes with existing challenges that arise in areas including the identification and implementation of inlicensing opportunities and project oversight.

Research and development

Across our businesses, we see opportunities both in the continued development of our brands and in the expansion of our research pipeline as a result of our innovation strength.

In the Pharmaceuticals segment, opportunities result from digitalization and associated new research and development methods that save time and increase development effectiveness. We also rely on networking, both within the company and with external partners, to boost our innovation strength. This stimulates the development of new products. Technological advances in pharmaceutical product development are likewise influenced by digitalization, which can also present a risk for us if we are not in a position to shape this development.

Furthermore, we cannot ensure that we will identify a sufficient number of research candidates and that all of the products we are currently developing or will develop in the future will obtain their planned approval / registration or achieve commercial success. This may result from the failure to meet technical, capacity- and time-related requirements or the inability to meet trial objectives in product development, among other factors. The performance of our research partners could also have a limiting impact in this respect. Delays or cost overruns might occur during product registration or launch. We seek to counter this risk through holistic portfolio management, by estimating the probability of success and prioritizing development projects.

In the Crop Science segment, we anticipate that by combining our innovation capacities and budgets, we can more effectively tackle the challenges faced in developing and introducing product solutions in agriculture, including longer and more costly development cycles or stricter regulatory requirements. In the medium to long term, we plan to leverage the strengths of the combined R&D platform to deliver pioneering technologies faster.

The development of resistance represents both a risk and a continuous driver of innovation in the Crop Science segment. Developing resistance to both crop protection products and special traits is a natural process that we routinely monitor so that, where necessary, industry-wide measures can be initiated to halt the spread of resistance. In addition, we actively update our product portfolio based on anti-resistance strategies and combat factors that facilitate resistance in farming through programs focused on the optimal application of our products (integrated weed and pest management).

See also A 1.2 Strategy and A 1.3 Innovation

Supply of products (procurement, production, logistics)

Despite all precautions, operations at our sites may be disrupted by earthquakes, fires, power outages or disruptions at our suppliers, for example. Certain materials, particularly in our Pharmaceuticals segment, are offered by only a small number of suppliers. Possible price adjustments can also have a negative impact on our margin. We counter these risks by establishing relationships with alternative suppliers, concluding long-term agreements, expanding inventories or producing raw materials ourselves. Strategic Material Review Committees regularly examine and assess the supplier risks. Furthermore, some of our production sites are located in regions that can be affected by natural disasters, such as flooding or earthquakes. These risks can lead to production disruptions or stoppages, result in personal injury and damage to our reputation, lead to declines in sales and / or margins, and necessitate the reconstruction of damaged infrastructure. If we are unable to meet demand for our products, sales may undergo a structural decline.

We address this risk for certain products by building up safety stocks and by distributing production among multiple sites, for example. Furthermore, an emergency response system based on the respective corporate policy has been implemented at all our production sites as a mandatory component of our HSEQ (health, safety, environment and quality) management.

Marketing, sales and distribution

New product launches present particular challenges for our marketing and distribution organization since assumptions about aspects such as the market and market circumstances may not materialize as anticipated. As a result, product launch concepts – including those related to clinical trials – and the planning or implementation of the distribution strategy could turn out to be inefficient or inadequate in terms of scheduling. We address these risks with a forward-looking analysis of possible scenarios and the development of suitable strategies for projects such as planned product launches.

In some countries, the marketing rights for certain pharmaceutical products are held by third parties. Inadequate performance by these marketing partners could adversely affect the development of our sales and costs. Therefore, we have established an Alliance Management unit to monitor the most important collaborations and provide relevant support to the operational functions.

Human resources

See also A 1.4

Skilled and dedicated employees are essential for the company's success. Difficulties in recruiting, hiring, retaining and further developing specialized employees could have significant adverse consequences for the company's future development. Furthermore, organizational changes that are not implemented adequately or transparently can lead to declining motivation. Based on our analysis of future requirements, we counter these risks by designing appropriate employee recruitment and development measures. In addition, the alignment of our company culture toward diversity and employee needs enables us to tap the full potential of the employment market. Furthermore, deliberate and transparent change management forms an integral part of our human resources management and supports our efforts to constantly motivate our employees.

Information technology

Our business and production processes and our internal and external communications are dependent on global IT systems. The confidentiality of internal and external data is of fundamental importance to us in this connection. The risk of a breach of data confidentiality, integrity or authenticity, for example due to (cyber) attacks, has increased as a result of the general security situation. This could lead to the manipulation and / or the uncontrolled outflow of data and knowledge, and to reputational damage. Our business and / or production processes could also be temporarily disrupted by (cyber) attacks. The measures we undertake to counter these risks include vigorously testing technologies before they are deployed and implementing projects to keep technical security standards up to date and proactively examine new threats. In addition, the existing IT infrastructure is protected against unauthorized access thanks to security measures implemented by the Corporate Cyber Defense Center.

Finance and tax

Liquidity risk

Liquidity risks are defined as the possible inability of the Bayer Group to meet current or future payment obligations. They are determined and managed by the Finance function as part of our same-day and medium-term liquidity planning. The Bayer Group holds sufficient liquidity to ensure the fulfillment of all planned payment obligations at maturity. For unbudgeted shortfalls in cash receipts or unexpected disbursements, furthermore, a reserve is maintained and its balance is regularly reviewed and adjusted. Credit facilities also exist with banks, including, in particular, an undrawn €4.5 billion syndicated revolving credit facility with a current maturity of 2023.

Credit risks

Credit risks arise from the possibility that the value of receivables or other financial assets of the Bayer Group may be impaired because counterparties cannot meet their payment or other performance obligations. The maximum default risk is reduced by existing collateral, especially our global credit insurance programs. To manage credit risks from trade receivables, the respective invoicing companies appoint credit managers who regularly analyze customers' creditworthiness. We generally agree reservation of title with our customers. Credit limits are set for all customers. All credit limits for debtors where total exposure is €10 million or more are evaluated locally and submitted to the Finance function. Credit risks from financial transactions are managed centrally in the Finance function. To minimize risks, financial transactions are only conducted within predefined exposure limits and with banks and other partners that preferably have investment-grade ratings.

Opportunities and risks resulting from market price changes

Opportunities and risks resulting from fluctuating exchange and interest rates as well as commodity prices in the market are managed by the Finance function. Risks are avoided or mitigated through the use of derivative financial instruments. The type and level of currency, interest rate and commodity price risks are determined using sensitivity analyses as per IFRS 7 that are based on hypothetical changes in risk variables (such as interest curves) to determine the potential effects of market price fluctuations on equity and earnings. The assumptions used in the sensitivity analyses are regularly reexamined and reflect our view of the changes in currency exchange and interest rates as well as commodity prices that are reasonably possible over a one-year period. Although they fall below the external reporting threshold under our ERM system, we report on interest rate and commodity price risks in this section due to the provisions of IFRS 7.

See also A 3.2.1/3 Risk Assessment Matrix

Foreign currency opportunities and risks for the Bayer Group result from changes in exchange rates and the related changes in the value of financial instruments (including receivables and payables) and of anticipated payment receipts and disbursements not in the functional currency. Receivables and payables in liquid currencies from operating activities and financial items are generally fully exchange-hedged through cross-currency interest rate swaps. Anticipated exposure from planned payment receipts and disbursements in the future is hedged through forward exchange contracts and currency options according to management guidelines.

Sensitivities were determined on the basis of a hypothetical scenario in which the euro appreciates or depreciates by 10% against all other currencies compared with the year-end exchange rates. In this scenario, the estimated hypothetical increase or decrease in cash flows from derivative and nonderivative financial instruments would have improved or diminished earnings as of December 31, 2018, by €12 million (December 31, 2017: €6 million). Derivatives used to hedge anticipated currency exposure that are designated for hedge accounting would have improved or diminished equity (other comprehensive income) by €358 million (December 31, 2017: €353 million). Currency effects on anticipated exposure are not taken into account. Of the amount impacting equity, €75 million is related to the Chinese renminbi (CNY), €53 million to the U.S. dollar (USD), €42 million to the Japanese yen (JPY) and €42 million to the Canadian dollar (CAD).

Interest rate opportunities and risks result for the Bayer Group through changes in capital market interest rates, which in turn could lead to changes in the fair value of fixed-rate financial instruments and changes in interest payments in the case of floating-rate instruments. Interest rate opportunities and risks are managed over a target duration established by management for Bayer Group debt that is subject to regular review. Interest rate swaps are concluded to achieve the target structure for Bayer Group debt. A sensitivity analysis conducted on the basis of our net floating-rate receivables and payables position at year-end 2018, taking into account the interest rates relevant for our receivables and payables in all principal currencies, produced the following result: A hypothetical increase of one percentage point in these interest rates (assuming constant currency exchange rates) as of January 1, 2018, would have raised our interest expense for the year ended December 31, 2018, by €69 million (December 31, 2017: interest income of €13 million).

Commodity price opportunities and risks result for the Bayer Group from the volatility of raw material prices, which can lead to an increase in the price we pay for seeds and energy. The commodity price risk is reduced by the use of commodity price derivatives such as futures, which are mainly designated as hedge accounting.

A sensitivity analysis with a 10% change in commodity prices would have an effect of €30 million on equity.

Financial risks associated with pension obligations

The Bayer Group has obligations to current and former employees related to pensions and other post-employment benefits. Changes in relevant measurement parameters such as interest rates, mortality and salary increase rates may raise the present value of our pension obligations. This may lead to increased costs for pension plans or diminish equity due to actuarial losses being recognized as other comprehensive income in the statement of comprehensive income. A large proportion of our pension and other post-employment benefit obligations is covered by plan assets including fixed-income securities, shares, real estate and other investments. Declining or even negative returns on these investments may adversely affect the future fair value of plan assets. Both of these effects may negatively impact the development of equity and / or earnings and / or may necessitate additional payments by our company. We address the risk of market-related fluctuations in the fair value of our plan assets through balanced strategic investment, and we constantly monitor investment risks in regard to our global pension obligations.

Tax risks

Bayer AG and its subsidiaries operate worldwide and are thus subject to many different national tax laws and regulations. Bayer Group companies are regularly audited by the tax authorities in various countries. Amendments to tax laws and regulations, legal judgments and their interpretation by the tax authorities, and the findings of tax audits in these countries may result in higher tax expense and payments, thus also influencing the level of tax receivables, tax liabilities and deferred tax assets and liabilities. Significant acquisitions, divestments, restructuring programs and other reorganizational measures undertaken by Bayer could also have an impact. We counter the resulting risks by continuously identifying and evaluating the tax framework. The Bayer Group establishes provisions for taxes, based on estimates, for liabilities to the tax authorities of the respective countries that are uncertain as to their amount and the probability of their occurrence. It cannot be ruled out that these provisions are insufficient to cover all the risks.

External partner compliance

See also
A 1.5 Procurement

From the perspective of the Bayer Group as a whole, there is a risk that our partners, such as suppliers, do not give due attention to our corporate values and ethical, compliance and sustainability requirements. We counter this risk through an evaluation process, a code of conduct for suppliers, and supplier evaluations and audits. Until full integration is completed, Monsanto will continue to apply its existing processes for sustainability in procurement. The code of conduct for the acquired business, which mainly matches the content of Bayer’s code, remains in place for existing supplier relationships.

Health, safety and environment

We attach great importance not only to product safety but also to protecting our employees and the environment. Misconduct or noncompliance with legal requirements or Bayer Group standards may result in personal injury, property, reputational or environmental damage, loss of production, business interruptions and / or liability for compensation payments. Our principles, standards and measures ensure that our requirements are adequately communicated, understood and optimally implemented.

Intellectual property

The Bayer Group has a portfolio that largely consists of patent-protected products. Due to the long period of time between the patent application and the market launch of a product, Bayer generally only has a few years in which to earn an adequate return on its investment in research and development. This makes effective and reliable patent protection all the more important. Generic manufacturers, in particular, attempt to contest patents prior to their expiration. We are currently involved in legal proceedings to enforce patent protection for our products. Legal action by third parties for alleged infringement of patent or proprietary rights by Bayer may impede or even halt the development or manufacturing of certain products or require us to pay monetary damages or royalties to third parties. Our patents department regularly reviews the patent situation in collaboration with the respective operating units and monitors for potential patent infringements so that legal action can be taken if necessary.

See also Note 32 to B Consolidated Financial Statements

Legal / compliance

We are exposed to risks from legal disputes or proceedings to which we are currently a party or which could arise in the future, particularly in the areas of product liability, competition and antitrust law, anticorruption law, patent law, tax law, data protection and environmental protection. Investigations of possible legal or regulatory violations may result in the imposition of civil or criminal penalties – including substantial monetary fines – and / or other adverse financial consequences, harm our reputation and hamper our commercial success. We have established a global compliance management system to ensure the observance of laws and regulations. Monsanto had its own compliance management system prior to the start of the integration process. This system, which addresses largely the same risk areas as Bayer's system, will remain in place until integration into Bayer's compliance processes and systems has been completed.

See also A 1.6.1, A 4.2 and Note 32 to B Consolidated Financial Statements

Product safety and stewardship

Bayer evaluates the potential health and environmental risks of a product along the entire value chain. Despite extensive studies prior to approval or registration, products can be partially or completely withdrawn from the market due to the occurrence of unexpected side-effects of pharmaceutical products or other factors. Such a withdrawal may be voluntary or result from legal or regulatory measures. In the agriculture business particularly, there is an additional risk that our customers could use our products incorrectly. Furthermore, the presence of traces of unwanted genetically modified organisms in agricultural products and / or foodstuffs can have wide-ranging repercussions.

See also A 1.6.1 Product Stewardship

We counter these risks, which could give rise to liability claims and also negatively affect our reputation, through comprehensive measures in the areas of pharmaceutical and crop protection product safety and testing, including in particular a comprehensive stewardship program for genetic product integrity and quality with regard to seeds. These measures are based on globally defined principles and include analysis and monitoring measures, an alert system and training programs.

Quality and regulatory requirements

In almost every country where we operate, our business activity is subject to extensive regulations, standards, requirements and inspections, for example regarding clinical studies or production processes in the area of health or at Crop Science in the monitoring of genetically modified organisms, particularly at country level. Potential infringements of regulatory requirements may result in the imposition of civil or criminal penalties, including substantial monetary fines, a restriction on our freedom to operate, and / or other adverse financial consequences. They could also harm Bayer's reputation and lead to declining sales and / or margins.

We counter these risks through binding principles, standards and the control mechanisms implemented. Quality requirements are defined and implemented in global quality management systems.

See also A 1.6.1

Security

Due to the general security situation, we see an increase in potential criminal activities targeting our employees, property or business activities. These include intellectual property theft, vandalism and sabotage. There is also the risk of crises such as an extended power outage that could cause disruptions to our information technology infrastructure and our production.

See also A 1.6 Safety for People and the Environment

We counter these risks – which in addition to financial effects could negatively affect our reputation in some cases – through our local crisis organizations, which produce response plans and other measures. We have implemented early warning systems, ensure continuous reporting and carry out regular crisis simulation exercises. In addition, we have established a global safety community, and the Business Continuity Management unit within the Risk Management function assesses business continuity risks and defines appropriate measures together with the responsible specialist units.

3.2.3 Overall Assessment of Opportunities and Risks by the Board of Management

No risks that could jeopardize the company's existence

In the opinion of the Board of Management, based on the current evaluations, none of the risks described above endanger the company's continued existence. Nor could we identify any risk interdependencies that could combine to endanger the company's continued existence. We do not see any change in our risk situation compared with the previous year, as we had already reported last year on changes resulting from the Monsanto acquisition. We remain convinced that we can take advantage of the opportunities resulting from our entrepreneurial activity and successfully master the challenges resulting from the risks stated above.

4. Corporate Governance Report

Conformance with the recommendations of the German Corporate Governance Code with two exceptions

Nonfinancial statement integrated into management report

The Corporate Governance Report of the Bayer Group conforms with the recommendations of the German Corporate Governance Code and includes a Declaration by Corporate Management pursuant to Sections 289f and 315d of the German Commercial Code as well as all the information and explanations required by Section 289a through e and Section 315a through d of the German Commercial Code. The contents of the Corporate Governance Report are also included in the management report. The information contained in the Declaration by Corporate Management is unaudited pursuant to Section 317, Paragraph 2, Sentence 4 and Sentence 5 of the German Commercial Code.

The Board of Management and the Supervisory Board have compiled a complete Corporate Governance Report which is available on the Bayer website at www.bayer.com/en/Corporate-Governance.aspx

See also C Governance Bodies

4.1 Declaration by Corporate Management Pursuant to Sections 289f and 315d of the German Commercial Code

With the Declaration by Corporate Management pursuant to Sections 289f and 315d of the German Commercial Code for Bayer AG and the Bayer Group, the company provides information on the main elements of the Bayer Group's corporate governance structures, relevant corporate governance practices, the composition and procedures of the Board of Management and the Supervisory Board and its committees, and the objectives and concepts that must be established when composing the Board of Management and the Supervisory Board.

Compensation of the Board of Management: see A 4.4

Declaration concerning the German Corporate Governance Code pursuant to Section 161 of the German Stock Corporation Act

In May 2018, the Board of Management and the Supervisory Board of Bayer AG published a supplement to the declaration of December 2017, noting two planned deviations from the recommendations of the Corporate Governance Code. Firstly, it was not possible to publish the interim report for the second quarter within the recommended deadline of 45 days due to the closing of the Monsanto transaction, as the necessary activities in connection with the first-time consolidation of this company could not be completed within this period. Secondly and also in connection with the acquisition, the performance targets for the short-term variable compensation of the members of the Board of Management were adjusted during 2018 to enable the continued evaluation of the Board of Management in accordance with proper and demanding criteria following the completion of the acquisition.

The declaration issued in December 2018 concerning the German Corporate Governance Code is published on the Bayer website along with previous declarations: www.bayer.com/en/corporate-governance.aspx

In December 2018, the Board of Management and Supervisory Board of Bayer AG once again issued the annual declaration concerning the German Corporate Governance Code. As stated in this declaration, Bayer AG complied with the recommendations of the German Corporate Governance Code in the past with the two aforementioned exceptions, and intends to fully comply with them once again in the future.

Information on corporate governance practices

Bayer AG is subject to German stock corporation law and therefore has a dual governance system consisting of the Board of Management and the Supervisory Board, which manage the company based on a transparent strategy that is geared toward the long-term success of the company and complies with applicable law and ethical standards.

See A 1.1

www.bayer.com/en/corporate-compliance-policy.aspx

www.bayer.com/en/supplier-code-of-conduct.aspx

Corporate governance practices that go beyond the legal requirements are derived from our vision and our common values, which form the basis of the respectful working relationship between our employees and with our external partners. Compliance with responsible practices at every stage of the value chain is crucial in corporate governance. The main guidelines are summarized primarily in our corporate policies on compliance, human rights, and fairness and respect at work, as well as our Supplier Code of Conduct. The organization and oversight obligations of the Board of Management and the Supervisory Board are mainly ensured by compliance management and risk management systems.

Board of Management

Composition and objectives (diversity concept)

Members of the Board of Management and offices they hold: see C Governance Bodies

The Board of Management of Bayer AG is comprised of seven members and runs the company on its own responsibility with the goal of sustainably increasing the company's enterprise value and achieving defined corporate objectives.

In the composition of the Board of Management, the Supervisory Board mainly takes into account specialist expertise and personal aptitude, as well as aspects such as age, gender, education and professional background. With regard to the proportion of women on the company's Board of Management, the Supervisory Board aims to ensure that there is at least one woman serving on the Board of Management. This corresponds to a share of around 14% of the seven-member Board of Management.

Another aspect relating to the composition of the Board of Management that the Supervisory Board has resolved to pursue is diversity. Without basing selection decisions on this aspect in individual cases, the Supervisory Board aims to ensure that different age groups are adequately represented on the Board of Management, while also taking into account the experience required for a position on the Board of Management. Irrespective of this, members of the Board of Management should generally step down from that office when they turn 62. The composition of the Board of Management should adequately reflect the company's international operations. The Supervisory Board therefore endeavors to include on the Board of Management several members of different nationalities or with an international background (e.g. several years of career experience outside Germany or the oversight of foreign business activities). The Supervisory Board also strives to ensure diversity with regard to the educational and professional background of the members of the Board of Management. In addition to the requisite specific professional expertise, management and leadership experience for the given task, members of the Board of Management should cover the broadest possible spectrum of knowledge, experience, and educational and professional backgrounds.

These objectives are taken into account in the selection of candidates to fill open positions on the Board of Management. With this concept for the composition of the Board of Management, the Supervisory Board pursues the goal of ensuring not just the greatest possible individual suitability of its various members, but also that as many different perspectives as possible are represented in the leadership of the company through a balanced and diverse Board of Management structure and that the candidate selection pool is as large as possible.

In accordance with statutory requirements, furthermore, there are also targets pertaining to the proportion of women at the first and second management levels below the Board of Management of Bayer AG. The Board of Management has set objectives of 20% women on the first management level of Bayer AG and 25% women on the second management level. These objectives are to be attained by June 30, 2022.

Implementation status of the objectives

The Board of Management should in the future return to having at least one female member.

Since the departure of Erica Mann on March 31, 2018, there has not been a woman on the Board of Management. We will continue to intensively pursue our target of having one woman on the Board of Management by June 30, 2022, or beforehand if at all possible. The goal of adequate representation of different age groups, while also taking into account the experience required for Board of Management positions, was achieved. The ages of the members of the Board of Management were relatively evenly spread across a range of 49 to 62 years as of December 31, 2018. Three of the seven members of the Board of Management are citizens of a country other than Germany. All members of the Board of Management have amassed many years of career experience outside Germany. The members of the Board of Management also have diverse educational and professional backgrounds: Some have completed various business-related courses of study or training, while others have studied in various scientific fields including medicine.

Procedure and committees

The Board of Management performs its tasks according to the law, the Articles of Incorporation and the Board's rules of procedure, and works with the company's other governance bodies in a spirit of trust.

For more information on the procedure and committees of the Board of Management see bayer.com/corporate-governance.aspx

Supervisory Board

Composition and objectives (diversity concept and expertise profile)

Under the German Codetermination Act, half of the Supervisory Board's 20 members are elected by the stockholders, and half by the company's employees.

Members of the Supervisory Board and offices of the members of the Supervisory Board: see C Further Information/Governance Bodies

Compensation of the members of the Supervisory Board: see A 4.3

The Supervisory Board endeavors to ensure that its members together possess the necessary expertise, skills and professional experience to properly perform their duties. It strives particularly to ensure that the members of the Supervisory Board possess expertise, skills and professional experience in the following areas: management and leadership of international companies, a business understanding with regard to the company's main areas of activity, research and development, finance, controlling/risk management, human resources and governance/compliance.

The Supervisory Board has also resolved to pursue diversity in its composition, for instance with regard to age, gender, education and professional background. With respect to the international business alignment of Bayer AG, the Supervisory Board strives to ensure at all times that several of its members have international business experience or an international background in other respects. Further objectives concerning the composition of the Supervisory Board are that different age groups be suitably represented on the Supervisory Board and that, absent special circumstances, a member should not hold office beyond the end of the next Annual Stockholders' Meeting following his or her 72nd birthday. With a view to avoiding potential conflicts of interest and taking into account the ownership structure of the company and the number of independent Supervisory Board members, the Supervisory Board has set itself the goal that more than half of the stockholder representatives be independent. In addition, the Supervisory Board aims for at least three quarters of its total membership (stockholder and employee representatives) to be independent. The Supervisory Board assesses the independence of its members according to the recommendation contained in Section 5.4.2 of the German Corporate Governance Code. In assessing independence, the Supervisory Board also considers the criteria given in the recommendation of the European Commission of February 15, 2005.[6] Finally, the Supervisory Board has set a standard limit on the duration of any person's membership of the Supervisory Board in line with the recommendation in Section 5.4.1, Paragraph 2 of the Code. Absent special circumstances, no person should remain a member of the Supervisory Board for more than three full terms of office. For members of the Supervisory Board serving at the time the standard limit was introduced (September 2015) who have already exceeded this limit or will exceed it by the end of their current term of office, the limit will be applied with effect from the conclusion of their current term of office.

The Nominations Committee and the full Supervisory Board take these objectives into consideration when selecting candidates to fill open positions on the Supervisory Board. The stated objectives refer to the Supervisory Board as a whole unless otherwise determined. However, since the Supervisory Board can only nominate candidates for election as stockholder representatives, it can only take the objectives into account in these nominations. One objective for Supervisory Board elections is that neither women nor men account for less than 30% of the membership.

[6] Annex 2 to the recommendation of the European Commission of February 15, 2005, on the role of nonexecutive or supervisory directors of listed companies and on the committees of the (supervisory) board (2005/162/EC)

The Supervisory Board aims to achieve a balanced and diverse composition, to the extent that it can influence this. The aim is to ensure that as many different perspectives as possible are represented in the leadership of the company and that the candidate selection pool is as large as possible.

Implementation status of the objectives

The Supervisory Board has several members with international business experience or an international background. The ages of the members of the Supervisory Board were relatively evenly spread across a range of 48 to 72 years as of December 31, 2018. The objective that a member should step down from the Supervisory Board at the Annual Stockholders' Meeting following their 72nd birthday – absent special circumstances – is being met. Two members of the Supervisory Board were previously members of the company's Board of Management: Werner Wenning was Chairman of the Board of Management until 2010, and Prof. Dr. Wolfgang Plischke was a member of the Board of Management until 2014. One member of the Supervisory Board, Dr. Paul Achleitner, has been a member of the Supervisory Board for more than three terms of office. However, neither Werner Wenning nor Prof. Dr. Wolfgang Plischke nor Dr. Paul Achleitner has any personal or business relationship with the company or a governance body of the company that in the opinion of the Supervisory Board gives rise to a material conflict of interest of a more than temporary nature.

There are no indications of any possible lack of independence in the case of the other Supervisory Board members. Thus the Supervisory Board considers all of its members to be independent. The proportion of women on the Supervisory Board is currently 30% for the full Supervisory Board and 30% for both the employee and the stockholder representatives. Five members of the Supervisory Board are citizens of a country other than Germany. Numerous other members have many years of international business experience. The members of the Supervisory Board have also completed various different vocational training and study courses.

Procedure and committees

See the Report of the Supervisory Board for information on the committees' responsibilities

The role of the Supervisory Board is to oversee and advise the Board of Management. The Supervisory Board is directly involved in decisions on matters of fundamental importance to the company, regularly conferring with the Board of Management on the company's strategic alignment and the implementation status of the business strategy. The Report of the Supervisory Board in this Annual Report provides details about the work of the Supervisory Board and its committees.

Further information

Securities transactions by members of governance bodies

www.bayer.com/en/disclosure-of-securities-transactions.aspx

Members of the Board of Management or Supervisory Board and persons with whom they have close relationships are legally obligated to report own-account transactions in shares or debt securities of Bayer AG, associated derivatives or other associated financial instruments to Bayer AG and the German Federal Financial Supervisory Authority (BaFin) as soon as the total volume of transactions made by a member of the Board of Management or Supervisory Board, or a person with whom they have a close relationship, within a calendar year has reached the €5,000 threshold. The transactions reported to Bayer AG in 2018 were duly published and can be viewed on the company's website.

4.2 Compliance

www.bayer.com/compliance

Bayer manages its businesses responsibly and in compliance with the statutory requirements and regulations of the countries in which it operates. We define compliance as legally and ethically impeccable conduct by all employees in their daily work, because the way they carry out their duties affects our company's reputation. We do not tolerate any violation of laws, codes of conduct or internal regulations. Compliance is essential for our long-term economic success.

Following the acquisition of Monsanto, compliance responsibilities for the acquired agriculture business now lie with Bayer and its Law, Patents & Compliance function. Monsanto had its own compliance management system prior to the start of the integration process. This system, which mitigates compliance risks and addresses largely the same risk areas as Bayer, will remain in place until integration into Bayer's compliance processes and systems has been completed. The integration process has already begun and is scheduled to be completed in 2019.

Bayer compliance management

The Board of Management is unreservedly committed to compliance, and Bayer will forgo any business transaction that would violate any of the 10 principles in our Corporate Compliance Policy observed throughout the Bayer Group. These principles include the following:

- // We compete fairly in every market.
- // We act with integrity in all our business dealings.
- // We balance economic growth with ecological and social responsibility.
- // We observe trade controls that regulate our global business.
- // We safeguard equal opportunity in securities trading.
- // We keep accurate books and records.
- // We treat each other with fairness and respect.
- // We protect and respect intellectual property rights.
- // We act in Bayer's best interest.
- // We protect and secure personal data.

Equivalent business principles are in place for our newly acquired business, forming part of its own existing Code of Conduct that will continue to apply for the interim. The chapters contained within this Code of Conduct correspond to the relevant chapters in the Bayer Corporate Compliance Policy.

www.bayer.com/monsanto-code-of-conduct

All employees are required to observe the compliance principles and to immediately report any violation of the Corporate Compliance Policy. Bayer's senior managers serve as role models and have a vital part to play in implementing the compliance principles. They may lose their entitlement to variable compensation components and be subject to further disciplinary measures if violations of applicable law or internal regulations have occurred in their sphere of responsibility. Compliant and lawful conduct also factors into the performance evaluations of all managerial employees.

The global compliance management system is steered by a central compliance organization within the Bayer Group. This organization is headed by the Group Compliance Officer, who reports directly to the Chairman of the Board of Management and to the Audit Committee of the Supervisory Board. It is staffed with specialist compliance managers who are responsible for the corporate functions and for establishing business- and industry-specific standards in the divisions, business units and service companies.

Potential compliance risks are identified together with the operational units to ensure the systematic and preventive detection and assessment of risks. Potential risks are then entered into a global compliance risk management database that we use to develop suitable measures for specific processes, business activities or countries, for example. In addition, we assess our business partners according to risk criteria as we look to identify potential compliance risks.

Adherence to the corporate compliance principles is among the subjects covered in audits conducted by Bayer's Internal Audit. The planning of these audits follows a function- and risk-based approach that also takes a corruption perceptions index into account. The largest companies, which account for about 80% of Group sales, are generally subjected to audits at three-year intervals. A total of 180 compliance audits were completed in 2018, of which 23 were preventive or incident-related audits. The head of Internal Audit and the Group Compliance Officer regularly attend the meetings of the Audit Committee of the Supervisory Board and once a year present an overview of the audits performed.

Corruption Perceptions Index: see Glossary

In connection with the acquisition of Monsanto, the Bayer Internal Audit Charter directly entered into force, guaranteeing regular transparency over audit findings of the internal audit organization of the acquired agriculture business. The integration of the two companies' internal audit processes and systems is set to be largely implemented over the course of 2019.

Handling of suspected and actual compliance violations

Suspected compliance violations can be reported – anonymously if desired and if permitted by respective national law – to a central, worldwide compliance hotline that is also accessible to the general public. In 2018, the compliance organization received a total of 251 reports in this way (including 166 anonymous reports), with 17 reports coming from Germany and 234 from other countries. The compliance hotline of our newly acquired agriculture business received a total of 77 reports (including 47 anonymous reports) in 2018. The hotline will remain available for a transitional period, ensuring that any reports received via that channel are recorded in the Bayer Group incident database and processed in line with Bayer regulations. The central Bayer compliance hotline was rolled out for the newly acquired agriculture business at the end of 2018. Alternatively, suspected violations may also be reported to the respective compliance functions in Germany or the country organizations, or to Internal Audit.

Compliance violations are systematically sanctioned. The action taken depends on factors including the gravity of the compliance violation and applicable law. All cases are recorded according to uniform criteria throughout the Bayer Group and dealt with under the rules set forth in Bayer's corporate policy entitled "Management of Compliance Incidents."

Starting in 2019, this will also apply to compliance violations assigned to the acquired agriculture business, ensuring that these cases are also subject to our Bayer Group documentation, processing and reporting criteria. Cases assigned to the newly acquired agriculture business that were received between the closing of the acquisition and the end of 2018 were documented in a designated Monsanto database and, if deemed to be significant in nature, were reported to the responsible Bayer representatives. These cases were processed in line with principles that mirror our Bayer-wide standards. Significant cases from the acquired agriculture business that had yet to be processed were analyzed and, where necessary, measures were drawn up.

Where an investigation confirms that a compliance violation has occurred, the company has a graduated set of measures at its disposal. These include a verbal warning or written reprimand, transfer to a different unit, cancellation of a planned promotion, a reduction in the short-term incentive payment, downgrading to a lower collectively agreed pay rate or managerial contract level, and ordinary or extraordinary termination. Bayer also reserves the right to assert further claims against the employee for cost reimbursement or damages and/or to initiate criminal proceedings.

Compliance training and communications activities

We support all employees in acting with integrity and proactively avoiding potential violations by implementing Bayer-wide training measures and communication campaigns that are tailored to target groups and based on identified needs. Both supervisors and compliance managers can answer employees' questions about lawful and ethical behavior.

In 2018, 97.6% (34,381) of Bayer's managerial employees worldwide (excluding the acquired agriculture business) completed at least one compliance training program. In 89 countries, we also implemented a new global web-based training program covering the principles set out in our Corporate Compliance Policy. The program, which takes the form of an interactive infographic, is currently available in nine languages. As of December 31, 2018, it had been completed by 70% (67,190) of employees (excluding the acquired agriculture business).

Relevant employees at the acquired agriculture business received training on insider trading directly after closing of the transaction. 397 employees completed this training course at the Monsanto University in June 2018, with a pass rate of 100%. As the next step, 865 employees from around the world who were working at the acquired agriculture business were invited to take an antitrust training course via the Bayer training portal in August and September 2018. In 2019, we will begin gradually rolling out further compliance training sessions, starting with a web-based training course in the form of an interactive infographic on the principles of our Corporate Compliance Policy. Training courses on the risk areas of anticorruption, conflicts of interest, fairness and respect at work, and data protection will follow. Employees at the acquired agriculture business have had access to all compliance training courses available in the Bayer training portal since Day One in August 2018.

The Corporate Compliance Policy forms the basis of our compliance communication and training activities. In 2018, we launched a speak-up campaign in both digital and print form. The rollout of the Bayer Group compliance hotline to employees at the acquired agriculture business was also accompanied by a speak-up campaign. Employees can additionally access compliance updates and training courses using a specially designed app.

Marketing compliance

We do not tolerate bribery or any other form of improper exertion of influence on our business partners. As part of our compliance management system, we register and investigate any suspected violation of our responsible marketing principles, irrespective of whether the complaints come from internal or external sources.

The most important internal Bayer corporate policy in this context is our Anti-Corruption Policy, which is supplemented by the rules of conduct established in our corporate policy entitled “Responsible Marketing & Sales.” Furthermore, we are committed to ethical advertising and communication for all our products and services.

www.bayer.com/
responsible-marketing

Bayer has also put in place directives and corporate policies to prevent price fixing and ensure data protection. Where several regulations are applicable, we principally comply with the more stringent standards. Our corporate policies and the respective training programs are implemented in the segments on a decentralized basis.

Industry codes adopted by major associations for pharmaceutical products and medical devices also apply in marketing and distribution at Bayer at the global or regional levels. In many countries, these standards are further underpinned by local codes – all of which apply to prescription pharmaceuticals and some of which also apply to nonprescription medicines, dietary supplements, medical devices and cosmetics.

All codes of the International Federation of Pharmaceutical Manufacturers & Associations (IFPMA) serve as a binding minimum global standard for all human pharmaceutical products marketed by Bayer. In addition, Bayer observes the codes of the European Federation of Pharmaceutical Industries and Associations (EFPIA) in its interaction with health care professionals and patient organizations. The WHO Ethical Criteria for Medicinal Drug Promotion, together with national ethical standards that are usually also enshrined in industry codes at the local level, represent the minimum global standards for the advertising of human pharmaceutical products at Bayer.

All the aforementioned codes contain provisions governing, among other matters, advertising materials, the distribution of samples, cooperation with members of specialist groups in connection with speaker and consultancy contracts, and scientific studies. Based on the EFPIA transparency code and the corresponding local interpretations, Pharmaceuticals annually discloses any payments and other remunerations made to health care professionals and organizations for the preceding calendar year.

In line with the principles of sustainable development and the responsible use of crop protection products and seeds, Crop Science follows the guidelines of its Product Stewardship Policy. This policy, which also satisfies the requirements of our corporate policy entitled “Responsible Marketing & Sales,” is based on the International Code of Conduct on Pesticide Management issued by the Food and Agriculture Organization (FAO) of the United Nations and the International Code of Conduct on Pesticide Management issued by CropLife International.

Training measures on product-related communication, antitrust law, data protection and anti-corruption are fundamental elements of our compliance management system. Principles communicated in these training courses provide an overview of globally applicable minimum requirements for cooperation with key stakeholders, explicitly including those in the health care industry such as physicians, hospitals or patient organizations. In addition to explaining general compliance principles, the anti-corruption courses provide specific advice on approaches to nonreciprocal benefits and the exchange of services with health care professionals.

www.bayer.com/code-of-conduct-lobbying

Lobbying

Forming part of our commitment to ensuring transparent lobbying, our corporate policy entitled "Code of Conduct for Responsible Lobbying" sets out binding rules for our involvement in political matters and creates transparency in our interactions with the representatives of political institutions. Following the acquisition of Monsanto, responsibility for the public affairs activities of the acquired business transferred to the corresponding corporate function at Bayer. The corresponding corporate policy on lobbying was updated in 2018 and is now binding for employees at the acquired agriculture business.

As set out in this corporate policy, Bayer as a company did not make any donations to political parties, politicians or candidates for political office in 2018. This does not include political donations in the United States, which permits Bayer to make donations in support of candidates and elections at the state level. Such donations are subject to stringent conditions and mandatory transparency measures that include a publicly accessible list documenting donations made at state level.

www.bayer.com/fec-bayer-pac

In the United States, where applicable law may prohibit corporate donations for some federal, state or local elections, Bayer's employees have organized the Bayer Corporation Political Action Committee (Bayer-US PAC) to support legislative candidates through private donations. Political action committees are separate, segregated funds governed by Bayer employees and further regulated by the U.S. Federal Election Commission and some state governments. The private donations made by Bayer-US PAC are regularly reported to the U.S. Federal Election Commission and can be viewed on its website.

GRI 102-43

www.bayer.com/eu-register

www.bayer.com/us-lobbying-disclosure

Liaison offices – Contact with political stakeholders

For Bayer, national liaison offices are key touchpoints between the company and political stakeholders. We publish details of material costs, project expenses, employee numbers and any of the other statistics required in each country in the transparency registers of the European institutions and the U.S. Congress. Bayer goes beyond the statutory requirements in doing so. For instance, we also publish data for countries such as Germany where there is no legal disclosure requirement. In 2018, the costs incurred at the liaison offices (excluding the acquired agriculture business) totaled approximately €1.31 million in Berlin, Germany; €3.3 million in Brussels, Belgium; €7 million in Washington, United States; €0.33 million in Moscow, Russia; €0.35 million in Brasília, Brazil; and €0.98 million in Beijing, China.

www.bayer.com/monsanto-political-disclosures

www.bayer.com/fec-monsanto

www.bayer.com/eu-register-monsanto

The acquired agriculture business had previously used a different system, which is why its data cannot be combined with Bayer's data. This part of the company is scheduled to be integrated into Bayer's processes in 2019. Once completed, combined figures will be available. For the United States, various categories of lobbying spending by the acquired agriculture business can be accessed on the political disclosures website, while lobbying spending at federal level can also be viewed in the transparency registry of the U.S. Congress. In Europe, disclosures in the E.U. Transparency Register were last updated in 2017.

4.3 Disclosures Pursuant to Sections 289b Through e and 315b and c of the German Commercial Code (HGB)

The Bayer Group meets the requirements for the nonfinancial statement pursuant to Sections 289 b through e and 315 b and c of the German Commercial Code (HGB). The relevant disclosures pertaining to the nonfinancial statement in accordance with the Corporate Social Responsibility Directive Implementation Act (CSR-RUG) are integrated into the management report.

The Supervisory Board fulfilled its auditing duty for the nonfinancial statement pursuant to Section 170, Paragraph 1 and Section 171, Paragraph 1 of the German Stock Corporation Act (AktG).

4.4 Compensation Report

The Compensation Report describes the essential features of the compensation packages for the members of the Board of Management and the Supervisory Board of Bayer AG and explains the compensation the individual members were granted or received for the 2018 fiscal year. The report complies with the requirements of the applicable financial reporting standards for publicly traded companies (German Commercial Code [HGB], German Accounting Standards [DRS] and the International Financial Reporting Standards [IFRS]) as well as with the recommendations contained in the current versions of the German Corporate Governance Code and the guidelines for the sustainable compensation of management board members. The Compensation Report also largely takes into account foreseeable requirements resulting from the European Shareholder Rights Directive II (SRD II), which has yet to be transposed into German law.[7]

The guidelines for the sustainable compensation of management board members were developed by supervisory board chairpersons, investor representatives, scientists and corporate governance experts.

4.4.1 Compensation of the Board of Management

Objective

The compensation system for the Board of Management of Bayer AG applies in the version approved by a large majority (81.1%) at the Annual Stockholders' Meeting on April 29, 2016. It is aligned to the corporate strategy and geared toward performance-driven, sustainable corporate governance and an appropriate compensation structure and level. The compensation system for the Board of Management corresponds very largely to the system applying to all managerial employees not covered by collective bargaining agreements.

Key elements in Board of Management compensation include not only the absolute amount and appropriate and clear thresholds, but also a balanced mix of fixed income and short- and long-term variable compensation components. In accordance with the recommendations of the German Corporate Governance Code and the guidelines for the sustainable compensation of management board members, the variable portion of target compensation at Bayer has a predominantly long-term character. Fixed compensation accounts for about 30% of target compensation, the annual target bonus for about 30% and the four-year long-term bonus for about 40%.

The compensation of the Board of Management is reviewed each year and is usually increased in line with the consumer price index for Germany. If the Supervisory Board considers an additional adjustment necessary, the Human Resources Committee discusses the matter in detail with the aid of background information and prepares a corresponding resolution proposal for the Supervisory Board. The benchmark for the compensation review, for which an external independent expert is consulted, is the DAX 30 companies excluding financial services companies. All of the assessment criteria recommended in Section 4.2.2 of the German Corporate Governance Code are taken into account. The full Supervisory Board then resolves on the proposed adjustment.

[7] The proposed rules as published on October 11, 2018, in the draft of a law to transpose the European Shareholder Rights Directive II into German law (ARUG II) were taken into account.

An overview of the compensation system for the Board of Management is given below:

A 4.4.1/1

Board of Management Compensation Policy for 2018

	Objective	Basis of calculation
Fixed annual compensation		The level of fixed annual compensation reflects a person's role on the Board of Management, their experience, the scope of responsibility to be exercised and market conditions.
Fringe benefits		Fringe benefits include a company car with driver, the costs of health screening examinations, various types of insurance, and private home security installations. They also include indemnity payments to new members of the Board of Management for variable compensation components granted to them by former employers that lapse due to their joining Bayer.
Short-term variable cash compensation (Short-term incentive [STI]) = annual bonus	The annual bonus encourages profitable growth and is based on a comparison of target attainment with the budgeted targets of individual segments and the Group as a whole.	1. Sales growth (Fx & portfolio adj.) & EBITDA margin before special items of segments 2. Core EPS In addition, Bayer agrees on personal targets with each member of the Board of Management. The attainment of these targets and a Board member's contribution to attaining Group targets can positively or negatively affect their individual payout.
Right of the Supervisory Board to intervene in determining the annual bonus; malus and clawbacks	Ensuring the relative fairness of bonuses for the individual members of the Board of Management	The Supervisory Board has the discretion to alter the amount of an annual bonus if the Supervisory Board arrives at an assessment that differs from the evaluation determined for a member of the Board of Management. Irrespective of this, the legal basis exists for Bayer to reduce payments or demand their return if a Board of Management member commits a breach of duty that results in financial loss. It is intended that this also be contractually agreed in the future.
Long-term stock-based cash compensation Aspire 2.0 (long-term incentive [LTI])	The four-year bonus fosters a sustained increase in corporate value.	Virtual, stock-based compensation program: Payments are made automatically after four years based on the absolute increase in value, dividends, and performance of Bayer shares relative to the EURO STOXX 50.
Payment limits (caps)	Avoiding excessive, out-of-control payments	Caps apply to both variable compensation components. In addition, there is an overall cap on the three components of cash compensation: STI: Target value = 100% of fixed annual compensation Cap = 200% of the target value LTI: Target value = 150% of fixed annual compensation multiplied by the personal STI payment factor for the previous fiscal year Cap = 250% of the target value The overall payment cap for components of cash compensation amounts to 1.8 times the target cash compensation (fixed annual compensation + STI + LTI). In this calculation, the LTI target value is set at 150% of fixed annual compensation.
Share ownership guidelines	Promotion of sustainable corporate development and identification with the company	Within four years of their appointment, members of the Board of Management are contractually obligated to purchase Bayer shares equating to one-half of the LTI target value (75% of fixed annual compensation) and to retain these shares for as long as they serve on the Board of Management.
Retirement and surviving dependents' pensions	Provision of contributions to provide an adequate pension	Company contributions amount to 42% of fixed annual compensation, with the Board of Management member contributing 9%. These amounts are converted into pension entitlements. Benefits accrue from the sum total of the pension entitlements.
Contract termination	Inappropriately high payments are to be avoided.	If the company early terminates a Board of Management member's contract, the company will fulfill its contractual commitments until that Board member leaves Bayer. This does not apply in the event of termination for cause. The company may also make a severance payment equivalent to the lower of two years' compensation or the compensation for the remainder of the original contract term.
Change of control	Ensuring independence in acquisition situations	Indemnity payments amounting to 250% of fixed annual compensation, capped as per the German Corporate Governance Code at the lower of (i) three years' compensation or (ii) the compensation for the remainder of the contract term

Performance-related components

Short-term variable cash compensation

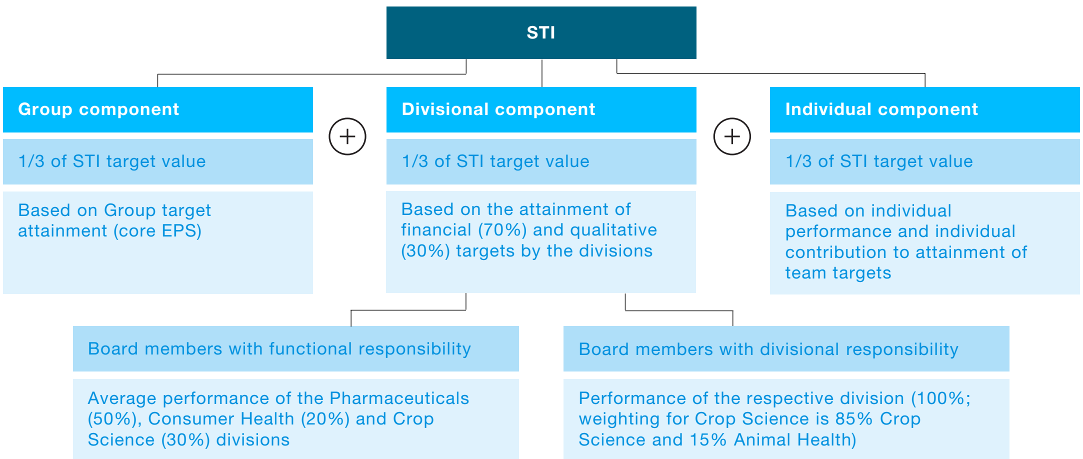
The short-term variable cash compensation (STI) depends on the company's business success in the respective year. The level of the STI is determined by the target attainment for three subcomponents – the Group component, the divisional component and the individual performance component – each of which is given a one-third weighting in the performance evaluation. The performance evaluation takes into account both positive and negative developments.

- // The Group component is based on the core earnings per share of the Group and is capped at 200%.
- // The divisional component is incentivized based on the average performance of the divisions. For the members of the Board of Management with functional responsibility, this component is calculated using the following weighting: Pharmaceuticals 50%, Consumer Health 20% and Crop Science 30% (of which the Crop Science Division accounts for 85% and Animal Health for 15%). For the Board members with divisional responsibility, this one-third of the STI is incentivized entirely on the basis of the respective division's earnings. The assessment of divisional performance comprises a 70% component linked to the attainment of financial targets in relation to the EBITDA margin before special items and divisional sales growth. For Crop Science, cash flow performance is also taken into account. The remaining 30% component of divisional performance is based on the attainment of qualitative goals in areas such as innovative progress, safety, compliance and sustainability. The divisional component is capped at 300%.
- // The target attainment criteria for the individual performance component are based on the duties and resulting personal targets of the respective member of the Board of Management, as well as on his or her individual contribution to the attainment of the Group targets. The individual targets for the members of the Board of Management are determined annually by the Supervisory Board, which also assesses their attainment. The individual performance component is capped at 200%

The entire amount of the STI is paid out in cash in the second quarter of the following year.

A 4.4.1/2

Short-Term Variable Cash Compensation Components (STI)



For fiscal 2018, the following target values for core EPS were budgeted and achieved, respectively, for the Group component: Target value: €5.74 per share / Target attainment: €5.94 per share. The performance evaluation corridor set for 2018 was between €6.24 (200% payout = cap) and €5.24 (payout from this component = 0). These values were adjusted due to the acquisition of Monsanto and the capital increases implemented in 2018. The previous target value was €6.72 per share with a corridor of €7.22 (200% payout = cap) and €6.22 (payout from this component = 0).

The divisional component consists of quantitative (70%) and qualitative (30%) elements. For the quantitative performance evaluation for the divisional component, sales growth (Fx & portfolio adj.) and the EBITDA margin before special items are considered in a two-dimensional matrix. Awards above 100% of the target value can occur, for example, if one performance target is met and the other is exceeded, or if both performance targets are exceeded.

A 4.4.1/3

STI Payment Matrix[1]

							EBITDA margin before special items				
							< Target value		Target value		> Target value
						PH	32.7%	…	33.7%	…	34.7%
						CH	20.0%	…	21.0%	…	22.0%
						CS	15.7%	…	17.7%	…	19.7%
						AH	21.2%	…	22.2%	…	23.2%
		PH	CH	CS	AH						
	< Target value	2.7%	−1.0%	47.6%	−0.9%		0%	…	50%	…	100%
		…	…	…	…		…	…	…	…	…
Sales growth (Fx & p. adj.)[2]	Target value	5.2%	1.5%	52.6%	1.6%		50%	…	100%	…	150%
		…	…	…	…		…	…	…	…	…
	> Target value	7.7%	4.0%	57.6%	4.1%		100%	…	150%	…	200%

[1] Financial targets for the respective division (70% weighting)
[2] Currency-adjusted sales growth is used at Crop Science in view of the Monsanto acquisition.

For fiscal 2018, the following target values for sales growth and the EBITDA margin before special items were budgeted and achieved, respectively, for the divisions.

Pharmaceuticals
- // Sales growth vs. 2017 (Fx & portfolio adj.): Target value: 5.2% / Attainment: 3.4%
- // EBITDA margin before special items: Target value: 33.7% / Attainment: 33.4%

Consumer Health
- // Sales growth vs. 2017 (Fx & portfolio adj.): Target value: 1.5% / Attainment: – 0.7%
- // EBITDA margin before special items: Target value: 21.0% / Attainment: 20.1%

Crop Science
- // Sales growth vs. 2017 (Fx adj.): Target value: 52.6% / Attainment: 52.8%[8]
- // EBITDA margin before special items: Target value: 17.7% / Attainment: 18.6%
- // The Crop Science target values were adjusted due to the acquisition of Monsanto. The original targets were 5.1% for sales growth and 21.7% for the EBITDA margin before special items.

Animal Health
- // Sales growth vs. 2017 (Fx & portfolio adj.): Target value: 1.6% / Attainment: 0.5%
- // EBITDA margin before special items: Target value: 22.2% / Attainment: 23.9%

[8] When determining target attainment, the sales of the Monsanto business were adjusted for currency effects on the basis of the exchange rates prevailing at the time the targets were set.

The qualitative performance evaluation is based on the attainment of other divisional targets. The qualitative components can also be used as a correction factor at the reasonable discretion of the Supervisory Board.

The quantitative and qualitative elements that make up the divisional component for 2018 resulted in the following overall target attainment levels:

- **Pharmaceuticals:** 52%
- **Consumer Health:** 35%
- **Crop Science:** 105%
- **Animal Health:** 123%
- **Reconciliation:** 65%

In accordance with a resolution of the Human Resources Committee and the Supervisory Board, all members of the Board of Management receive individual targets that are tailored to their respective areas of responsibility. Target attainment is individually evaluated following the end of the fiscal year. The following table provides an overview of the subject areas taken into account for the individual performance targets agreed upon.

A 4.4.1/4

Individual Targets Agreed

Board of Management member	Topic areas for individual targets
Werner Baumann	Acquisition and integration of Monsanto, strengthening the Bayer brand, quality assurance, integrating new Board members
Dr. Hartmut Klusik	Talent acquisition and employee development, quality assurance, production safety, sustainability strategy
Johannes Dietsch/Wolfgang Nickl[1]	Acquisition and integration of Monsanto, financing of the Monsanto acquisition, reducing Bayer's interest in Covestro
Kemal Malik	Research, innovation, Leaps by Bayer[2]
Liam Condon	Acquisition and integration of Monsanto, business continuity at Crop Science, digitalization
Erica Mann/Heiko Schipper[1]	Consumer Health core topics, focus on United States and China, digitalization
Dieter Weinand/Stefan Oelrich[1]	Research and product pipeline at Pharmaceuticals, quality assurance, inlicensing, key markets, digitalization

[1] Wolfgang Nickl, Heiko Schipper and Stefan Oelrich took over the personal targets of their respective predecessors for the remainder of the year.
[2] For information on Leaps by Bayer, see also A 1.3.

In addition, team targets are agreed to reflect the collective responsibility of the members of the Board of Management as a governance body. The team targets are based on the Group targets set by the Board of Management for 2018 and approved by the Supervisory Board. The following table provides an overview of the subject areas taken into account for the Group targets.

A 4.4.1/5

Team Targets 2018

Subject area	Targets
Alignment against growth markets	// Prepare closing and successfully integrate Monsanto while maintaining business continuity
	// Drive organic growth by further focusing activities on 'must-wins'
	// Create value-creating growth opportunities by active portfolio management, M&A and inlicensing
Innovation powered by science	// Drive pipeline progress in divisions
	// Drive breakthrough innovation through Leaps by Bayer
	// Drive digital transformation
Excellence in execution	// Take measures to ensure profitable growth and sound cash generation
	// Realize Monsanto synergy milestones and drive other divisional/functional efficiency programs
	// Accomplish functional excellence for best-in-class business support
Commitment to people and sustainability	// Ensure quality, safety, compliance and actively manage risks
	// Drive cultural enhancement and further advance Bayer as an employer of choice
	// Drive societal and ecological progress

The attainment of the individual targets and the team targets is assessed by the Human Resources Committee and the Supervisory Board following the end of the fiscal year and has a one-third weighting in the calculation of the STI payout.

Long-term stock-based cash compensation (LTI)
Members of the Board of Management are eligible to participate in the annual tranches of the long-term stock-based compensation program Aspire on condition that they purchase a certain number of Bayer shares – determined for each individual according to specific guidelines – as a personal investment and hold them for as long as they continue in the service of the Bayer Group.

The LTI target values for the Aspire 2.0 tranches issued each year since 2016 are generally based on a contractually agreed target rate of 150% of fixed annual compensation. The starting value is also multiplied by the individual STI payment factor for the Board member concerned for the year prior to the issuance of the respective tranche.

$$\text{LTI target value} = 150\% * \text{fixed annual compensation} * \text{STI payment factor prior to issuance of the tranche}$$

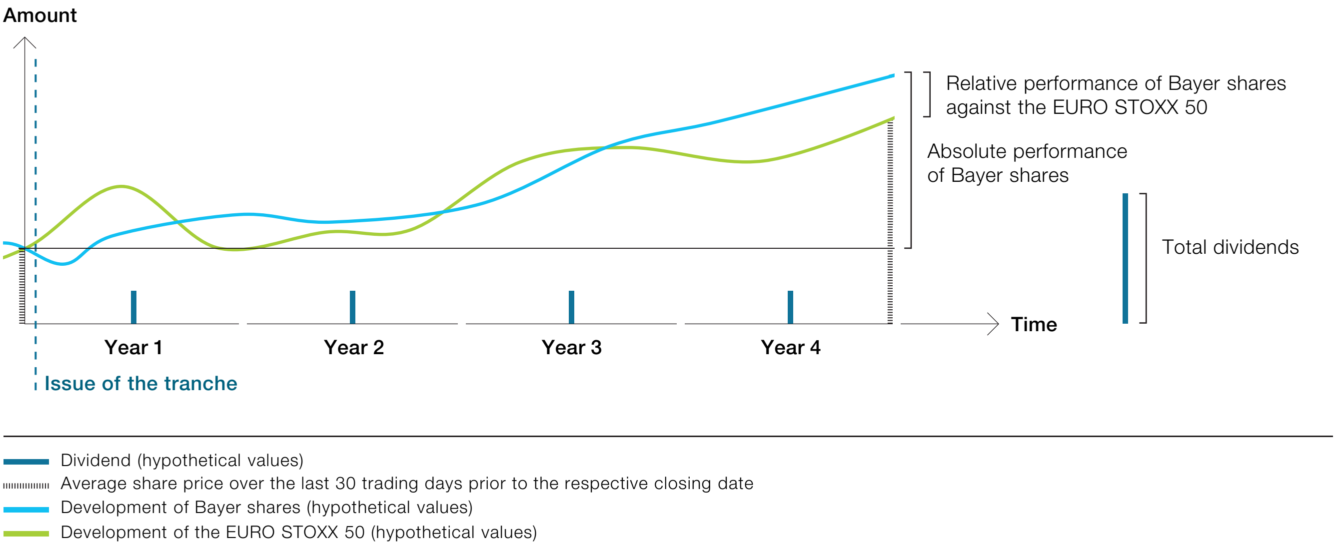
The cash payment amounts are determined after four years based on the LTI target value, the development of Bayer's share price, the performance of Bayer stock relative to the EURO STOXX 50 and the dividends paid in the meantime (total stockholder return approach).

$$\text{LTI payout} = \text{LTI target value} * \frac{\begin{array}{c}\text{average share price of last 30 days}\\ \text{of trading prior to expiration of the tranche}\end{array}}{\begin{array}{c}\text{average share price of last 30 days}\\ \text{of trading prior to issuance of the tranche}\end{array}} * \begin{array}{c}\text{relative performance}\\ \text{vs. EURO STOXX50}\end{array} + \text{total dividends}$$

For the Board of Management, an additional performance measure has been included in the LTI program in the form of the comparison with the EURO STOXX 50 mentioned above. This increases or decreases the payout by the percentage of overperformance or underperformance, respectively, but by no more than 50 percent either way.

A 4.4.1/6

Illustration of Aspire 2.0 Elements and Design



The payments made under the tranches of the Aspire program issued in the years up to 2015 continue to be based until their expiration on the Aspire Target Opportunity, which is a contractually agreed percentage of fixed annual compensation. Depending on the performance of Bayer stock, both in absolute terms and relative to the EURO STOXX 50 benchmark index, participants are granted an award of between 0% and a maximum 300% of their individual Aspire Target Opportunity at the end of the respective performance periods.

The payout/performance matrix according to the absolute and relative development of Bayer's share price is explained at www.investor.bayer.com/en/stock/stockprograms/aspire/.

If a member of the Board of Management enters retirement during the year or steps down from the Board of Management during the year due to the nonextension of their service contract by mutual agreement or by the company's decision, the Aspire tranche granted for that year is reduced on a prorated basis according to the duration of the member's active service on the Board of Management during this first year of the tranche. In this case, tranches granted for previous years remain in effect without any changes.

The payout from the 2014 Aspire tranche in January 2018 was based on the following starting and closing prices/values for Bayer's shares and the EURO STOXX 50, with the closing price/value having been calculated at year-end 2017 (end of the four-year period):

- Starting price of Bayer shares (average of the last 30 trading days in 2013): €96.96
  Closing price of Bayer shares (average of the last 30 trading days in 2017): €106.61
- Starting value of the EURO STOXX 50 (average of the last 30 trading days in 2013): 3,026.85
  Closing value of the EURO STOXX 50 (average of the last 30 trading days in 2017): 3,566.83

For the 2014 Aspire tranche, 20% of the starting value was paid out. The 2015 tranche did not lead to a payout in January 2019 due to a decline in the stock price.

Pension entitlements (retirement and surviving dependents' pensions)
The annual pension entitlement for members of the Board of Management is based on contributions. Each year Bayer provides a hypothetical contribution amounting to 42% of the respective fixed annual compensation. This percentage is comprised of a basic contribution of 6% and a matching contribution of 36%, which is four times the member's personal contribution of 9%. The total annual contribution is converted into a pension entitlement according to the annuity table for the applicable tariff of the Rheinische Pensionskasse VVaG pension fund. The annual pension entitlement upon retirement is the total amount of the accumulated pension entitlements including an investment bonus. The investment bonus is determined annually based on the net return on the assets of the Rheinische Pensionskasse VVaG minus the minimum return on the contributions

that is guaranteed under the tariff and approved by the German Financial Supervisory Authority (BaFin). Future pension payments are annually reviewed and adjusted to take into account the development of consumer prices.

In addition, special individual arrangements exist for the following members of the Board of Management:

- Werner Baumann has been granted a vested entitlement to an annual pension of €200 thousand starting on his 60th birthday. This is subject to a prorated reduction in the event that his term of office ends prior to his 60th birthday under certain conditions.
- Kemal Malik has been granted a vested entitlement to an annual pension of €80 thousand starting on his 65th birthday. This is subject to a prorated reduction in the event that his term of office ends prior to his 65th birthday under certain conditions.
- Erica Mann participated in pension plans in Germany (30%) and Switzerland (70%) on a prorated basis in view of her split service contract. Ms. Mann had the option to receive either a lifelong monthly annuity or a capital sum when the pension benefits from her two pension plans fell due. She chose the capital sum.
- Heiko Schipper participates in pension plans in Germany (30%) and Switzerland (70%) on a prorated basis in view of his split service contract.

Certain assets are administered by Bayer Pension Trust e.V. under a contractual trust arrangement (CTA) to cover pension entitlements resulting from direct commitments in Germany. This provides substantial additional security – beyond the benefits from the Pension Insurance Association – for the respective pension entitlements of the members of the Board of Management in Germany.

Benefits upon termination of service on the Board of Management

When a service contract of a Board of Management member terminates (by expiration or nonextension), all previously applicable payments for fixed compensation and the annual bonus (STI) cease along with expenditures for the company pension plan and all fringe benefits. However, long-term variable compensation (LTI) has a continuing effect, as payments from these four-year tranches are only made over time and are not brought forward upon termination of the service contract. However, the entitlements have been earned during the regular contract term.

Post-contractual noncompete agreements

Post-contractual noncompete agreements exist with the members of the Board of Management, providing for compensatory payments to be made by the company for the two-year duration of these agreements. The compensatory payment for each of the two years amounts to 100% of the average fixed compensation for the 12 months preceding their departure. In line with legal requirements, other work-related income is taken into account when determining the compensatory payment. The company can opt to waive the noncompete agreement when a service contract terminates, in which case no compensatory payment is made. This is also the case when a member of the Board of Management retires after leaving the company.

Unfitness for work
In the event of temporary unfitness for work, members of the Board of Management continue to receive the contractually agreed compensation. Bayer AG may early terminate the service contract if the Board member has been continuously unfit for work for at least 18 months and is likely to be permanently incapable of fully performing their duties (permanent incapacity to work). A disability pension is paid in the event of contract termination before the age of 60 due to permanent incapacity to work. For members of the Board of Management, the amount of the disability pension under the service contract corresponds to the entitlement accrued on the date of contract termination, taking into account a fictitious period of service between that date and the member's 55th birthday, where applicable.

Planned changes starting in 2019 and 2020

For members of the Board of Management with functional responsibility, the following adjustment will be made to the weighting of the divisional component of their short-term variable cash compensation as a result of the Monsanto acquisition: Pharmaceuticals 45%, Consumer Health 10% and Crop Science 45% (of which the Crop Science Division accounts for 95% and Animal Health for 5%).

The Supervisory Board intends to adjust the Share Ownership Guidelines and to increase the required value of each Board of Management member's personal investment in Bayer stock to 100% of fixed annual compensation starting in 2020.

The Supervisory Board also plans to include explicit clawback provisions – i.e. possibilities for reclaiming compensation components that have already been paid out – in the contracts.

Compensation of the Board of Management in 2018

The aggregate compensation (HGB) for the members of the Board of Management in 2018 totaled €24,509 thousand (2017: €24,324 thousand), comprising €8,212 thousand (2017: €6,414 thousand) in non-performance-related components and €16,297 thousand (2017: €17,910 thousand) in performance-related components. The pension service cost amounted to €2,745 thousand (2017: €2,546 thousand).

As of December 31, 2018, the Board of Management of Bayer AG consisted of seven members. The following changes to the membership of the Board of Management took place in 2018, with the new members having been appointed by the Supervisory Board:

- Heiko Schipper became a member of the Board of Management of Bayer AG effective March 1, 2018. He succeeded Erica Mann as head of the Consumer Health Division on April 1, 2018.
- Wolfgang Nickl became a member of the Board of Management of Bayer AG effective April 26, 2018. He succeeded Johannes Dietsch as Chief Financial Officer of Bayer AG on June 1, 2018.
- Stefan Oelrich became a member of the Board of Management of Bayer AG effective November 1, 2018. He succeeded Dieter Weinand as head of the Pharmaceuticals Division on the same date.

The following table shows the aggregate compensation, according to the German Commercial Code, of the individual members of the Board of Management who served in 2017 and/or 2018:

A 4.4.1/7

Board of Management Compensation (German Commercial Code)

€ thousand	Fixed annual compensation 2017	Fixed annual compensation 2018	Fringe benefits 2017	Fringe benefits 2018	Short-term variable cash compensation 2017	Short-term variable cash compensation 2018	Long-term stock-based cash compensation (Aspire)[1] 2017	Long-term stock-based cash compensation (Aspire)[1] 2018	Aggregate compensation 2017	Aggregate compensation 2018	Pension service cost[2] 2017	Pension service cost[2] 2018
Serving members of the Board of Management as of December 31, 2018												
Werner Baumann (Chairman)	1,487	1,511	49	46	1,335	1,708	3,530	2,039	6,401	5,304	809	874
Liam Condon	806	819	43	45	519	1,056	1,677	793	3,045	2,713	320	348
Dr. Hartmut Klusik	756	768	40	39	565	805	1,597	864	2,958	2,476	305	331
Kemal Malik	781	794	36	37	604	813	1,591	923	3,012	2,567	310	315
Wolfgang Nickl	–	523	–	41	–	571	–	1,056	–	2,191	–	133
Stefan Oelrich[3]	–	137	–	142	–	133	–	973	–	1,385	–	19
Heiko Schipper[4]	–	640	–	1,431	–	639	–	1,104	–	3,814	–	178
Former members												
Johannes Dietsch[5]	756	320	42	17	679	346	1,483	432	2,960	1,115	305	141
Erica Mann[6]	756	192	24	3	378	192	1,210	145	2,368	532	257	204
Dieter Weinand	806	683	32	24	810	674	1,932	1,031	3,580	2,412	240	202
Total[7]	**6,148**	**6,387**	**266**	**1,825**	**4,890**	**6,937**	**13,020**	**9,360**	**24,324**	**24,509**	**2,546**	**2,745**

[1] Fair value at grant date
[2] Including company contributions to Bayer-Pensionskasse VVaG, Rheinische Pensionskasse VVaG and to a pension fund outside Germany
[3] The fringe benefits for Stefan Oelrich contain an indemnity payment of €135 thousand for variable compensation components granted to him by his former employer that lapsed due to his joining Bayer. The indemnity amounts to €2,424 thousand in total and will be paid over a period of three years on a pro rata temporis basis.
[4] The fringe benefits for Heiko Schipper contain an indemnity payment of €894 thousand for variable compensation components granted to him by his former employer that lapsed due to his joining Bayer. The compensation amounts to €1,950 thousand in total. A quarter of this amount was paid as at the date he joined the Board of Management. The remaining three-quarters of this amount will be paid over a period of three years on a pro rata temporis basis.
[5] Johannes Dietsch was additionally granted a compensatory payment of €1,522 thousand under the post-contractual noncompete agreement. This will be paid out monthly over a period of two years on a pro rata temporis basis.
[6] It was agreed with Erica Mann that she would receive a severance payment of €1,978 thousand in view of her leaving the company effective March 31, 2018. This puts her in the same position as if she had held office until December 31, 2018, and had then retired.
[7] The total compensation of the Board of Management includes fixed annual compensation of €583 thousand (2017: €529 thousand), fringe benefits of €1,000 thousand (2017: €24 thousand), short-term variable cash compensation of €581 thousand (2017: €265 thousand) and long-term stock-based cash compensation of €874 thousand (2017: €847 thousand) that Erica Mann and Heiko Schipper received from our subsidiary Bayer Consumer Care AG, Switzerland, in their respective capacities as head of the Consumer Health Division.

Fixed annual compensation

The fixed annual compensation of the members of the Board of Management was adjusted in 2018. The total fixed annual compensation of all the members was €6,387 thousand (2017: €6,148 thousand).

Short-term variable cash compensation

The total short-term variable cash compensation for all the members of the Board of Management in 2018 totaled €6,937 thousand (2017: €4,890 thousand) after deduction of the solidarity contribution. Provisions of €5,725 thousand (2017: €4,890 thousand) were established for payment of this compensation component to the members of the Board of Management serving as of December 31, 2018. The solidarity contribution is made by all employees of the companies covered by the respective agreements with the employee representatives to help safeguard jobs at the German sites. For 2018 it amounted to 0.22% (2017: 0.25%) of each person's STI award.

Long-term variable cash compensation based on virtual Bayer shares

This compensation component no longer exists following the adjustment of the compensation system for the Board of Management effective January 1, 2016. The conversion of 50% of the STI into virtual Bayer shares took place for the last time in 2015 and was based on an average price of €119.17. The aggregate compensation for 2018 according to IFRS includes a negative change of €978 thousand (2017: positive change of €538 thousand) in the value of existing entitlements. Provisions of €1,824 thousand (2017: €6,841 thousand) existed as of December 31, 2018, for the future cash disbursements to currently serving members of the Board of Management based on the virtual Bayer shares granted in previous years. This amount also contains the dividend entitlements attributable to the respective prior years.

Long-term stock-based cash compensation (Aspire)

The long-term stock-based cash compensation under the Aspire program is included in the aggregate compensation according to the German Commercial Code at its fair value of €9,360 thousand (2017: €13,020 thousand) at the respective grant date.

The aggregate compensation according to IFRS includes the fair value of the partial entitlement earned in the respective year. Grants of stock-based compensation with a four-year performance period are therefore expensed at their respective fair values over four years starting with the grant year. The stock-based compensation according to IFRS also includes the change in the value of existing entitlements under ongoing Aspire tranches granted in prior years.

A 4.4.1/8

Board of Management Compensation – Aspire Program (IFRS)

		Serving members of the Board of Management as of December 31, 2018							Former members			
€ thousand		Werner Baumann (Chairman)	Liam Condon	Dr. Hartmut Klusik	Kemal Malik	Wolfgang Nickl	Stefan Oelrich	Heiko Schipper	Johannes Dietsch	Erica Mann	Dieter Weinand	Total
Stock-based compensation entitlements earned in the respective year[1]	2018	1,029	537	524	536	105	28	131	1,197	475	2,098	6,660
	2017	1,528	871	819	830	–	–	–	2,038	2,049	947	9,082
Change in the value of existing entitlements[2]	2018	(972)	(604)	(565)	(581)	–	–	–	(26)	(491)	(529)	(3,768)
	2017	(120)	(77)	(42)	(58)	–	–	–	(51)	(240)	(53)	(641)
Total[3]	**2018**	**57**	**(67)**	**(41)**	**(45)**	**105**	**28**	**131**	**1,171**	**(16)**	**1,569**	**2,892**
	2017	1,408	794	777	772	–	–	–	1,987	1,809	894	8,441

[1] The newly earned entitlements are derived from the 2015 – 2018 (2017: 2014 – 2017) tranches of the Aspire program because this compensation was or is being earned over a four-year period. They are stated at their prorated fair values in 2017 and 2018, respectively. Johannes Dietsch, Erica Mann and Dieter Weinand earned their entitlements at an accelerated rate until they left the company on May 31, 2018, March 31, 2018, and October 31, 2018, respectively. Accordingly, the proportion earned by Johannes Dietsch and Erica Mann in 2017 and by Dieter Weinand in 2018 is higher than for serving Board members as of December 31, 2018. The Aspire entitlements earned in 2017 and 2018 and the value changes for Liam Condon, Johannes Dietsch, Dr. Hartmut Klusik, Kemal Malik, Erica Mann and Dieter Weinand relate in part to Aspire tranches granted to them before they joined the Board of Management but not yet fully earned.

[2] This line shows the change in the value of the entitlements already earned in 2015, 2016 and 2017 (2017: 2014, 2015 and 2016).

[3] €425 thousand of the entitlements earned in 2018 (2017: €1,434 thousand) and minus €344 thousand of the change in the value of existing entitlements (2017: minus €168 thousand) pertain to entitlements against our subsidiary Bayer Consumer Care AG, Switzerland.

Provisions of €5,590 thousand (2017: €11,747 thousand) were established for the Aspire entitlements of the members of the Board of Management serving as of December 31, 2018. Of this amount, €4,695 thousand relates to the tranches issued up to 2017 and €895 thousand to the 2018 tranche.

Pension entitlements

The pension service cost recognized for the members of the Board of Management in 2018 according to the German Commercial Code was €2,745 thousand (2017: €2,546 thousand), while the current service cost for pension entitlements recognized according to IFRS was €3,489 thousand (2017: €3,907 thousand). The following table shows the service cost and the settlement or present value of the pension obligations attributable to the individual members of the Board of Management.

A 4.4.1/9

Pension Entitlements (German Commercial Code and IFRS)

	German Commercial Code				IFRS			
	Pension service cost [1]		Settlement value of pension obligation as of December 31 [2]		Current service cost for pension entitlements		Present value of defined benefit pension obligation as of December 31	
€ thousand	2017	2018	2017	2018	2017	2018	2017	2018
Serving members of the Board of Management as of December 31, 2018								
Werner Baumann (Chairman)	809	874	9,044	11,217	1290	1,254	13,544	15,075
Liam Condon	320	348	2,345	3,063	563	539	4,038	4,618
Dr. Hartmut Klusik	305	331	5,302	6,141	435	433	7,285	7,769
Kemal Malik	310	315	2,186	2,606	493	448	2,697	3,110
Wolfgang Nickl	–	133	–	148	–	206	–	207
Stefan Oelrich	–	19	–	21	–	27	–	28
Heiko Schipper	–	178	–	3,312	–	142	–	3,331
Former members								
Johannes Dietsch	305	141	3,951	–	483	87	5,919	–
Erica Mann	257	204	7,492	–	275	75	7,532	–
Dieter Weinand	240	202	700	–	368	278	988	–
Total	**2,546**	**2,745**	**31,020**	**26,508**	**3,907**	**3,489**	**42,003**	**34,138**

[1] Including company contribution to Bayer-Pensionskasse VVaG, Rheinische Pensionskasse VVaG and a pension fund outside Germany
[2] The pension obligations of foreign subsidiaries and Bayer pension funds are included at present value according to IFRS.

The difference between the pension service cost according to the German Commercial Code and the service cost for pension entitlements according to IFRS arises from the difference in the valuation principles used in calculating the settlement value according to the German Commercial Code and the present value of the defined benefit pension obligation according to IFRS.

Benefits upon termination of service on the Board of Management

It was agreed with Erica Mann in December 2017 that she be granted a severance package worth €1,978 thousand in light of the mutually agreed early termination of her service contract, effective March 31, 2018, which originally was to run until December 31, 2018. This package primarily comprises severance payments for fixed compensation, short-term variable compensation components, Aspire and payments for pension entitlements, each for the period April 1, 2018, through December 31, 2018. Erica Mann's entitlements under the company pension plan and the Aspire program were set at the levels they would have reached if she had been eligible to participate until December 31, 2018. The severance payment for her fixed compensation and the short-term variable compensation component, together amounting to €1,172 thousand, was paid in April 2018. The payments from the Aspire tranches will be made upon expiration of each tranche based on the respective Aspire program parameters. A noncompete agreement ending on December 31, 2018 existed with Erica Mann.

Johannes Dietsch concluded his service on the Board of Management as of May 31, 2018, when his contract expired. A two-year noncompete agreement ending on May 31, 2020, exists with Johannes Dietsch under his service contract. The resulting compensatory payment of €761 thousand per year is being made to him in monthly installments.

The contract with Dieter Weinand was early terminated effective October 31, 2018, by mutual agreement without any severance payments or compensatory payments.

The following table shows the present values of the contractually agreed compensatory payments for members of the Board of Management resulting from noncompete agreements as of December 31, 2018. For currently serving members of the Board of Management, it is assumed that payments will commence when their current contracts expire. Expected inflation-based adjustments to fixed annual compensation are taken into account in the calculation.

A 4.4.1/10

Compensatory Payments in Event of Contract Termination

€ thousand	Fixed annual compensation 2018	End of current contract	Present value of potential compensatory payments as of Dec. 31, 2018	
Serving members of the Board of Management				
Werner Baumann	1,511	April 30, 2021	3,178	
Liam Condon	819	Dec. 31, 2023	1,782	
Dr. Hartmut Klusik	768	Dec. 31, 2019	1,562	
Kemal Malik	794	Jan. 31, 2022	1,698	
Wolfgang Nickl	768	April 25, 2021	1,616	
Stefan Oelrich	819	Oct. 31, 2021	1,722	
Heiko Schipper	768	Feb. 28, 2021	1,616	
	Average fixed compensation in last 12 months	**Stepped down on**	**Present value of potential compensatory payments as of Dec. 31, 2018**	**Expense 2018**
Former members of the Board of Management				
Johannes Dietsch	761	May 31, 2018	1,078	444
Erica Mann[1]	–	March 31, 2018	–	–
Dieter Weinand[1]	–	Oct. 31, 2018	–	–

[1] Noncompete agreement waived by mutual consent

Aggregate Board of Management compensation (IFRS)

The aggregate Board of Management compensation according to IFRS is shown in the following table.

A 4.4.1/11

Board of Management Compensation according to IFRS

€ thousand	2017	2018
Fixed annual compensation	6,148	6,387
Fringe benefits	266	1,825
Total short-term non-performance-related compensation	**6,414**	**8,212**
Short-term performance-related cash compensation	4,890	6,937
Total short-term compensation	**11,304**	**15,149**
Change in value of existing entitlements to stock-based compensation (virtual Bayer shares)	538	(978)
Stock-based compensation (Aspire) earned in the respective year	9,082	6,660
Change in value of existing entitlements to stock-based compensation (Aspire)	(641)	(3,768)
Total stock-based compensation (long-term incentive)	**8,979**	**1,914**
Service cost for pension entitlements earned in the respective year	3,907	3,489
Total long-term compensation	**12,886**	**5,403**
Severance indemnity in connection with the termination of a service contract	1,978	–
Aggregate compensation (IFRS)	**26,168**	**20,552**

4.4.2 Disclosures Pursuant to the Recommendations of the German Corporate Governance Code

In accordance with the recommendations of the German Corporate Governance Code, the following tables show the compensation – including fringe benefits – granted for 2018, indicating the target values and the maximum and minimum achievable values for the variable compensation components, along with the allocation of compensation.

A 4.4.2/1

Compensation and Benefits Granted (Part I)

	Serving members of the Board of Management as of December 31, 2018											
	Werner Baumann (Chairman)				Liam Condon (Crop Science)				Dr. Hartmut Klusik (Human Resources, Technology & Sustainability)			
	Joined Jan. 1, 2010				Joined Jan. 1, 2016				Joined Jan. 1, 2016			
€ thousand	Target value 2017	Target value 2018	Min. 2018	Max.[1] 2018	Target value 2017	Target value 2018	Min. 2018	Max.[1] 2018	Target value 2017	Target value 2018	Min. 2018	Max.[1] 2018
Fixed annual compensation	1,487	1,511	1,511	1,511	806	819	819	819	756	768	768	768
Fringe benefits	49	46	46	46	43	45	45	45	40	39	39	39
Total fixed annual compensation	**1,536**	**1,557**	**1,557**	**1,557**	**849**	**864**	**864**	**864**	**796**	**807**	**807**	**807**
Short-term variable cash compensation	1,487	1,511	0	3,021	806	819	0	1,639	756	768	0	1,536
Long-term stock-based compensation (Aspire)												
2017 (Jan. 1, 2017–Dec. 31, 2020)	3,530				1,677				1,597			
2018 (Jan. 1, 2018–Dec. 31, 2021)		2,039	0	5,099		793	0	1,982		864	0	2,160
Total	**6,553**	**5,107**	**1,557**	**9,677**	**3,332**	**2,476**	**864**	**4,485**	**3,149**	**2,439**	**807**	**4,503**
Service cost/benefit expense (IFRS)	1,290	1,254	1,254	1,254	563	539	539	539	435	433	433	433
Total compensation	**7,843**	**6,361**	**2,811**	**10,931**	**3,895**	**3,015**	**1,403**	**5,024**	**3,584**	**2,872**	**1,240**	**4,936**

A 4.4.2/1 (continued)

Compensation and Benefits Granted (Part II)

	Serving members of the Board of Management as of December 31, 2018											
	Kemal Malik (Innovation)				Wolfgang Nickl (Finance)				Stefan Oelrich[2] (Pharmaceuticals)			
	Joined Feb. 1, 2014				Joined April 26, 2018				Joined Nov. 1, 2018			
€ thousand	Target value 2017	Target value 2018	Min. 2018	Max.[1] 2018	Target value 2017	Target value 2018	Min. 2018	Max.[1] 2018	Target value 2017	Target value 2018	Min. 2018	Max.[1] 2018
Fixed annual compensation	781	794	794	794	–	523	523	523	–	137	137	137
Fringe benefits	36	37	37	37	–	41	41	41	–	142	142	142
Total fixed annual compensation	**817**	**831**	**831**	**831**	**–**	**564**	**564**	**564**	**–**	**279**	**279**	**279**
Short-term variable cash compensation	781	794	0	1,587	–	512	0	1,024	–	137	0	273
Long-term stock-based compensation (Aspire)												
2017 (Jan. 1, 2017–Dec. 31, 2020)	1,591				–				–			
2018 (Jan. 1, 2018–Dec. 31, 2021)		923	0	2,307		1,056	0	2,641		973	0	2,432
Total	**3,189**	**2,548**	**831**	**4,725**	**–**	**2,132**	**564**	**4,229**	**–**	**1,389**	**279**	**2,984**
Service cost/benefit expense (IFRS)	493	448	448	448	–	206	206	206	–	27	27	27
Total compensation	**3,682**	**2,996**	**1,279**	**5,173**	**–**	**2,338**	**770**	**4,435**	**–**	**1,416**	**306**	**3,011**

A 4.4.2/1 (continued)

Compensation and Benefits Granted (Part III)

	Serving members of the Board of Management as of December 31, 2018				Former members			
	Heiko Schipper[3] (Consumer Health)				Johannes Dietsch[4] (Finance)			
	Joined Mar. 1, 2018				Stepped down May 31, 2018			
€ thousand	**Target value 2017**	**Target value 2018**	**Min. 2018**	**Max.[1] 2018**	**Target value 2017**	**Target value 2018**	**Min. 2018**	**Max.[1] 2018**
Fixed annual compensation	–	640	640	640	756	320	320	320
Fringe benefits	–	1,431	1,431	1,431	42	17	17	17
Total fixed annual compensation	**–**	**2,071**	**2,071**	**2,071**	**798**	**337**	**337**	**337**
Short-term variable cash compensation	–	640	0	1,280	756	320	0	640
Long-term stock-based compensation (Aspire)								
2017 (Jan. 1, 2017–Dec. 31, 2020)	–				1,483			
2018 (Jan. 1, 2018–Dec. 31, 2021)		1,104	0	2,760		432	0	1,080
Total	**–**	**3,815**	**2,071**	**6,111**	**3,037**	**1,089**	**337**	**2,057**
Service cost/benefit expense (IFRS)	–	142	142	142	483	87	87	87
Total compensation	**–**	**3,957**	**2,213**	**6,253**	**3,520**	**1,176**	**424**	**2,144**

A 4.4.2/1 (continued)

Compensation and Benefits Granted (Part IV)

	Former members							
	Erica Mann[5] (Consumer Health)				Dieter Weinand (Pharmaceuticals)			
	Stepped down March 31, 2018				Stepped down October 31, 2018			
€ thousand	**Target value 2017**	**Target value 2018**	**Min. 2018**	**Max.[1] 2018**	**Target value 2017**	**Target value 2018**	**Min. 2018**	**Max.[1] 2018**
Fixed annual compensation	756	192	192	192	806	683	683	683
Fringe benefits	24	3	3	3	32	24	24	24
Total fixed annual compensation	**780**	**195**	**195**	**195**	**838**	**707**	**707**	**707**
Short-term variable cash compensation	756	192	192	192	806	683	0	1,366
Long-term stock-based compensation (Aspire)								
2017 (Jan. 1, 2017–Dec. 31, 2020)	1,210				1,932			
2018 (Jan. 1, 2018–Dec. 31, 2021)		145	0	361		1,031	0	2,578
Total	**2,746**	**532**	**387**	**748**	**3,576**	**2,421**	**707**	**4,651**
Service cost/benefit expense (IFRS)	275	75	75	75	368	278	278	278
Total compensation	**3,021**	**607**	**462**	**823**	**3,944**	**2,699**	**985**	**4,929**

[1] The maximum achievable variable compensation shown here does not yet take into account the total caps applicable (see A 4.4.1/1).
[2] The fringe benefits for Stefan Oelrich contain an indemnity payment of €135 thousand for variable compensation components granted to him by his former employer that lapsed due to his joining Bayer. The indemnity amounts to €2,424 thousand in total and will be paid over a period of three years on a pro rata temporis basis.
[3] The fringe benefits for Heiko Schipper contain an indemnity payment of €894 thousand for variable compensation components granted to him by his former employer that lapsed due to his joining Bayer. The indemnity amounts to €1,950 thousand in total. A quarter of this amount was paid on the date he joined the Board of Management. The remaining three-quarters will be paid over a period of three years on a pro rata temporis basis.
[4] Johannes Dietsch was granted a compensatory payment of €1,522 thousand under the post-contractual noncompete agreement. This will be paid out monthly over a period of two years on a pro rata temporis basis.
[5] In December 2017, Erica Mann was also awarded a severance payment of €1,978 thousand.

A 4.4.2/2

Allocation of Compensation (Part I)

	Serving members of the Board of Management as of December 31, 2018									
	Werner Baumann (Chairman)		Liam Condon (Crop Science)		Dr. Hartmut Klusik (Human Resources, Technology & Sustainability)		Kemal Malik (Innovation)		Wolfgang Nickl (Finance)	
	Joined Jan. 1, 2010		Joined Jan. 1, 2016		Joined Jan. 1, 2016		Joined Feb. 1, 2014		Joined April 26, 2018	
€ thousand	**2017**	**2018**	**2017**	**2018**	**2017**	**2018**	**2017**	**2018**	**2017**	**2018**
Fixed annual compensation	1,487	1,511	806	819	756	768	781	794	–	523
Fringe benefits	49	46	43	45	40	39	36	37	–	41
Total	**1,536**	**1,557**	**849**	**864**	**796**	**807**	**817**	**831**	**–**	**564**
Short-term variable cash compensation										
for 2017	1,335		519		565		604		–	
for 2018		1,708		1,056		805		813		571
Long-term cash compensation (virtual Bayer shares)										
2013 (Jan. 1, 2014–Dec. 31, 2016)	911		564		–		–		–	
2014 (Jan. 1, 2015–Dec. 31, 2017)		1,037		1,125		–		760		–
Long-term stock-based cash compensation (Aspire)										
2013 (Jan. 1, 2013–Dec. 31, 2016)[1]	959		513		312		303		–	
2014 (Jan. 1, 2014–Dec. 31, 2017)		72		44		26		27		–
Total	**4,741**	**4,374**	**2,445**	**3,089**	**1,673**	**1,638**	**1,724**	**2,431**	**–**	**1,135**
Service cost/benefit expense	1,290	1,254	563	539	435	433	493	448	–	206
Total compensation	**6,031**	**5,628**	**3,008**	**3,628**	**2,108**	**2,071**	**2,217**	**2,879**	**–**	**1,341**

A 4.4.2/2 (continued)

Allocation of Compensation (Part II)

	Serving members of the Board of Management as of December 31, 2018				Former members					
	Stefan Oelrich (Pharmaceuticals)		Heiko Schipper[2] (Consumer Health)		Johannes Dietsch[3] (Finance)		Erica Mann[4] (Consumer Health)		Dieter Weinand (Pharmaceuticals)	
	Joined Nov. 1, 2018		Joined March 1, 2018		Stepped down May 31, 2018		Stepped down March 31, 2018		Stepped down October 31, 2018	
€ thousand	**2017**	**2018**	**2017**	**2018**	**2017**	**2018**	**2017**	**2018**	**2017**	**2018**
Fixed annual compensation	–	137	–	640	756	320	756	192	806	683
Fringe benefits	–	8	–	538	42	17	24	3	32	24
Total	**–**	**145**	**–**	**1,178**	**798**	**337**	**780**	**195**	**838**	**707**
Short-term variable cash compensation										
for 2017	–		–		679		378		810	
for 2018		133		639		346		192		674
Long-term cash compensation (virtual Bayer shares)										
2013 (Jan. 1, 2014–Dec. 31, 2016)	–		–		–		–		–	
2014 (Jan. 1, 2015–Dec. 31, 2017)		–		–		276		–		–
Long-term stock-based cash compensation (Aspire)										
2013 (Jan. 1, 2013–Dec. 31, 2016)[1]	–		–		279		1,596		–	
2014 (Jan. 1, 2014–Dec. 31, 2017)		–		–		21		106		33
Total	**–**	**278**	**–**	**1,817**	**1,756**	**980**	**2,754**	**493**	**1,648**	**1,414**
Service cost/benefit expense	–	27	–	142	483	87	275	75	368	278
Total compensation	**–**	**305**	**–**	**1,959**	**2,239**	**1,067**	**3,029**	**568**	**2,016**	**1,692**

[1] The payments in 2017 to Johannes Dietsch, Liam Condon, Dr. Hartmut Klusik, Kemal Malik and Erica Mann from the 2013 Aspire tranche related to vesting periods that in some cases were before they joined the Board of Management. The payments in 2018 to Johannes Dietsch, Liam Condon, Dr. Hartmut Klusik, Kemal Malik, Erica Mann and Dieter Weinand from the 2014 Aspire tranche related to vesting periods that in some cases were before they joined the Board of Management. The tranches of these members were not yet fully vested at the dates on which they joined the Board of Management.

[2] The fringe benefits for Heiko Schipper contain compensation of €495 thousand for variable compensation granted to him by his former employer that lapsed due to his joining Bayer.

[3] In 2018, after stepping down from the Board of Management, Johannes Dietsch also received a total compensatory payment of €444 thousand and a normal accelerated payment of €560 thousand in connection with the long-term cash compensation based on virtual Bayer shares for 2015 (Jan. 1, 2016 – Dec. 31, 2018).

[4] In 2018, Erica Mann also received a severance payment of €1,686 thousand, a payment of €3,825 thousand to settle pension entitlements in the United States, and current pension payments.

4.4.3 Development of Board of Management Compensation Relative to Employee Compensation and the Financial Performance of the Company[9]

The European Shareholder Rights Directive requires a comparative presentation of the annual change in Board of Management compensation, the financial performance of the company and the average compensation of employees (based on full-time equivalents) over the past five years.

The following overview shows the development of the compensation earned by the individual members of the Board of Management in the respective fiscal year according to IFRS in relation to selected financial performance indicators used by the Bayer Group. The total earned compensation may be impacted, for example, by changes in the number of Board of Management members or overlaps between joining and departing Board members, as well as one-time effects of fringe benefits. The financial performance indicators are impacted in particular by the divestment of Covestro and its presentation as a discontinued operation in 2017, and by the acquisition of Monsanto in 2018.

A 4.4.3/1

Compensation Earned by the Board of Management in Relation to Company's Financial Performance

€ thousand	2014	Change %	2015	Change %	2016	Change %	2017	Change %	2018
Compensation earned (€ thousand)									
Serving members of the Board of Management as of December 31, 2018									
Werner Baumann	4,680	–0.2	4,671	+3.1	4,818	+19.1	5,740	–27.2	4,180
Liam Condon	–	–	–	–	2,475	+16.5	2,883	–27.1	2,103
Dr. Hartmut Klusik	–	–	–	–	2,709	–5.0	2,573	–22.1	2,004
Kemal Malik	2,849	+15.2	3,283	–26.8	2,402	+17.1	2,812	–37.6	1,754
Wolfgang Nickl	–	–	–	–	–	–	–	–	1,446
Stefan Oelrich	–	–	–	–	–	–	–	–	467
Heiko Schipper	–	–	–	–	–	–	–	–	2,983
Former members of the Board of Management									
Marijn Dekkers[1]	8,389	–1.7	8,243	–11.3	7,311	–	–	–	–
Johannes Dietsch	1,003	+319.4	3,204	–24.2	2,429	+65.9	4,030	–51.8	1,941
Michael König[1]	3,217	+37.0	4,407	–	–	.	–	–	
Erica Mann[1]	–	–	–	–	2,701	+93.3	5,220	–91.5	446
Prof. Dr. Wolfgang Plischke	2,096	–	–	–	–	–	–	–	
Dieter Weinand	–	–	–	–	2,730	+6.6	2,910	+10.9	3,228
Total	**22,234**	**+7.1**	**23,808**	**+15.8**	**27,575**	**–5.1**	**26,168**	**–21.5**	**20,552**
Financial KPIs[2]									
EBITDA before special items (€ million)	8,812	+16.5	10,266	+10.1	11,302	–17.8	9,288	+2.8	9,547
Core EPS (€)	6.02	+13.5	6.83	+7.2	7.32	–7.9	6.74	–11.9	5.94
Sales (€ million)[3]	42,239	+2.7	46,324	+3.5	46,769	+1.5	35,015	+4.5	39,586

[1] These amounts contain severance payments for Marijn Dekkers in 2016, Michael König in 2015 and Erica Mann in 2017.
[2] Reporting is based on the financial KPIs initially published for the respective year and their development without regard to any subsequent restatements thereof.
[3] The change in sales on a currency- and portfolio-adjusted basis is reported as a key indicator for corporate management.

The following overview shows the development of the target cash compensation of the Board of Management in relation to the compensation of all employees in Germany and that of nonmanagerial employees under collective bargaining agreements in Germany. This is calculated based on contractually agreed target entitlements – in accordance with the German Corporate Governance Code – with regard to fixed compensation, the annual bonus and the four-year stock-based compensation (where the respective employee groups are eligible to participate). For nonmanagerial employees in Germany, the 13th monthly salary and the contractually agreed vacation bonus were

[9] Information pursuant to the requirements of the ARUG II draft legislation

taken into account. Variable compensation components for both the Board of Management and the other employee groups were based on the assumption of 100% target attainment. Expenditures for fringe benefits (such as home security equipment, indemnity payments for lapsed variable compensation components granted by former employers) were not taken into account due to their irregular nature. Expenditures for pensions were also disregarded in view of the interest sensitivity of the expenses. The aim of this approach is to enhance comparability in the development of compensation.

A 4.4.3/2

Development of Average Target Cash Compensation[1] of the Board of Management and Employees

€	2014	Change %	2015	Change %	2016	Change %	2017	Change %	2018
Board of Management	2,969,385	+0.8	2,993,141	+1.9	3,050,000	+0.8	3,074,400	+1.6	3,123,600
All employees[2] in Germany[3]	85,658	+4.3	89,361	+9.7	98,004	+3.7	101,662	+2.6	104,336
Nonmanagerial employees in Germany[3]	59,967	+2.7	61,613	+3.5	63,749	+2.8	65,512	+3.2	67,628

[1] Fixed annual compensation, STI and LTI (not taking into account individual STI payout factor), excluding pensions and fringe benefits; Calculated on the basis of full-time equivalents (FTEs)
[2] Excluding the Board of Management
[3] Excluding the employees of Bayer 04 Leverkusen Fußball GmbH and of the Currenta Group
The relative changes in average target cash compensation can be influenced by a range of factors and can vary both over time and across the Board of Management, the overall workforce and nonmanagerial employees. This includes changes in the composition of the workforce, various salary adjustments within and outside of collective bargaining agreements, the integration and carving out of business entities, or measures relating to HR policy. The 9.7% increase in the average target cash compensation of all employees in 2016 compared with 2015 was mainly attributable to the carve-out of Covestro, a change in workforce structure, and an increase in the proportion of managerial employees.

In 2018, the ratio between the average compensation of a Board of Management member and that of all employees in Germany stood at of 30:1, while the ratio between the average compensation of a Board member and that of nonmanagerial employees in Germany was 46:1. For the Chairman of the Board of Management, the ratios were 51:1 in relation to all employees and 78:1 in relation to nonmanagerial employees in Germany.

4.4.4 Compensation of the Supervisory Board

The Supervisory Board is compensated based on the relevant provisions of the Articles of Incorporation as last amended at the Annual Stockholders' Meeting on April 28, 2017.

The members of the Supervisory Board receive fixed annual compensation of €132 thousand (2017: €132 thousand) plus reimbursement of their expenses.

In accordance with the recommendations of the German Corporate Governance Code, additional compensation is paid to the Chairman and Vice Chairman of the Supervisory Board and for chairing and membership of committees. The Chairman of the Supervisory Board receives fixed annual compensation of €396 thousand (2017: €396 thousand), the Vice Chairman €264 thousand (2017: €264 thousand). These amounts also cover membership and chairmanship of committees. The other members receive additional compensation for committee membership. The chairman of the Audit Committee receives an additional €132 thousand (2017: €132 thousand) and the other members of the Audit Committee €66 thousand (2017: €66 thousand) each. The chairmen of the remaining committees receive €66 thousand (2017: €66 thousand) each and the other members of those committees €33 thousand (2017: €33 thousand) each. As before, no additional compensation is paid for membership of the Nominations Committee. A Supervisory Board member who is a member of more than two committees receives compensation only for the two committees with the highest compensation. If changes are made to the Supervisory Board and/or its committees during the year, members receive compensation on a prorated basis. As in the past, the members of the Supervisory Board also receive an attendance fee of €1 thousand each time they personally attend a meeting of the Supervisory Board or a committee. The attendance fee is limited to €1 thousand per day.

The members of the Supervisory Board have given a voluntary pledge that they will each purchase Bayer shares for 25% of their pretax fixed compensation, including any additional compensation for committee membership, and hold these shares for as long as they remain members of the Supervisory Board. This does not apply to members who are prevented from purchasing shares due to a service or employment contract with a company or who transfer at least 85% of their fixed compensation to the Hans Böckler Foundation in accordance with the rules of the German Trade Union Confederation or whose service or employment contract with a company requires them to transfer such compensation to that company. If less than 85% of the fixed compensation is transferred, the voluntary pledge applies to the portion not transferred. The obligation to purchase Bayer shares was adjusted in 2017 and now only applies for the first five years of membership of the Supervisory Board; these shares must then be held until membership of the Supervisory Board ceases. Bayer shares acquired prior to 2017 in connection with the voluntary pledge are taken into account for this purpose. By voluntarily pledging to invest in and hold Bayer shares, the Supervisory Board members reinforce their interest in the long-term, sustainable success of the company.

Compensation of the Supervisory Board in 2018

The following table shows the components of each Supervisory Board member's compensation for 2018.

A 4.4.4/1

Compensation of the Members of the Supervisory Board of Bayer AG in 2018

	Fixed compensation		Attendance fee		Total	
€ thousand	2017	2018	2017	2018	2017	2018
Members of the Supervisory Board serving as of December 31, 2018						
Dr. Paul Achleitner	192	198	5	6	197	204
Dr. Simone Bagel-Trah	128	132	3	5	131	137
Dr. Norbert W. Bischofberger	92	165	3	5	95	170
André van Broich	170	198	6	7	176	205
Thomas Ebeling	128	132	4	3	132	135
Dr. Thomas Elsner	134	198	7	10	141	208
Johanna W. (Hanneke) Faber	128	132	4	4	132	136
Colleen A. Goggins	90	132	3	4	93	136
Heike Hausfeld	112	165	4	7	116	172
Reiner Hoffmann	128	132	2	4	130	136
Frank Löllgen	192	198	8	10	200	208
Prof. Dr. Wolfgang Plischke	256	264	8	10	264	274
Petra Reinbold-Knape	192	198	4	6	196	204
Detlef Rennings	76	132	3	6	79	138
Sabine Schaab	36	165	3	6	39	171
Michael Schmidt-Kießling	128	132	5	6	133	138
Werner Wenning (Chairman)	384	396	10	11	394	407
Prof. Dr. Otmar D. Wiestler	160	165	6	5	166	170
Prof. Dr. Norbert Winkeljohann [1]	–	160	–	5	–	165
Oliver Zühlke (Vice Chairman)	256	264	8	9	264	273

A 4.4.4/1 (continued)

Compensation of the Members of the Supervisory Board of Bayer AG in 2018

	Fixed compensation		Attendance fee		Total	
€ thousand	2017	2018	2017	2018	2017	2018
Members who left the Supervisory Board in 2017 and 2018						
Dr. Clemens Börsig[2]	39	–	2	–	41	–
Dr. Thomas Fischer[2]	58	–	4	–	62	–
Yüksel Karaaslan[3]	65	–	2	–	67	–
Petra Kronen[4]	105	–	3	–	108	–
Sue H. Rataj[2]	39	–	2	–	41	–
Dr. Klaus Sturany[5]	256	105	9	5	265	110
Heinz Georg Webers[2]	39	–	2	–	41	–
Total	**3,583**	**3,763**	**120**	**134**	**3,703**	**3,897**

[1] Member of the Supervisory Board since May 25, 2018
[2] Member of the Supervisory Board until April 28, 2017
[3] Member of the Supervisory Board until June 4, 2017
[4] Member of the Supervisory Board until September 30, 2017
[5] Member of the Supervisory Board until May 25, 2018

In addition to their compensation as members of the Supervisory Board, those employee representatives who are employees of Bayer Group companies receive compensation unrelated to their service on the Supervisory Board. The total amount of such compensation in 2018 was €757 thousand (2017: €767 thousand), including fixed and variable compensation components. Pension obligations to all employee representatives on the Supervisory Board amounted to €4,072 thousand (2017: €3,941 thousand).

No compensation was paid or benefits granted to members of the Supervisory Board for personally performed services such as consultancy or agency services. The company has purchased insurance for the members of the Supervisory Board to cover their personal liability arising from their service on the Supervisory Board.

4.4.5 Further Information

Advances or loans to members of the Board of Management or Supervisory Board

There were no advances or loans to members of the Board of Management or the Supervisory Board outstanding as of December 31, 2018, nor at any time during 2018 or 2017.

Pension payments to former members of the Board of Management or their surviving dependents

We currently pay retired members of the Board of Management a monthly pension equal to a maximum of 80% of the fixed compensation received immediately prior to retirement. The pensions paid to former members of the Board of Management or their surviving dependents are reassessed annually and adjusted, taking into account the development of consumer prices. The pensions paid to former members of the Board of Management or their surviving dependents in 2018 totaled €17,183 thousand (2017: €12,758 thousand). These benefits are paid in addition to any amounts they receive under previous employee pension arrangements. The present value of the defined benefit pension obligation for former members of the Board of Management and their surviving dependents according to IFRS amounted to €185,736 thousand (2017: €184,479 thousand), while the settlement value of the pension obligation according to the German Commercial Code amounted to €161,427 thousand (2017: €153,388 thousand).

4.5 Takeover-Relevant Information

Explanatory report pursuant to Sections 289a, Paragraph 1 and 315a, Paragraph 1 of the German Commercial Code (HGB)

The capital stock of Bayer AG amounted to €2,387,333,027.84 as of December 31, 2018, (December 31, 2017: €2,116,986,388.48), divided into 932,551,964 no-par registered shares (December 31, 2017: 826,947,808). Each share confers one voting right. A small number of shares may be subject to temporary trading restrictions, such as retention periods, in connection with employee stock participation programs. We received no notifications in 2018 of direct or indirect holdings of shares in Bayer AG that exceed 10% of the capital stock. The company thus is not in possession of any notifications of holdings that exceed 10% of the capital stock.

See also www.bayer.com/ownership-structure

The appointment and dismissal of members of the Board of Management are subject to the provisions of Sections 84 and 85 of the German Stock Corporation Act, Section 31 of the German Codetermination Act and Section 6 of the company's Articles of Incorporation. Pursuant to Section 84, Paragraph 1 of the German Stock Corporation Act, the members of the Board of Management are appointed and dismissed by the Supervisory Board. Since Bayer AG falls within the scope of the German Codetermination Act, the appointment or dismissal of members of the Board of Management requires a majority of two thirds of the votes of the members of the Supervisory Board on the first ballot pursuant to Section 31, Paragraph 2 of that act. If no such majority is achieved, the appointment is resolved pursuant to Section 31, Paragraph 3 of the Codetermination Act on a second ballot by a simple majority of the votes of the members of the Supervisory Board. If the required majority still is not achieved, a third ballot is held. Here again, a simple majority of the votes suffices, but in this ballot the Chairman of the Supervisory Board has two votes pursuant to Section 31, Paragraph 4 of the Codetermination Act. Under Section 6, Paragraph 1 of the Articles of Incorporation of Bayer AG, the number of members of the Board of Management is determined by the Supervisory Board but must be at least two. The Supervisory Board may appoint one member of the Board of Management to be the Chairman of the Board of Management pursuant to Section 84, Paragraph 2 of the German Stock Corporation Act and Section 6, Paragraph 1 of the Articles of Incorporation.

Any amendments to the Articles of Incorporation are made pursuant to Section 179 of the German Stock Corporation Act and Sections 10 and 17 of the Articles of Incorporation. Under Section 179, Paragraph 1 of the German Stock Corporation Act, amendments to the Articles of Incorporation require a resolution of the Stockholders' Meeting. Pursuant to Section 179, Paragraph 2 of the German Stock Corporation Act, this resolution must be passed by a majority of three quarters of the voting capital represented at the meeting, unless the Articles of Incorporation provide for a different majority. However, where an amendment relates to a change in the object of the company, the Articles of Incorporation may only specify a larger majority. Section 17, Paragraph 2 of the Articles of Incorporation of Bayer AG utilizes the scope for deviation pursuant to Section 179, Paragraph 2 of the German Stock Corporation Act and provides that resolutions may be passed by a simple majority of the votes cast or, where a capital majority is required, by a simple majority of the capital represented. Pursuant to Section 10, Paragraph 9 of the Articles of Incorporation, the Supervisory Board may resolve on amendments to the Articles of Incorporation that relate solely to their wording.

Provisions of the Articles of Incorporation concerning Authorized Capital I and Authorized Capital II are entered in the commercial register of Bayer AG. With the approval of the Supervisory Board and until April 28, 2019, the Board of Management may use the Authorized Capital I to increase the capital stock by up to a total of €530 million. New shares may be issued against cash contributions and/or contributions in kind, but capital increases against contributions in kind may not exceed a total of €423 million. If the Authorized Capital I is used to issue shares in return for cash contributions, stockholders must normally be granted subscription rights. The Board of Management may only exclude stockholders' subscription rights to a volume of shares issued out of the Authorized Capital I that did not represent more than 20% of the existing capital stock at the time the respective resolution was adopted by the Annual Stockholders' Meeting on April 29, 2014. Absent a further resolution on the exclusion of stockholders' subscription rights, the Board of Management also may only exclude stockholders' subscription rights to a volume of shares issued under other authorizations regarding capital measures (Authorized Capital II, bonds with warrants or convertible notes, purchase and disposal of own shares) that did not represent more than 20% of the existing capital stock at the time the respective resolution was adopted by the Annual Stockholders' Meeting on April 29, 2014. In 2018, the Board of Management used €190,986,639.36 from the Authorized Capital I to issue 74,604,156 new shares, with subscription rights granted to existing shareholders. The Authorized Capital I amounted to €339,013,360.64 as of December 31, 2018.

With the approval of the Supervisory Board and until April 28, 2019, the Board of Management is authorized to increase the capital stock by up to €211,698,560 in one or more installments by issuing shares out of the Authorized Capital II against cash contributions. The stockholders must normally be granted subscription rights. However, the Board of Management is authorized, with the approval of the Supervisory Board, to exclude subscription rights for stockholders provided the volume of shares issued out of the Authorized Capital II against cash contributions does not exceed 10% of the capital stock existing at the time this authorization is registered or at the time the new shares are issued and the issue price of the new shares is not significantly below the market price of the already listed shares. In 2018, the Board of Management used €79,360,000 from the Authorized Capital II to issue 31 million new shares, excluding subscription rights for existing shareholders. The Authorized Capital II amounted to €132,338,560 as of December 31, 2018.

Conditional capital of €211,698,560 exists in connection with an authorization – valid through April 28, 2019 – to issue bonds with warrants or convertible notes, profit-sharing rights or profit participation bonds (collectively referred to as "bonds") with a total face value of €6 billion, €4 billion of which has already been used for mandatory convertible notes. The Board of Management may, with the consent of the Supervisory Board and under certain conditions, exclude the bond subscription rights that would otherwise be granted to stockholders. One of the conditions is that the total volume of shares required to service the bonds exceed neither 10% of the capital stock that existed at the time the respective resolution was adopted by the Annual Stockholders' Meeting on April 29, 2014, nor 10% of the capital stock existing at the time this authorization is exercised. Any other shares issued without granting subscription rights to the stockholders in direct or analogous application of Section 186, Paragraph 3, Sentence 4 of the German Stock Corporation Act shall be credited against this 10% limit.

Further, by resolution of the Annual Stockholders' Meeting on April 29, 2014, the Board of Management is authorized to purchase and dispose of own shares representing up to 10% of the capital stock existing at the time the resolution was adopted. The authorization to purchase own shares also includes the purchase of own shares using put or call options (derivatives) up to a volume of 5% of the capital stock existing at the time the resolution was adopted or at the time the authorization is exercised. This authorization also expires on April 28, 2019.

A material agreement that is subject to the condition precedent of a change of control pertains to the undrawn €4.5 billion syndicated credit facility arranged by Bayer AG and its U.S. subsidiary Bayer Corporation. This facility is available until December 2025. The participating banks are entitled to terminate the credit facility in the event of a change of control at Bayer and demand repayment of any loans that may have been granted under this facility up to that time.

A similar clause is also contained in the agreement on a syndicated credit facility in the original amount of US$56.9 billion granted to Bayer US Finance II LLC and Bayer AG in September 2016 to finance the acquisition of Monsanto (the "Monsanto credit facility"). Pursuant to the agreement, the Monsanto credit facility was reduced in 2016 by the US$4.2 billion net proceeds from the issuance of mandatory convertible notes, to US$52.7 billion, and in June 2017 by the US$1.2 billion net proceeds from the issuance of an exchangeable bond, to US$51.5 billion. The mandatory convertible notes were issued by Bayer Capital Corporation B.V., guaranteed by Bayer AG and mature in November 2019. The terms on which holders may convert the notes into shares before the maturity date are more favorable in the event of a change of control than they would be otherwise. The exchangeable bond was issued by Bayer AG and matures in 2020, and Bayer AG can flexibly exchange bonds for cash, Covestro AG shares or a combination of the two.

Holders of these notes have the right to demand the redemption of unexchanged notes by Bayer AG in the event of a change of control if Bayer AG's credit rating is downgraded within 120 days after such change of control becomes effective.

The Monsanto credit facility was drawn in June 2018 to finance the acquisition of Monsanto. The resulting loan had a value of US$4.9 billion as of December 31, 2018. The Monsanto credit facility and the loan were reduced in 2018 through the proceeds from the aforementioned capital increases, a further reduction of Bayer's interest in Covestro AG, a series of divestments to fulfill antitrust requirements, a bond with a nominal volume of €5 billion issued by Bayer Capital Corporation B.V. and guaranteed by Bayer AG, and a US$15 billion bond in 144A/RegS format issued by Bayer US Finance II LLC and guaranteed by Bayer AG. Both bonds have largely the same terms in the event of a change of control as the aforementioned exchangeable bond, although the period for a potential deterioration of Bayer AG's credit rating is only 60 days in the case of the US$15 billion bond.

The terms of the nominal €1.5 billion (as of December 31, 2018) in notes issued by Bayer in the years 2013 to 2017 under its existing Debt Issuance Programme also contain a corresponding change-of-control clause associated with a deterioration of the credit rating within 120 days. The terms of the US$7 billion bond in 144A/Reg S format issued in October 2014 also contain a clause to this effect. The outstanding amount of this bond as of December 31, 2018, was US$4.6 billion.

Agreements exist for the members of the Board of Management in compliance with Section 4.2.3 of the German Corporate Governance Code to cover the eventuality of a takeover offer being made for Bayer AG. Under these agreements, payments promised in the event of early termination of the service contract of a Board of Management member due to a change of control are limited to the value of three years' compensation and may not compensate more than the remaining term of the contract.

4.6 CSR Directive Implementation Act: Index to Nonfinancial Statement

A 4.6/1

CSR Directive Implementation Act[1]: Index to Nonfinancial Statement

Business model	We present our business model within the meaning of the German Commercial Code (HGB), Section 289c and Section 315c in Chapter A 1.1 Corporate Profile and Structure.			**Page** 23-27
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Environmental aspects		**Chapter**		**Page**
	Resource efficiency; environmental protection (emissions into air, water, soil); safety; product stewardship	A 1.2.1	Group Strategy and Targets	28, 30-31
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		A 1.6	Safety for People and the Environment - Introduction	65-66
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		A 1.6.3	Environmental Protection	77-83
Supplier management	Supplier management	A 1.2.1	Targets and Key Performance Indicators	31
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	Stakeholder engagement and partnerships; societal engagement; product stewardship; safety	A 1.2.1	Targets and Key Performance Indicators	31
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Bribery and corruption		**Chapter**		**Page**
Instruments for combating corruption and bribery	Business ethics	A 1.2.1	Targets and Key Performance Indicators	31
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Supplier management	Supplier management	A 1.2.1	Targets and Key Performance Indicators	31
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Respect for human rights		**Chapter**		**Page**
	Employee relations and developments (fair working conditions); human rights; supplier management	A 1.2.1	Targets and Key Performance Indicators	31
		A 1.4.1	Employees	55-56, 58-59
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		A 1.5	Procurement and Supplier Management	62-65
Material risks	In chapters A 3.2.1 Group-wide Opportunity and Risk Management System, A 3.2.2 Opportunity and Risk Status and B 29 Legal Risks, we report on material risks that arise through our business activity, business relationships, products and services			**Page** 122, 124 125, 130-131, 248-253
Diversity concept	We present our diversity concept for the Board of Management and Supervisory Board in Chapter A 4.1 Declaration by Corporate Management, and for Group employees in general in Chapter A 1.4.1 Employees			**Page** 134-136 58-59

[1] Sections 289b to e HGB, sections 315b and c HGB; additional information on the nonfinancial statement of Bayer AG in accordance with sections 289b to e HGB is given in Chapter A 1.7

B Consolidated Financial Statements

Bayer Group Consolidated Income Statements

B 1

€ million	Note	2017	2018
Net sales	**[6]**	**35,015**	**39,586**
Cost of goods sold		(11,382)	(17,010)
Gross profit		**23,633**	**22,576**
Selling expenses		(11,116)	(12,751)
Research and development expenses		(4,504)	(5,246)
General administration expenses		(2,026)	(2,728)
Other operating income	[7]	864	5,057
Other operating expenses	[8]	(948)	(2,994)
EBIT [1]		**5,903**	**3,914**
Equity-method income (loss)	[10.1]	20	68
Financial income		289	910
Financial expenses		(1,635)	(2,574)
Financial result	**[10]**	**(1,326)**	**(1,596)**
Income before income taxes		**4,577**	**2,318**
Income taxes	[11]	(1,329)	(607)
Income from continuing operations after income taxes		**3,248**	**1,711**
of which attributable to noncontrolling interest		(1)	16
of which attributable to Bayer AG stockholders		3,249	1,695
Income from discontinued operations after income taxes	**[5.3]**	**4,846**	**–**
of which attributable to noncontrolling interest		759	–
of which attributable to Bayer AG stockholders		4,087	–
Income after income taxes		**8,094**	**1,711**
of which attributable to noncontrolling interest	[12]	758	16
of which attributable to Bayer AG stockholders (net income)		**7,336**	**1,695**
€			
Earnings per share	**[13]**		
From continuing operations	**[13]**		
Basic		3.67	1.80
Diluted		3.67	1.80
From discontinued operations	**[13]**		
Basic		4.62	0.00
Diluted		4.62	0.00
From continuing and discontinued operations	**[13]**		
Basic		8.29	1.80
Diluted		8.29	1.80

2017 figures restated
[1] For definition see Combined Management Report, Chapter 2.4 “Alternative Performance Measures Used by the Bayer Group.”

Bayer Group Consolidated Statements of Comprehensive Income

B 2

€ million	Note	2017	2018
Income after income taxes		**8,094**	**1,711**
of which attributable to noncontrolling interest	[12]	758	16
of which attributable to Bayer AG stockholders		7,336	1,695
Remeasurements of the net defined benefit liability for post-employment benefit plans	[22]	1,236	(612)
Income taxes	[11]	(515)	129
Other comprehensive income from remeasurements of the net defined benefit liability for post-employment benefit plans		**721**	**(483)**
Change in the fair value of own credit risk component of financial liabilities measured at fair value		–	(6)
Income taxes	[11]	–	2
Other comprehensive income relating to own credit risk component of financial liabilities measured at fair value		–	**(4)**
Other comprehensive income from equity instruments measured at fair value		–	**46**
Other comprehensive income relating to associates accounted for using the equity method		**(44)**	**19**
Other comprehensive income that will not be reclassified subsequently to profit or loss		**677**	**(422)**
Changes in fair values of derivatives designated as cash flow hedges	[27.3]	(144)	125
Reclassified to profit or loss		3	124
Income taxes	[11]	53	(80)
Other comprehensive income from cash flow hedges		**(88)**	**169**
Changes in fair values of available-for-sale financial assets	[17]	(3)	–
Reclassified to profit or loss		(2)	–
Income taxes	[11]	3	–
Other comprehensive income from available-for-sale financial assets		**(2)**	**–**
Changes in exchange differences recognized on translation of operations outside the eurozone		(2,152)	1,008
Reclassified to profit or loss		–	118
Other comprehensive income from exchange differences		**(2,152)**	**1,126**
Other comprehensive income relating to associates accounted for using the equity method		**101**	**1**
Other comprehensive income that may be reclassified subsequently to profit or loss		**(2,141)**	**1,296**
Total other comprehensive income[1]		**(1,464)**	**874**
of which attributable to noncontrolling interest		(106)	(8)
of which attributable to Bayer AG stockholders		(1,358)	882
Total comprehensive income		**6,630**	**2,585**
of which attributable to noncontrolling interest		652	8
of which attributable to Bayer AG stockholders		5,978	2,577

[1] Other comprehensive income is recognized outside profit or loss in equity.

Bayer Group Consolidated Statements of Financial Position

B 3

€ million	Note	Dec. 31, 2017	Dec. 31, 2018
Noncurrent assets			
Goodwill	[14]	14,751	38,146
Other intangible assets	[14]	11,674	36,746
Property, plant and equipment	[15]	7,633	12,944
Investments accounted for using the equity method	[16]	4,007	515
Other financial assets	[17]	1,634	2,212
Other receivables	[20]	400	511
Deferred taxes	[11]	4,915	4,278
		45,014	**95,352**
Current assets			
Inventories	[18]	6,550	10,961
Trade accounts receivable	[19]	8,582	11,836
Other financial assets	[17]	3,529	1,166
Other receivables	[20]	1,276	1,875
Claims for income tax refunds		474	809
Cash and cash equivalents		7,581	4,052
Assets held for sale	[5.3]	2,081	234
		30,073	**30,933**
Total assets		**75,087**	**126,285**
Equity	**[21]**		
Capital stock		2,117	2,387
Capital reserves		9,658	18,388
Other reserves		25,026	25,202
Equity attributable to Bayer AG stockholders		**36,801**	**45,977**
Equity attributable to noncontrolling interest		60	171
		36,861	**46,148**
Noncurrent liabilities			
Provisions for pensions and other post-employment benefits	[22]	8,020	8,717
Other provisions	[23]	1,366	3,347
Refund liabilities	[6]	–	167
Contract liabilities	[6]	–	986
Financial liabilities	[24]	12,483	37,712
Income tax liabilities		495	1,415
Other liabilities	[26]	1,116	349
Deferred taxes	[11]	1,153	4,621
		24,633	**57,314**
Current liabilities			
Other provisions	[23]	4,344	3,686
Refund liabilities	[6]	–	3,622
Contract liabilities	[6]	–	3,235
Financial liabilities	[24]	1,935	3,682
Trade accounts payable	[25]	5,129	5,414
Income tax liabilities		422	1,050
Other liabilities	[26]	1,652	2,122
Liabilities directly related to assets held for sale	[5.3]	111	12
		13,593	**22,823**
Total equity and liabilities		**75,087**	**126,285**

Bayer Group Consolidated Statements of Changes in Equity

B 4

€ million	Capital stock	Capital reserves	Retained earnings incl. net income	Exchange differences	Fair-value measurement of equity instruments[1]
Dec. 31, 2016	**2,117**	**9,658**	**18,393**	**45**	**81**
Equity transactions with owners					
Capital increase					
Dividend payments			(2,233)		
Other changes			2,727		
Other comprehensive income			628	(1,915)	17
Income after income taxes			**7,336**		
Dec. 31, 2017	**2,117**	**9,658**	**26,851**	**(1,870)**	**98**
Adjustments on adoption of IFRS 9 (after tax)			(43)		(17)
Adjustments on adoption of IFRS 15 (after tax)			86		
Jan. 1, 2018, adjusted	**2,117**	**9,658**	**26,894**	**(1,870)**	**81**
Equity transactions with owners					
Capital increase	270	8,730			
Dividend payments			(2,402)		
Other changes			1		
Other comprehensive income			(478)	1,134	61
Miscellaneous other changes			24		(20)
Income after income taxes			1,695		
Dec. 31, 2018	**2,387**	**18,388**	**25,734**	**(736)**	**122**

[1] 2017: fair-value measurement of securities

B 4 (continued)

€ million	Cash flow hedges	Other reserves[2]	Equity attributable to Bayer AG stockholders	Equity attributable to non-controlling interest	Equity
Dec. 31, 2016	**22**	**17**	**30,333**	**1,564**	**31,897**
Equity transactions with owners					
Capital increase					
Dividend payments			(2,233)	(131)	(2,364)
Other changes		(4)	2,723	(2,025)	698
Other comprehensive income	(88)		(1,358)	(106)	(1,464)
Income after income taxes			**7,336**	**758**	**8,094**
Dec. 31, 2017	**(66)**	**13**	**36,801**	**60**	**36,861**
Adjustments on adoption of IFRS 9 (after tax)			(60)		(60)
Adjustments on adoption of IFRS 15 (after tax)			86		86
Jan. 1, 2018, adjusted	**(66)**	**13**	**36,827**	**60**	**36,887**
Equity transactions with owners					
Capital increase			9,000		9,000
Dividend payments			(2,402)	(5)	(2,407)
Other changes			1	(53)	(52)
Other comprehensive income	169	(4)	882	(8)	874
Miscellaneous other changes	(26)	(4)	(26)	161	135
Income after income taxes			1,695	16	1,711
Dec. 31, 2018	**77**	**5**	**45,977**	**171**	**46,148**

[2] Other reserves comprise reserves for changes in the company's own credit risk (minus €4 million) and for remeasurements (€9 million; 2017: €13 million).

Bayer Group Consolidated Statements of Cash Flows

B 5

€ million	Note	2017	2018
Income from continuing operations after income taxes		3,248	1,711
Income taxes		1,329	607
Financial result		1,326	1,596
Income taxes paid		(1,821)	(2,143)
Depreciation, amortization and impairments		2,660	6,352
Change in pension provisions		(227)	(322)
(Gains) losses on retirements of noncurrent assets		(133)	(4,247)
Decrease (increase) in inventories		(293)	615
Decrease (increase) in trade accounts receivable		(18)	2,476
(Decrease) increase in trade accounts payable		265	(44)
Changes in other working capital, other noncash items		275	1,316
Net cash provided by (used in) operating activities from continuing operations		**6,611**	**7,917**
Net cash provided by (used in) operating activities from discontinued operations		1,523	–
Net cash provided by (used in) operating activities		**8,134**	**7,917**
Cash outflows for additions to property, plant, equipment and intangible assets		(2,366)	(2,593)
Cash inflows from sales of property, plant, equipment and other assets		241	230
Cash inflows from divestments		453	7,563
Cash inflows from (outflows for) noncurrent financial assets		(313)	2,879
Cash outflows for acquisitions less acquired cash		(158)	(45,316)
Interest and dividends received		168	247
Cash inflows from (outflows for) current financial assets		1,543	2,838
Net cash provided by (used in) investing activities		**(432)**	**(34,152)**
Capital contributions		–	8,986
Proceeds from shares of Covestro AG		3,717	–
Dividend payments		(2,364)	(2,407)
Issuances of debt		10,369	65,090
Retirements of debt		(12,848)	(47,271)
Interest paid including interest-rate swaps		(801)	(1,331)
Interest received from interest-rate swaps		69	412
Cash outflows for the purchase of additional interests in subsidiaries		(23)	(47)
Net cash provided by (used in) financing activities		**(1,881)**	**23,432**
Change in cash and cash equivalents due to business activities	[30]	**5,821**	**(2,803)**
Cash and cash equivalents at beginning of year		**1,899**	**7,435**
Change in cash and cash equivalents due to changes in scope of consolidation		–	1
Change in cash and cash equivalents due to exchange rate movements		(139)	(581)
Cash and cash equivalents at end of year		**7,581**	**4,052**

The difference in cash and cash equivalents at the beginning of 2018 and the end of 2017 is due to the first-time application of IFRS 9.

Notes to the Consolidated Financial Statements of the Bayer Group

1. General information

The consolidated financial statements of the Bayer Group as of December 31, 2018, were prepared by Bayer Aktiengesellschaft (Bayer AG) according to the International Financial Reporting Standards (IFRS) issued by the International Accounting Standards Board (IASB), London, United Kingdom, in effect at the end of the reporting period, and the interpretations of the IFRS Interpretations Committee (IFRS IC) as endorsed by the European Union. The applicable further requirements of Section 315e of the German Commercial Code were also taken into account.

Bayer AG (which is entered in the commercial register of the Local Court of Cologne, Germany, HRB 48248) is a global enterprise based in Germany. Its registered office is at Kaiser-Wilhelm-Allee 1, 51368 Leverkusen. The material business activities of the Bayer Group in the fields of health care and agriculture took place in the reporting period in the Pharmaceuticals, Consumer Health, Crop Science and Animal Health segments. The activities of each segment are outlined in Note [4].

The declarations required under Section 161 of the German Stock Corporation Act concerning the German Corporate Governance Code have been issued and made available to stockholders.

The declaration issued in December 2018 concerning the German Corporate Governance Code is published on the Bayer website along with previous declarations: www.bayer.com/en/corporate-governance.aspx

The Board of Management of Bayer AG prepared the consolidated financial statements of the Bayer Group on February 19, 2019. They were discussed by the Audit Committee of the Supervisory Board of Bayer AG at its meeting on February 25, 2019, and approved by the Supervisory Board at its plenary meeting on February 26, 2019.

The consolidated financial statements of the Bayer Group are drawn up in euros. Except where otherwise indicated, amounts are stated in millions of euros (€ million) and rounded to the nearest million. Adding the individual figures may therefore not always result in the exact total given.

2. Effects of new financial reporting standards

Financial reporting standards applied for the first time in 2018

Details of the new standards whose first-time application has a material impact on the Group's financial position and results of operations are given below.

IFRS 9 (Financial Instruments) and IFRS 15 (Revenue from Contracts with Customers) were applied for the first time as of January 1, 2018. The effects resulting from their first-time application are described in this section.

IFRS 9 is the new standard for accounting for financial instruments. It replaces IAS 39 (Financial Instruments: Recognition and Measurement). Bayer applied IFRS 9 in modified form retrospectively for the first time as of January 1, 2018, without restating the prior-year figures, accounting for the aggregate amount of any transition effects by way of an adjustment to equity and presenting the comparative period in line with previous rules. It replaces the previous rules under IAS 39 (Financial Instruments: Recognition and Measurement).

The effects that the first-time application of IFRS 9 and IFRS 15 had on retained earnings and the fair value measurement of securities/equity instruments are detailed in the following tables:

B 2/1

Retained Earnings Reconciliation: IFRS 9 and IFRS 15

€ million	
Retained earnings incl. net income as of December 31, 2017	**26,851**
Effects of IFRS 9	(43)
Effects of IFRS 15	86
Retained earnings incl. net income as of January 1, 2018	**26,894**

B 2/2

Reconciliation of Fair-Value Measurement of Equity Instruments

€ million	
Fair-value measurement of securities as of December 31, 2017	**98**
Reclassifications to retained earnings	(37)
Remeasurement due to change in measurement category	11
Deferred taxes	9
Fair-value measurement of equity instruments as of January 1, 2018	**81**

IFRS 9 introduces new provisions for the classification and measurement of financial assets and replaces the current rules on the impairment of financial assets. The new standard requires a change in accounting methods for the effects resulting from a change in the company's own credit risk for financial liabilities classified at fair value and modifies the requirements for hedge accounting. The classification and measurement of financial liabilities are otherwise largely unchanged from the existing regulations.

Under IFRS 9, the classification and measurement of financial assets is determined by the company's business model and the characteristics of the cash flows of each financial asset. In the case of equity instruments held as of January 1, 2018, that are not held for trading, Bayer has uniformly opted to recognize future changes in their fair value through other comprehensive income in the statement of comprehensive income and to continue to classify these as equity upon the derecognition of the financial instrument. As for new instruments, Bayer can opt to make use of this option on an instrument-by-instrument basis upon recognition, but it must continue to do so thereafter. The 6.8% interest in Covestro acquired from Bayer Pension Trust at the beginning of May 2018 to service the exchangeable bond maturing in 2020 is recognized at fair value through profit or loss.

As of the date of first-time application, reclassifications primarily resulted from the characteristics of the cash flows from fund shares, investments in limited partnerships, and the loan capital and jouissance right capital (Genussrechtkapital) provided to Bayer Pensionskasse VVaG. These financial instruments were previously reported in the category "available for sale," with changes in their fair value recognized in other comprehensive income in the statement of comprehensive income. They are now classified as debt instruments, and changes in their fair values are recognized through profit or loss.

Changes in the classification and measurement of financial assets led to the following effects as of the date of first-time application:

B 2/3

Financial Assets Reconciliation from IAS 39 to IFRS 9

€ million

Measurement category (IAS 39)[1]	Carrying amount Dec. 31, 2017 (IAS 39)	Reclassi-fication	Effect due to change in measurement category	Effect of the expected loss model	Carrying amount Jan. 1, 2018 (IFRS 9)	Measurement category (IFRS 9)[2]
Trade accounts receivable						
LaR	8,582			(93)	8,489	AC
Other financial assets						
LaR	1,731				1,731	AC
AfS – debt instruments	34				34	AC
HtM	57				57	AC
AfS – equity instruments at amortized cost	35		11		46	FVTOCI (no recycling)
AfS – equity instruments	191				191	FVTOCI (no recycling)
AfS – equity instruments	39				39	FVTPL (debt instruments)
AfS – debt instruments	2,429	145			2,574	FVTPL
Derivatives	647				647	Derivatives
Other receivables						
LaR	380			(4)	376	AC
AfS – debt instruments	46				46	FVTPL
Cash and cash equivalents						
LaR	7,581	(145)		(1)	7,435	AC
Total financial assets	**21,752**	**0**	**11**	**(98)**	**21,665**	

[1] AfS: available for sale; at fair value through other comprehensive income
HtM: held to maturity; at amortized cost
LaR: loans and receivables; at amortized cost
[2] AC: at amortized cost
FVTOCI: at fair value through other comprehensive income
FVTPL: at fair value through profit or loss

There were no effects on financial liabilities.

The following table shows the effects of the first-time application of IFRS 9 on retained earnings and other comprehensive income in the statement of comprehensive income, broken down by measurement category:

B 2/4

Effects of First-Time Application of IFRS 9 on Retained Earnings and Other Comprehensive Income

€ million

Measurement category (IAS 39)[1]	Measurement category (IFRS 9)[1]	Retained earnings effect as of Jan. 1, 2018	OCI effect as of Jan. 1, 2018
Trade accounts receivable			
LaR	AC	(93)	
Other financial assets			
AfS – equity instruments at amortized cost	FVTOCI (no recycling)		11
AfS – equity instruments	FVTPL (debt instruments)	10	(10)
AfS – debt instruments	FVTPL	36	(36)
Other receivables			
LaR	AC	(4)	
AfS – debt instruments	FVTPL	(9)	9
Cash and cash equivalents			
LaR	AC	(1)	
Total financial assets		**(61)**	**(26)**

[1] See table B 2/3 for definition of measurement categories.

The following table shows the effects of the first-time application of IFRS 9 on financial assets and liabilities measured at fair value using unobservable inputs (Level 3). The development of these assets and liabilities in 2018 is presented in Table B 27.1/2.

B 2/5

Reconciliation of Financial Assets Measured at Fair Value (Level 3) from IAS 39 to IFRS 9

€ million

Measurement category (IAS 39)[1]	Carrying amount Dec. 31, 2017 (IAS 39)	Reclassi-fication due to change in fair value hierarchy	Remeasure-ment due to change in measurement category	Carrying amount Jan. 1, 2018 (IFRS 9)	Measurement category (IFRS 9)[1]
Other financial assets					
AfS – equity instruments at amortized cost		35	11	46	FVTOCI (no recycling)
AfS – equity instruments	18	4		22	FVTOCI (no recycling)
AfS – equity instruments	18			18	FVTPL (debt instruments)
AfS – debt instruments	757			757	FVTPL
Derivatives	10			10	Derivatives
Other receivables					
AfS – debt instruments	46			46	FVTPL
Total financial assets	**849**	**39**	**11**	**899**	

[1] See table B 2/3 for definition of measurement categories.

The effects of the increase in loss allowances resulting from the first-time application of the new impairment model are presented in the following table[1]:

B 2/6

Reconciliation of Loss Allowances

€ million

Measurement category (IAS 39)[1]	Closing loss allowances Dec. 31, 2017 (IAS 39)	Effect of the expected credit loss model (IFRS 9)	Opening loss allowances Jan 1, 2018 (IFRS 9)	Measurement category (IFRS 9)[1]
Trade accounts receivable				
LaR	(425)	(93)	(518)	AC
Other receivables				
LaR	(3)	(4)	(7)	AC
Cash and cash equivalents				
LaR		(1)	(1)	AC
Total	**(428)**	**(98)**	**(526)**	

[1] See table B 2/3 for definition of measurement categories.

Changes in the fair values of financial liabilities measured at fair value through profit or loss resulting from Bayer's own credit risk are now recognized through other comprehensive income in the statement of comprehensive income rather than in the income statement. At Bayer, this change principally affects the debt instruments (exchangeable bonds) issued in June 2017, which also can be exchanged into Covestro shares. As of the transition date, this accounting change did not have any material effects.

For hedge accounting, Bayer has opted to prospectively apply IFRS 9 from January 1, 2018. If only the intrinsic value of an option is designated as a hedging instrument in a hedging relationship, IFRS 9 requires

[1] For the calculation of impairments see "Financial assets" in Chapter 3 "Basic principles, methods and critical accounting estimates."

that changes in the fair value of the time value of options during the hedging period initially be recognized as other comprehensive income in the statement of comprehensive income. The release of the accumulated amounts, either in the form of a basis adjustment or directly through profit or loss, depends on the type of hedged transaction. In contrast to the other rules on hedge accounting, the revised accounting method is to be applied retrospectively. As of the transition date, these changes did not have any material impact on the presentation of the Group's financial position and results of operations.

In October 2017, the IASB published an amendment to IFRS 9 (Financial Instruments) under the title "Prepayment Features with Negative Compensation." It also published a clarification regarding the accounting for a modification of a financial liability that does not result in its derecognition. For these non-substantial modifications, modification gains or losses – including the costs of the modification – must be immediately recognized in profit or loss. This amendment to IFRS 9 is to be applied for annual periods beginning on or after January 1, 2018. As there were no past nonsubstantial modifications of liabilities, this amendment did not have any impact on the presentation of the Group's financial position and results of operations. A bond exchange program constituting a nonsubstantial modification was initiated in June 2018 for the Monsanto bonds acquired as part of the Monsanto acquisition. In this connection, expenses of €13 million were recognized in profit or loss in the second quarter of 2018.

IFRS 15 has led to the introduction of a five-step model for revenue recognition from contracts with customers. Under the standard, revenue is recognized at amounts that reflect the consideration that an entity expects to be entitled to in exchange for transferring goods or services to a customer. Revenue is recognized when (or as) control of goods or services has been transferred to a customer either over time or at a point in time. In addition, IFRS 15 clarifies the allocation of individual topics to (new) line items in the statement of financial position and to functional cost items in the income statement, and whether gross or net amounts are to be presented.

As of January 1, 2018, Bayer transitioned to IFRS 15 on the basis of the modified retrospective method, accounting for the aggregate amount of the transition effects by way of an adjustment to retained earnings as of January 1, 2018, and presenting the comparative period in line with previous rules. Bayer has elected to retrospectively apply the standard only to contracts that are not completed contracts at the date of first-time application and has opted to reflect the aggregate effect of all contract modifications that occurred prior to the date of first-time application in accordance with IFRS 15.C7A(b).

The adoption of IFRS 15 has led to the following effects:

Changes in the timing of recognition

// IFRS 15 requires catch-up adjustments to revenue when milestone payments for right-to-access licenses become unconstrained, leading to earlier revenue recognition. This change resulted in an increase in retained earnings by €64 million after deferred taxes and a decrease in contract liabilities (under IAS 18, amounts were presented as deferred income in other liabilities) by €86 million as of January 1, 2018. For the Pharmaceuticals segment, the introduction of IFRS 15 translates into a €10 million decrease in net sales in 2018, resulting in a €4 million decrease in deferred tax expense in 2018 compared with IAS 18.

// IFRS 15 in conjunction with IAS 38 (Intangible Assets) generally requires the recognition of the purchase price related to a brand divestment net of associated carrying amounts in other operating income or expenses upon transfer of control. Some cases were identified where the purchase price was deferred under former policy in line with IAS 18, but would have been recognized in income earlier under IFRS 15, leading to a €21 million increase in retained earnings after deferred taxes and a €27 million decrease in contract liabilities (under IAS 18, amounts were presented as deferred income in other liabilities) on the date of transition. For the Pharmaceuticals and Animal Health segments, the introduction of IFRS 15 translates into a combined €40 million decrease in net sales in 2018, resulting in a €7 million decrease in deferred tax expense in 2018 compared with IAS 18.

- Including the effects described individually, the change in the timing of revenue recognition led to a €28 million decrease in net income in 2018 as compared to revenue recognition under IAS 18. These earnings effects pertain to the Bayer Group prior to the first-time consolidation of the former Monsanto Group, whose financial information for the reference periods was prepared according to U.S. accounting standards and therefore does not permit an appropriate comparison with net sales as determined according to IAS 18.

Presentational changes

Bayer has also changed the presentation of certain items in the statement of financial position and the income statement to reflect the methodology of IFRS 15.

- IFRS 15 changes the presentation of expected product returns within the statement of financial position from net to gross in cases where returns are expected to be resalable and Bayer will refund the purchase price. The right-of-return asset is reflected in inventories at the former carrying amount less expected costs to recover and potential impairment. The refund liabilities resulting from the gross presentation include amounts expected to be refunded upon product return. Prior to the adoption of IFRS 15, Bayer presented the margin of expected returns on a net basis in “other provisions.” In the statement of cash flows, the increase in inventories to be recorded under IFRS 15 is set against a decline in “other working capital, other noncash items.”
- Amounts already received (or receivable) but expected to be refunded to the customer are presented as “refund liabilities” under IFRS 15. These amounts typically relate to expected volume rebates and expected product returns and were previously presented as “other provisions.”
- Advance payments received (or receivable) in connection with product deliveries were previously recognized in trade accounts payable. Advance payments received (or receivable) relating to right-to-access licenses and service contracts recognized over time were previously presented under “deferred income” in “other liabilities.” With the introduction of IFRS 15, both are presented as contract liabilities. Within the statement of cash flows, the decline in trade accounts payable resulting from the presentational change is set against a corresponding change in “other working capital, other noncash items.”

The effects of applying the modified retrospective method on the opening statement of financial position as of January 1, 2018, are shown in table B 2/7.

B 2/7

IFRS 15 Accounting Changes: Consolidated Statement of Financial Position as of January 1, 2018

€ million	Dec. 31, 2017 Before accounting changes	Presentational changes	Changes in timing of recognition	Jan. 1, 2018 After accounting changes
Deferred taxes	4,915		(5)	4,910
Inventories	6,550	76		6,626
Other reserves	25,026		86	25,112
Other provisions (noncurrent)	1,366	(152)		1,214
Refund liabilities (noncurrent)	–	152		152
Contract liabilities (noncurrent)	–	905	(78)	827
Other liabilities (noncurrent)	1,116	(905)		211
Deferred taxes	1,153		24	1,177
Other provisions (current)	4,344	(2,197)		2,147
Refund liabilities (current)	–	2,275		2,275
Contract liabilities (current)	–	740	(37)	703
Trade accounts payable	5,129	(561)		4,568
Other liabilities (current)	1,652	(181)		1,471

The impact of the transition from IAS 18 to IFRS 15 on the consolidated statement of financial position as of December 31, 2018, which includes the former Monsanto Group, is presented in table B 2/8.

B 2/8

Reconciliation IFRS 15 to IAS 18 for Presentational Changes: Consolidated Statement of Financial Position as of December 31, 2018

€ million	IFRS 15 December 31, 2018	Presentational changes	IAS 18 December 31, 2018
Inventories	10,961	(85)	10,876
Other provisions (noncurrent)	3,347	167	3,514
Refund liabilities (noncurrent)	167	(167)	–
Contract liabilities (noncurrent)	986	(986)	–
Other liabilities (noncurrent)	349	852	1,201
Other provisions (current)	3,686	3,537	7,223
Refund liabilities (current)	3,622	(3,622)	–
Contract liabilities (current)	3,235	(3,235)	–
Trade accounts payable	5,414	3,159	8,573
Other liabilities (current)	2,122	210	2,332

In addition to IFRS 9 and IFRS 15, the following changes were applied as of January 1, 2018, but did not have any material impact on the Group's financial position and results of operations.

B 2/9

Amendments to standards with no material impact

Amendments to standards/interpretations		Mandatory application
IFRS 2	Amendment "Classification and Measurement of Share-based Payment Transactions"	Jan. 1, 2018
IFRS 9	Amendment "Applying IFRS 9 Financial Instruments with IFRS 4 Insurance Contracts"	Jan. 1, 2018
IAS 40	Amendment "Transfers of Investment Property"	Jan. 1, 2018
IFRIC 22	Foreign Currency Transactions and Advance Consideration	Jan. 1, 2018
	Annual Improvements to IFRS Standards 2014–2016 Cycle	Jan. 1, 2018

Published financial reporting standards that have not yet been applied

The IASB and the IFRS Interpretations Committee have issued the following standards, amendments to standards and interpretations whose application was not yet mandatory for the 2018 fiscal year or for which the European Union had not yet completed the endorsement process. The following IFRS and interpretations have not yet been applied by Bayer:

B 2/10

Published financial reporting standards that have not yet been applied

Amendments to standards/interpretations		Mandatory application	Anticipated effects
IFRS 3	Amendment to IFRS 3 Business Combinations	Jan. 1, 2020	Effects currently being evaluated
IFRS 9	Prepayment Features with Negative Compensation	Jan. 1, 2019	No material effects expected
IFRS 16	Leases	Jan. 1, 2019	See following explanations
IFRS 17	Insurance Contracts	Jan. 1, 2021	Effects currently being evaluated
IAS 1, IAS 8	Amendments to IAS 1 and IAS 8: Definition of Material	Jan.1, 2020	Effects currently being evaluated
IAS 19	Amendments to IAS 19 (Employee Benefits): Plan Amendments, Curtailments or Settlements	Jan. 1, 2019	No material effects expected
IAS 28	Long-term Interests in Associates and Joint Ventures	Jan. 1, 2019	No material effects expected
IFRIC 23	Uncertainty over Income Tax Treatments	Jan. 1, 2019	No material effects expected
	Annual Improvements to IFRS Standards 2015–2017 Cycle	Jan. 1, 2019	No material effects expected
	Amendments to References to the Conceptual Framework in IFRS Standards	Jan. 1, 2020	Effects currently being evaluated

The information below pertains only to future amendments to accounting standards whose foreseeable effects – if any – could be material to the Bayer Group’s financial position or results of operations.

In January 2016, the IASB published the new standard for lease accounting, IFRS 16 (Leases), which replaces the rules contained in IAS 17 (Leases) along with the associated interpretations. The new standard is to be applied for annual periods beginning on or after January 1, 2019. The standard introduces a single lessee accounting model, requiring lessees to recognize right-of-use assets for granted rights of use and corresponding lease liabilities. It eliminates the previous requirement for lessees to differentiate between operating leases – without recognizing the respective assets or liabilities – and finance leases. However, IFRS 16 contains the option of exercising exemptions for the recognition of short-term leases and those pertaining to low-value assets. As under the previous standard, IAS 17, lessors still have to differentiate between operating and finance leases. According to IFRS 16, subleases are classified with reference to the right-of-use asset arising from the sublease in relation to the head lease.

Bayer will apply IFRS 16 for the first time as of January 1, 2019, retrospectively without restating the prior-year figures. In this connection, various options and practical expedients can be applied as of the transition date for lease agreements in which a Bayer company is the lessee. On the date of first-time application, no additional assessment will be undertaken with regard to whether a contract represents or contains a leasing relationship. For contracts previously classified as operating leases, Bayer will measure the lease liabilities as of the date of first-time application of IFRS 16 at the present value of the outstanding lease payments, using as the discount rate the respective incremental borrowing rate as of that date. On the date of first-time application, the right-of-use asset will generally be measured at the amount of the lease liability, adjusted by the amounts of any prepaid or accrued lease payments and / or provisions for onerous leases recognized in the statement of financial position as of December 31, 2018. Initial direct costs will not be taken into account in the measurement of the right-of-use asset as of the date of first-time application. The current state of knowledge as of the date of first-time application will be taken into account when discretionary decisions are made.

Bayer will exercise the option of exempting intangible assets from the scope of application of IFRS 16 and will apply the exemptions for short-term leases to certain leases ending in 2019. It will also apply this exemption for short-term leases beginning after December 31, 2018.

The first-time application of IFRS 16 as of January 1, 2019, is anticipated to result in the recognition of additional lease liabilities of approximately €900 million to €1,200 million. Net financial debt will increase accordingly as a result of the significant increase in lease liabilities. Right-of-use assets will increase in line with the lease liabilities, taking into account adjustments resulting from the first-time application of IFRS 16.

In the statement of comprehensive income, Bayer will cease recognizing expenses for operating leases in operating income and will instead recognize the depreciation of the right-of-use assets and the interest expense for the lease liabilities under IFRS 16. An analogous effect will occur in the statement of cash flows, where IFRS 16 will have a positive effect on the operating cash flow by reducing cash outflows for operating activities, while the repayment component of lease payments and the interest expense will be recognized in the financing cash flow.

Change in accounting methods

In connection with the planned acquisition of Monsanto and in preparation for the future combined business, the structure of the Crop Science segment was adjusted as of January 1, 2018, in line with the internal financial reporting system (management approach). In the new structure, all the strategic business entities are organizationally located directly below the operating and reportable Crop Science segment. Global impairment testing of goodwill will also be carried out at the Crop Science segment level each year in the future.

3. Basic principles, methods and critical accounting estimates

In the income statement and statement of comprehensive income, statement of financial position, statement of cash flows and statement of changes in equity, certain items are combined for the sake of clarity. These are explained in the Notes. The income statement was prepared using the cost-of-sales method. Assets and liabilities are classified by maturity. They are regarded as current if they mature within one year or within the normal business cycle of the company or the Group, or are held for sale. The normal business cycle is defined for this purpose as beginning with the procurement of the resources necessary for the production process and ending with the receipt of cash or cash equivalents as consideration for the sale of the goods or services produced in that process. Inventories and trade accounts receivable and payable are always presented as current items. Deferred tax assets and liabilities and pension provisions are always presented as noncurrent items.

The financial statements of the consolidated companies are prepared according to uniform accounting policies and measurement principles. The consolidated financial statements of the Group are based on the principle of the historical cost of acquisition, construction or production, with the exception of the items reflected at fair value, such as equity instruments held, debt instruments held that do not solely comprise principal and interest payments, and derivatives and liabilities designated at fair value through profit or loss.

In preparing the consolidated financial statements, the management has to make certain assumptions and estimates that may substantially impact the presentation of the Group's financial position and/or results of operations. Such estimates, assumptions or the exercise of discretion mainly relate to the useful life of noncurrent assets, the discounted cash flows used for impairment testing and purchase price allocations, and the recognition of provisions, including those for litigation-related expenses, pensions and other benefits, taxes, environmental compliance and remediation costs, product liability and guarantees, as well as the recognition of refund liabilities. Essential estimates and assumptions that may affect reporting in the various item categories of the financial statements are described in the following sections of this Note. Estimates are based on historical experience and other assumptions that are considered reasonable under given circumstances. They are continually reviewed but may vary from the actual values.

Changes in accounting policies or measurement principles in light of new or revised standards are generally applied in line with the options permitted within the respective standard. Depending on the option that Bayer makes use of, the income statement for the previous year and the opening statement of financial position for that year are adjusted where necessary. For detailed information on standards to be applied for the first time from January 1, 2018, please see Note [2].

Consolidation

The consolidated financial statements include subsidiaries, joint operations, joint ventures and associates. The financial statements of the individual consolidated companies are prepared as of the closing date of the Group financial statements.

Subsidiaries are companies over which Bayer AG is currently able to exercise power by virtue of existing rights. Power means the ability to direct the relevant activities that significantly affect a company's profitability. Control is therefore only deemed to exist if Bayer AG is exposed, or has rights, to variable returns from its involvement with a company and has the ability to use its power over that company to affect the amount of that company's returns. The ability to control another company generally derives from Bayer AG's direct or indirect ownership of a majority of the voting rights. In the case of structured entities, however, control is based on contractual agreements. Inclusion of an entity's accounts in the consolidated financial statements begins when the Bayer Group is able to exercise control over the entity and ceases when it is no longer able to do so.

Joint operations and joint ventures are based on joint arrangements. A joint arrangement is deemed to exist if the Bayer Group through a contractual agreement jointly controls an entity's activities with a third party. Joint control is only deemed to exist if decisions regarding the relevant activities require the unanimous consent of the parties sharing control. A joint operation is a joint arrangement whereby the parties that have joint control of the arrangement have rights to the assets, and obligations for the liabilities, relating to the arrangement. The Bayer Group recognizes the share of assets, liabilities, revenues and expenses relating to its interest in a joint operation in accordance with its rights and obligations. A joint venture is a joint arrangement whereby the parties that have joint control of the arrangement have rights to the net assets of the arrangement. Joint ventures are accounted for using the equity method.

Associates are companies over which Bayer AG exerts significant influence, generally through an ownership interest between 20% and 50%. They also are accounted for using the equity method. The carrying amounts of a company accounted for using the equity method is adjusted annually by the percentage of any change in its equity corresponding to Bayer's percentage interest in the company. Differences arising upon first-time inclusion using the equity method are accounted for according to full-consolidation principles. Bayer's share of changes – recognized in profit or loss – in these companies' equity and impairment losses recognized on goodwill are reflected in equity-method income/loss. Gains and losses from the sale of investments accounted for using the equity method are recognized in financial income or expenses, respectively, within income from investments in affiliated companies.

Interests in subsidiaries, joint ventures and associates that do not have a material impact on the Group's financial position or results of operations, either individually or in aggregate, are not consolidated but recognized as financial investments in equity instruments.

Foreign currency translation

The financial statements of the individual companies for inclusion in the consolidated financial statements are prepared in their respective functional currencies. A company's functional currency is that of the economic environment in which it primarily generates and expends cash. The majority of consolidated companies carry out their activities autonomously from a financial, economic and organizational point of view, and their functional currencies are therefore the respective local currencies.

In the consolidated financial statements, the assets and liabilities of companies that do not use the euro as their functional currency at the start and end of the year are translated into euros at closing rates. All changes occurring during the year and all income and expense items and cash flows are translated into euros at average monthly rates. Equity components are translated at the historical exchange rates prevailing at the respective dates of their first-time recognition in Group equity. The exchange differences arising between the resulting amounts and those obtained by translating at closing rates are recognized outside profit or loss as “Exchange differences on translation of operations outside the eurozone” (in other comprehensive income) or presented as “Exchange differences” in the tables in the Notes. When a company is deconsolidated or the net investment in a foreign operation is reduced, such exchange differences are reclassified from equity to profit or loss and recognized in the financial result. The exchange rates for major currencies against the euro varied as follows:

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Exchange Rates for Major Currencies

		BRL	CAD	CNY	GBP	JPY	RUB	USD
		Brazil	**Canada**	**China**	**U.K.**	**Japan**	**Russia**	**U.S.A.**
Closing rate	2017	3.98	1.51	7.81	0.89	135.01	69.41	1.20
	2018	4.44	1.56	7.87	0.89	125.87	79.76	1.15
Average rate	2017	3.59	1.46	7.61	0.88	126.39	65.71	1.13
	2018	4.29	1.53	7.80	0.88	130.38	73.87	1.18

Since July 1, 2018, IAS 29 (Financial Reporting in Hyperinflationary Economies) has been applied for Bayer S.A., Argentina. On the date of first-time application, the adjustment of the carrying amounts of nonmonetary assets and liabilities was recognized in equity based on the general price index. Gains and losses incurred from the current hyperinflation of nonmonetary assets and liabilities and of equity are recognized in the income statement as other operating income and expenses. Both the adjustment in equity and the effects of the ongoing application of IAS 29 have so far been immaterial for the Group.

In previous years and up until September 30, 2018, the rules of IAS 29 were also applied for Bayer S.A., Venezuela. This company was deconsolidated as of September 30, 2018, leading to a currency translation loss of €132 million in the financial result.

Foreign currency measurement

In the separate financial statements of the individual consolidated companies, monetary items, such as receivables and liabilities, that are denominated in currencies other than the respective functional currency are measured at closing rates. Related exchange differences are recognized as exchange gains or losses under other financial income or expenses.

Net sales and other operating income

All revenues derived from the selling of products, rendering of services or from licensing agreements are recognized as sales. This is done on the basis of customer contracts and the performance obligations contained therein, which are individually identified and presented separately for the purpose of revenue recognition. Other operational revenues are recognized as other operating income. Revenues are recognized through profit or loss when or as soon as the entity transfers control of goods or services to a customer either over time or at a point in time. Control lies with the customer if the customer can independently determine the use of and consume the benefit derived from a product or service. Revenues from product deliveries are recognized at a point in time based on an overall assessment of the existence of a right to payment, the allocation of ownership rights, the transfer of physical possession, the transfer of risks and rewards, and acceptance by the customer. In the case of product deliveries undertaken by the Bayer Group, the transfer of risks and rewards and the right to determine the product shipment destination are particularly important. Revenues from services, on the other hand, are recognized over the period of time when services are rendered and in accordance with a reasonable measure of progress.

Net sales are limited to the amount the Bayer Group expects to receive for the fulfillment of performance obligations. Payment components to be withheld for third parties are deducted. Sales are therefore reduced by sales taxes and by actual and expected sales deductions resulting from rebates, discounts and bonuses. Sales deductions are estimated primarily on the basis of historical experience, specific contractual terms and future expectations of sales development. Amounts for rebates, which are reported separately as refund liabilities, amounted to 8.3% of total net sales in 2018 (2017: 6.1%). Furthermore, sales are reduced by the amount of the provisions for expected returns of defective goods or of saleable products that may be returned under contractual arrangements. The net sales are reduced on the date of sale or on the date when the amount of future product returns can be reasonably estimated. The refund liabilities for product returns in 2018 amounted to 1.2% of total net sales (2017: 0.6%). The right-of-return assets are reflected in inventories at the former carrying amount less any recovery and processing costs and potential impairment. For unilaterally fulfilled customer contracts where more than one year passes between performance and payment, significant financing components are accounted for separately based on their present values and the subsequent unwinding of the discount. The underlying discount rate takes into account the individual credit risk of the contracting party that receives the financing.

Some of the Bayer Group's revenues are generated on the basis of licensing agreements under which third parties have been granted the right-to-use or the right-to-access products and technologies. A right-to-use license is characterized by the underlying technology remaining essentially unchanged over the period for which the rights are granted. With a right-to-access license, by contrast, the customer's interest is directed toward the consistent further development of that intellectual property (IP). Revenues from right-to-use licenses are recognized at a specific point in time, while those from right-to-access licences are recognized over time according to the underlying measure of progress. Milestone payments related to right-to-access licenses are allocated to satisfied and unsatisfied portions of the underlying performance obligation, as applicable. Consideration relating to already satisfied obligations is recognized as catch-up adjustments to revenue. Payment elements still to be earned are deferred as contract liabilities. Sales- or usage-based royalties agreed in connection with outlicensing arrangements are only recognized if the sale or the usage is sufficiently verified and the underlying performance obligation has been fulfilled.

Income may also arise from the exchange of assets. The amount recognized is generally based on the fair value of the asset received plus (less) any cash received (disbursed).

Research and development expenses

For accounting purposes, research expenses are defined as costs incurred for current or planned investigations undertaken with the prospect of gaining new scientific or technical knowledge and understanding. Development expenses are defined as costs incurred for the application of research findings or specialist knowledge to plans or designs for the production, provision or development of new or substantially improved products, services or processes, respectively, prior to the commencement of commercial production or use. Research and development (R&D) expenses are incurred in the Bayer Group for in-house R&D activities as well as numerous research and development collaborations and alliances with third parties. R&D expenses mainly comprise the costs for active ingredient discovery, clinical studies, research and development activities in the areas of application technology and engineering, field trials, regulatory approvals and approval extensions.

Research costs cannot be capitalized. The conditions for capitalization of development costs are closely defined: a key precondition for recognition of an intangible asset is that it is sufficiently certain that the development activity will generate future cash flows that will cover the associated development costs. Since our own development projects are often subject to regulatory approval procedures and other uncertainties, the conditions for the capitalization of costs incurred before receipt of approvals are not normally satisfied. In the case of R&D collaborations, a distinction is generally made between payments on contract signature, upfront payments, milestone payments and cost reimbursements for work performed. If an intangible asset (such as the right to the use of an active ingredient) is acquired in connection with any of these payment obligations, the respective payment is capitalized even if it is uncertain whether further development work will ultimately lead to the production of a saleable product. Reimbursements of the cost of R&D work are recognized in profit or loss, except where they are required to be capitalized.

Income taxes

Income taxes comprise the taxes levied on taxable income in the individual countries along with changes in deferred tax assets and liabilities that are recognized in profit or loss. The income taxes recognized are reflected at the amounts likely to be payable under the statutory regulations in force, or already enacted in relation to future periods, at the end of the reporting period. Complex tax regulations may give rise to uncertainties with respect to their interpretation and the amounts and timing of future taxable income. Given the wide range of international business relationships and the long-term nature and complexity of existing contractual agreements, differences arising between the actual results and the assumptions made, or future changes to such assumptions, could necessitate adjustments to tax income and expense in future periods. The Group establishes provisions for taxes, based on reasonable estimates, for liabilities to the tax authorities of the respective countries that are uncertain as to their amount and the probability of their occurrence. The amount of such provisions is based on various factors, such as experience with previous tax audits and differing legal interpretations by the taxable entity and the responsible tax authority.

In compliance with IAS 12 (Income Taxes), deferred taxes are recognized for temporary differences between the carrying amounts of assets and liabilities in the statement of financial position prepared according to IFRS and their tax bases. Deferred taxes are also recognized for consolidation measures and for loss carryforwards, interest carryforwards and tax credits that are likely to be usable. Deferred tax assets relating to deductible temporary differences, tax credits, loss carryforwards and interest carryforwards are recognized where it is sufficiently probable that taxable income will be available in the future to enable them to be used. Deferred tax liabilities are recognized on temporary differences taxable in the future. Deferred taxes are calculated at the rates which – on the basis of the statutory regulations in force, or already enacted in relation to future periods, as of the closing date – are expected to apply in the individual countries at the time of realization. Deferred tax assets and deferred tax liabilities are offset if they relate to income taxes levied by the same taxation authority and Bayer has a legal right to settle on a net basis. Material effects of changes in tax rates or tax law on deferred tax assets and liabilities are generally accounted for in the period in which the changes are enacted. Such effects are recognized in profit or loss except where they relate to deferred taxes that were recognized outside profit or loss, in which case they are recognized in other comprehensive income or directly in equity.

Deferred and current taxes are recognized in profit or loss unless they relate to items recognized outside profit or loss, in which case they, too, are recognized in other comprehensive income or directly in equity. The probability that deferred tax assets resulting from temporary differences, loss carryforwards or interest carryforwards can be used in the future is the subject of forecasts by the individual consolidated companies regarding their future earnings situation and other parameters. Deferred tax liabilities are recognized on planned dividend payments by subsidiaries. Where no dividend payment is planned for the foreseeable future, no deferred tax liability is recognized on the difference between the proportionate net assets according to IFRS and the tax base of the investment in the subsidiary.

Goodwill

In a business combination, goodwill is capitalized at the acquisition date. It is measured at its cost of acquisition, which is the excess of the acquisition price for shares in a company over the acquired net assets. The results of foreign currency cash flow hedges are taken into account in the acquisition price. The net assets are the balance of the fair values of the acquired identifiable assets and the assumed liabilities and contingent liabilities. Goodwill is not amortized but tested annually for impairment. Details of the annual impairment tests are given under “Procedure used in Group-wide impairment testing and its impact.” Once an impairment loss has been recognized on goodwill, it is not reversed in subsequent periods.

Other intangible assets

An “other intangible asset” is an identifiable nonmonetary asset without physical substance, other than goodwill (such as a patent, a trademark or a marketing right). It is capitalized if the future economic benefits attributable to the asset will probably flow to the company and the cost of acquisition or generation of the asset can be reliably measured.

Other intangible assets are recognized at the cost of acquisition or generation. Those with a determinable useful life are amortized accordingly on a straight-line basis over a period of up to 30 years, except where their actual depletion demands a different amortization pattern. Determination of the expected useful lives of such assets and the amortization patterns is based on estimates of the period for which they will generate cash flows. An impairment test is performed if there is an indication of possible impairment. Other intangible assets with an indefinite life (such as the Bayer Cross trademark) and intangible assets not yet available for use (such as R&D projects) are not amortized, but tested annually for impairment.

Property, plant and equipment

Property, plant and equipment is depreciated by the straight-line method over an asset's expected useful life, except where use-related depreciation is more appropriate. Following the acquisition of Monsanto, the depreciation periods given below are applied:

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Useful Life of Property, Plant and Equipment

Buildings	5 to 50 years
Plant installations and machinery	4 to 40 years
Furniture, fixtures and other equipment	2 to 15 years

When assets are sold, closed down or scrapped, the difference between the net proceeds and the net carrying amount of the assets is recognized as a gain or loss in other operating income or expenses, respectively.

Investment property comprises land and buildings not being used for operational or administrative purposes. It is measured using the cost model. The fair values of buildings and developed sites reported in the Notes are primarily determined on the basis of internal valuations using the income approach, while those of undeveloped sites are mainly calculated using the market comparison approach.

Financial assets

Financial assets comprise receivables, acquired equity and debt instruments, cash and cash equivalents, and derivatives with positive fair values.

Regular-way purchases and sales of financial assets are generally posted on the settlement date. The amount at which a financial asset is initially recognized comprises its fair value and in most cases the transaction costs.

The classification and measurement of financial assets is based in each case on the business model and the characteristics of the cash flows. The business models "hold" and "sell" are applied to divested trade accounts receivable depending on the structure of the respective sale agreements, resulting in measurement at amortized cost or fair value. The option of recognizing debt instruments at fair value through profit or loss under certain conditions is not exercised. In the case of equity instruments that are not held for trading, the option of recognizing future changes in their fair value through other comprehensive income in the statement of comprehensive income is generally exercised.

Loss allowances for expected credit losses are recognized for financial assets measured at amortized cost.

A default on receivables expected over the respective term (stage 2 of the impairment model) is determined for trade accounts receivable based on portfolio-specific default rates. These expected default rates are mainly based on the average defaults on receivables in recent years. In individual cases, these default rates are adjusted during the year for the respective customer portfolio if a significant increase or decrease in defaults is expected in the future. When determining the expected default rates, the business model, the respective customer and the economic environment of the geographic region are accounted for as follows. Specific default rates are applied for the individual Group companies; a standard calculation for countries with a comparable credit risk is undertaken for smaller companies. Further differentiation is achieved by taking into account the segments' various customer groups. Throughout the Bayer Group, customers are also assigned to risk classes with different expected default rates depending on their individual credit risk assessments.

Where action such as insolvency or comparable proceedings has been initiated against a defaulter or other substantial indications exist that receivables are impaired (such as a considerable worsening of creditworthiness or a financial restructuring), the receivables are individually tested for impairment (stage 3 of the impairment model). In addition, all receivables more than 90 days past due are individually tested for impairment during the year.

For other financial assets, the expected credit loss for the next 12 months is determined on first-time recognition and on subsequent measurement using the Monte Carlo simulation method (stage 1 of the impairment model). In the event of a significant increase in the default risk, which is defined as a more than 0.25% increase in the probability of default, the expected credit losses over the respective term of the asset are taken into account (stage 2 of the impairment model). An impairment loss is recognized if there are objective indications of an impairment.

Expected credit losses are not calculated for contract assets or lease receivables due to insignificant carrying amounts.

Financial assets are derecognized when contractual rights to receive cash flows from the financial assets expire or the financial assets were transferred together with all material risks and benefits.

Inventories

Inventories encompass assets consumed in production or in the rendering of services (raw materials and supplies), assets in the production process for sale (work in process), goods held for sale in the ordinary course of business (finished goods and goods purchased for resale), advance payments on inventories, and expected product returns (right-of-return assets). Inventories are recognized at their cost of acquisition or production (production-related full costs) – calculated by the weighted-average method – or at their net realizable value, whichever is lower. The net realizable value is the estimated selling price in the ordinary course of business less estimated cost to complete and selling expenses.

Cash and cash equivalents

Cash and cash equivalents comprise cash, checks received and balances with banks and companies. Cash equivalents are highly liquid short-term financial investments that are subject to an insignificant risk of changes in value, are easily convertible into a known amount of cash and have a maturity of three months or less from the date of acquisition or investment.

Provisions for pensions and other post-employment benefits

Within the Bayer Group, post-employment benefits are provided under defined contribution and/or defined benefit plans. In the case of defined contribution plans, the company pays contributions to publicly or privately administered pension plans on a mandatory, contractual or voluntary basis. Once the contributions have been paid, the company has no further payment obligations. The regular contributions constitute expenses for the year in which they are due and as such are included in the functional cost items and thus in EBIT. All other post-employment benefit systems are defined benefit plans, which may be either unfunded, i.e. financed by provisions, or funded, i.e. financed through pension funds.

The present value of provisions for defined benefit plans and the resulting expense are calculated in accordance with IAS 19 (Employee Benefits) by the projected unit credit method. The future benefit obligations are valued by actuarial methods and spread over the entire employment period on the basis of specific assumptions regarding beneficiary structure and the economic environment. These relate mainly to the discount rate, expected future salary and pension increases, variations in health care costs, and mortality rates. The discount rates used are calculated from the yields of high-quality corporate bond portfolios in specific currencies with cash flows approximately equivalent to the expected disbursements from the pension plans. The uniform discount rate derived from this interest-rate structure is thus based on the yields, at the closing date, of a portfolio of AA-rated corporate bonds whose weighted residual maturities approximately correspond to the duration necessary to cover the entire benefit obligation.

The fair value of plan assets is deducted from the present value of the defined benefit obligation for pensions and other post-employment benefits to determine the net defined benefit liability. The obligations and plan assets are valued at regular intervals. Plan assets included assets with a carrying amount of €4,240 million whose fair values are not determined based on quoted prices in active markets. These assets mainly include mortgage, land charge and annuity claims, registered bonds, notes, shares not listed on stock exchanges, and loans. The fair values of these assets were determined by applying the usual measurement methods and on the basis of freely accessible data such as interest rate curves and credit spreads. The fair value of bank deposits is the nominal value. Plan assets in excess of the benefit obligation are reflected in other receivables, subject to the asset ceiling specified in IAS 19 (Employee Benefits). The balance of all income and expenses, except the net interest on the net liability, is recognized in EBIT. The net interest on the net liability is reflected in the financial result under other financial income and expenses. The effects of remeasurements of the net defined benefit liability are reflected in the statement of comprehensive income as other comprehensive income. They consist of actuarial gains and losses, the return on plan assets and changes in the effects of the asset ceiling, less the amounts included in net interest. Deferred taxes relating to the effects of remeasurements are also recognized in other comprehensive income.

Other provisions

Other provisions are recognized for present legal and constructive obligations arising from past events that will probably give rise to a future outflow of resources, provided that a reliable estimate can be made of the amount of the obligations.

If the projected obligation declines as a result of a change in the estimate, the provision is reversed by the corresponding amount and the resulting income recognized in the operating expense item(s) in which the original charge was recognized.

A sensitivity analysis undertaken for certain provisions that examined the impact of a five percentage point change in the probabilities of occurrence in each case did not produce any material deviations from the amount of provisions established.

Provisions for environmental protection are mainly established for the expected costs of ensuring compliance with environmental regulations, remediation work on contaminated land, recultivation of landfills, and redevelopment and water protection measures.

Estimating the future costs involves, in particular, uncertainties with regard to the applicable laws and regulations and to the actual local conditions. Significant factors in estimating the costs include previous experiences in similar cases, expert opinions, current costs and new developments affecting costs, management's interpretation of current environmental regulations, the financial position of third parties that may become obligated to participate in any remediation costs on the basis of joint liability, and the remediation methods likely to be deployed. Changes in these assumptions could impact future reported results of the Group.

Taking into consideration experience gained to date, provisions are believed to be adequate. However, material additional costs could be incurred beyond the amounts accrued that result in additional expenses in subsequent periods.

Provisions for restructuring only cover expenses that arise directly from restructuring measures, are necessary for restructuring and are not related to future business operations. Such expenses include severance payments to employees and compensation payments in respect of rented property that is no longer used.

Restructuring measures may include the sale or termination of business units, site closures, relocations of business activities or fundamental reorganizations of business units.

Trade-related provisions are recorded mainly for obligations related to services performed but not yet invoiced and to sales commissions not recognized under trade accounts payable.

Provisions for litigations are established under certain conditions in the case of legal risks. Litigations and other judicial proceedings often raise complex issues and are subject to many uncertainties and complexities including, but not limited to, the facts and circumstances of each particular case, the jurisdiction in which each suit is brought and differences in applicable law. The outcomes of currently pending and future proceedings generally cannot be predicted. It is particularly difficult to assess the likely outcomes of class actions for damages or mass compensation claims in the United States, which may give rise to significant financial risks for the Bayer Group. As a result of a final judgment in court proceedings, regulatory decisions or the conclusion of a settlement, the Bayer Group may incur charges for which no accounting measures have yet been taken for lack of reasonable estimability or which exceed presently established provisions and the insurance coverage.

The Bayer Group considers the need for accounting measures in respect of pending or future litigations, and the extent of any such measures, on the basis of the information available to its legal department and in close consultation with legal counsel acting for the Bayer Group. Where it is more likely than not that such a litigation will result in an outflow of resources that is already reasonably estimable, a provision for litigation is recorded in the amount of the present value of the expected cash outflows. Such provisions cover the estimated payments to the plaintiffs, court and procedural costs, attorney costs and the cost of potential settlements.

It is frequently impossible to reliably determine the existence of a present obligation or reasonably estimate the probability that a potential outflow of resources will result from a pending or future litigation. The status of the material “legal risks” is described in Note [29]. Due to the special nature of these litigations, provisions generally are not established until initial settlements allow an estimate of potential amounts or judgments have been issued. Provisions for legal defense costs are established if it is probable that material costs will have to be incurred for external legal counsel to defend the company’s legal position.

Internal and external legal counsel evaluate the current status of the Bayer Group’s material legal risks at the end of each reporting period. The need to establish or adjust a provision and the amount of the provision or adjustment are determined on this basis. Adjusting events are reflected up to the date of preparation of the consolidated financial statements. The measurement of provisions in the case of class actions or mass compensation claims is mainly based on any settlements reached during the past year and on pending or anticipated future claims.

Personnel-related provisions are established, for example, for variable, performance-related one-time payments to employees, stock-based payments, and payments for service awards, early retirement and pre-retirement part-time working arrangements. Provisions for severance payments resulting from restructuring are reflected in provisions for restructuring.

Miscellaneous provisions include those for other liabilities, contingent liabilities from business combinations, and asset retirement obligations (other than those included in provisions for environmental protection).

Under IAS 37.92, further information on aspects such as the processes, risks and related measures as well as on estimated financial effects, uncertainties, the amounts of individual provisions and contingent liabilities and their maturities can be withheld in exceptional cases if disclosing it could prejudice the company’s position. Such information may include, in particular, risks in the areas of product liability, competition and antitrust law, patent disputes, tax assessments and environmental matters.

Financial liabilities

These also include trade accounts payable and other liabilities that are settled in cash and cash equivalents or other financial instruments, as well as negative fair values of derivatives.

Financial liabilities are measured at amortized cost with the exception of those carried at fair value, such as derivatives with negative fair values, liabilities for contingent consideration in business combinations, or liabilities designated at fair value through profit or loss.

Mandatory convertible notes are assessed to determine whether they should be accounted for entirely as debt or split into an equity component and a debt component. This involves examining whether Bayer's early conversion rights have economic substance. These rights may have economic substance with respect to maintaining the current credit rating if early conversion can prevent a rating downgrade. In this event, future savings of credit interest would more than offset the cost of early conversion by Bayer. If the right to early conversion is deemed to have economic substance, components of the mandatory convertible notes are classified as equity.

The mandatory convertible notes issued are accounted for as a hybrid financial instrument. The directly attributable costs along with the debt component, which corresponds to the present value of the future interest payments, are deducted from the proceeds of the issue. The debt component is included in financial liabilities. The remaining amount is the equity component, which is reflected in capital reserves.

Financial liabilities with one or multiple embedded derivatives (hybrid financial instruments), where at least one of the derivatives has to be separated from the host contract and significantly modifies the contractual cash flows, can be designated in their entirety at fair value through profit or loss. Use was made of this option for the debt instruments issued in June 2017 (exchangeable bond 2017/2020), which are exchangeable into Covestro shares. Changes in the fair value of these instruments are recognized in other financial income and expenses with the exception of those attributable to Bayer's own credit risk, which are recognized in other comprehensive income in the statement of comprehensive income.

Financial liabilities are derecognized when the contractual obligation is discharged or canceled, or has expired.

Other receivables and liabilities

Accrued items and other nonfinancial assets and liabilities are carried at amortized cost. They are amortized to income by the straight-line method or according to performance of the underlying transaction. Grants and subsidies from third parties that serve to promote investment are reflected in the statement of financial position under other liabilities and amortized to income over the useful lives of the respective investments or in line with the terms of the grant or subsidy.

Derivatives

The Bayer Group uses derivatives to mitigate the risk of changes in exchange rates, interest rates or commodity prices (such as for soybeans and corn) and to hedge stock-based compensation programs. The instruments used include forward exchange contracts, interest-rate swaps, forward commodity contracts and forward stock transactions. Derivatives are recognized at the trade date.

Contracts concluded in order to receive or deliver nonfinancial items for the company's own purposes are not accounted for as derivatives but treated as pending transactions. This applies in particular to raw material supply contracts at Crop Science. Where embedded derivatives are identified that are required to be separated from the pending transactions, they are accounted for separately. To take advantage of market opportunities or cover possible peak demand, a nonmaterial volume of transactions may be entered into for which the possibility of immediate resale cannot be excluded. Such transactions are allocated to separate portfolios upon acquisition and accounted for as derivatives through profit or loss according to IFRS 9.

Derivatives are carried at fair value. Positive fair values at the end of the reporting period are reflected in financial assets, negative fair values in financial liabilities. Changes in the fair values of these derivatives are recognized directly in profit or loss except where hedge accounting is used.

Changes in the fair values of the effective portion of derivatives designated as cash flow hedges are initially recognized outside profit or loss in other comprehensive income. They are not reclassified to profit or loss until the underlying transaction is recognized through profit or loss. The ineffective portion of derivatives designated as cash flow hedges is recognized either in other operating income or expenses or in the financial result, depending on the type of underlying transaction. Changes in the fair values of derivatives designated as fair-value hedges and the adjustments in the carrying amounts of the underlying transactions are recognized in profit or loss.

Changes in the fair values of forward exchange contracts and currency options serving as hedges of items in the statement of financial position are reflected in other financial income and expenses as exchange gains or losses, while changes in the values of interest-rate swaps and interest-rate options are recognized in interest income or expense. Changes in the fair values of commodity futures and options are initially recognized in other comprehensive income and subsequently reclassified to cost of goods sold. Effects from cash flow hedges of forward exchange contracts used to hedge forecasted sales transactions in foreign currencies are initially recognized outside profit or loss and then reclassified to other operating income or expenses at the time the sales are recognized. Changes in the fair values of stock options or forward stock transactions used to hedge stock-based employee compensation are initially recognized outside profit or loss and subsequently reclassified to profit or loss in the functional costs over the periods of the Aspire programs.

Acquisition accounting

Acquired businesses are accounted for using the acquisition method, which requires that the assets acquired and liabilities assumed be recorded at their respective fair values on the date Bayer obtains control. For significant acquisitions, the purchase price allocation is carried out with assistance from independent third-party valuation specialists. The related valuations are based on the information available at the acquisition date. Ancillary acquisition costs are recognized as expenses in the periods in which they occur. The application of the acquisition method requires certain estimates and assumptions to be made, especially concerning the fair values of the acquired intangible assets, property, plant and equipment and the liabilities assumed at the acquisition date, and the useful lives of the acquired intangible assets, property, plant and equipment. Measurement is based to a large extent on anticipated cash flows. If actual cash flows vary from those used in calculating fair values, this may materially affect the Group’s future results of operations. In particular, the estimation of discounted cash flows from intangible assets under development, patented and nonpatented technologies, customer relationships and brands is based on assumptions concerning, for example:

- The outcomes of R&D activities regarding the efficacy of a crop protection product, trait, seed or compound, and results of clinical trials
- The probability of obtaining regulatory approvals in individual countries
- Long-term sales projections
- Possible selling price erosion due to offerings of unpatented products following patent expirations
- The behavior of competitors (launch of competing products, marketing initiatives, etc.)

In step acquisitions, the fair values of the acquired entity’s assets and liabilities are measured in accordance with IFRS 3 (Business Combinations) at the date on which control is obtained. Any resulting adjustments to the fair value of the existing interest are recognized in profit or loss. The carrying amount of the assets and liabilities already recognized in the statement of financial position is then adjusted accordingly.

Divestment accounting

Divestments of shares in subsidiaries that result in a loss of control are generally accounted for in profit or loss. When shares in a subsidiary are gradually divested in several tranches, a reduction in the majority shareholding without the loss of control is reflected outside profit or loss and results in an increase in the equity attributable to noncontrolling stockholders. After the loss of control, the interest remaining at the time of the loss of control is carried at fair value. If Bayer AG still retains significant influence after selling shares, the remaining interest is recognized as an interest in an associate and is accounted for using the equity method. Once Bayer can no longer exert significant influence on the company, the remaining interest held is carried at fair value as an equity instrument. The remaining shares in Covestro AG are recognized through profit or loss.

Procedure used in Group-wide impairment testing and its impact

Impairment tests are performed not only on individual items of intangible assets, property, plant and equipment, but also at the level of cash-generating units or groups of cash-generating units. A cash-generating unit is the smallest identifiable group of assets that generates cash inflows that are largely independent of the cash inflows from other assets or groups of assets. The Bayer Group regards product families, among other things, as cash-generating units and subjects them to global impairment testing. Goodwill is tested at segment level.

Cash-generating units and unit groups are globally tested if there is an indication of possible impairment. Those to which goodwill is allocated are tested at least annually.

Impairment testing involves comparing the carrying amount of each cash-generating unit, unit group or item of intangible assets, property, plant or equipment to the recoverable amount, which is the higher of its fair value less costs of disposal or value in use. If the carrying amount exceeds the recoverable amount, an impairment loss must be recognized for the difference. In this case an impairment loss is first recognized on any goodwill allocated to the cash-generating unit or unit group. Any remaining impairment loss is allocated among the other noncurrent nonfinancial assets in proportion to their carrying amounts. The resulting expense is reflected in the functional item of the income statement in which the depreciation or amortization of the respective assets is recognized. The same applies to income from impairment loss reversals.

The recoverable amount is generally determined on the basis of the fair value less costs of disposal, taking into account the present value of the future net cash flows as market prices for the individual units are not normally available. These are forecasted on the basis of the Bayer Group's current planning, the planning horizon normally being three to five years. Forecasting involves making assumptions, especially regarding future selling prices, sales volumes, costs, market growth rates, economic cycles and exchange rates. These assumptions are based on internal estimates along with external market studies. Where the recoverable amount is the fair value less costs of disposal, measurement is undertaken from the viewpoint of an independent market participant. Where the recoverable amount is the value in use, the object of valuation is measured as currently used. In either case, net cash flows beyond the planning period are determined on the basis of long-term business expectations using the respective individual growth rates derived from market information. The fair value less costs of disposal is determined on the basis of unobservable inputs (Level 3).

The net cash inflows are discounted at a rate equivalent to the weighted average cost of equity and debt capital. To allow for the different risk and return profiles of the Bayer Group's principal businesses, the after-tax cost of capital is calculated separately for each reporting segment while taking into account regional focus areas, and a segment-specific capital structure is defined by benchmarking against comparable companies in the same industry sector. The cost of equity corresponds to the return expected by stockholders, while the cost of debt is based on the conditions on which comparable companies can obtain long-term financing. Both components are derived from capital market information.

The growth rates applied for impairment testing in 2017 and 2018 and the capital cost factors are shown in the following table:

B 3/3

Impairment Testing Parameters

	Growth rate		After-tax cost of capital	
%	**2017**	**2018**	**2017**	**2018**
Pharmaceuticals	0.0	0.0	5.6	7.6
Consumer Health	1.0	1.0	4.8	7.9
Crop Science	2.0	2.0	5.4	7.8
Animal Health	1.0	1.0	5.0	8.6

An impairment loss of €1,547 million was recognized on the goodwill of the Consumer Health segment on the basis of the annual Group-wide impairment testing of the cash-generating units and unit groups (2017: €0 million). This impairment loss was included in other operating expenses. Impairment losses on intangible assets, property, plant and equipment – net of €0 million (2017: €13 million) in impairment loss reversals – totaled €3,353 million (2017: €506 million). Details are provided in Notes [14] and [15].

Although the estimates of the useful lives of certain assets, assumptions concerning the macroeconomic environment and industry developments, and estimates of the discounted future cash flows are believed to be appropriate, changes in assumptions or circumstances could require changes in the carrying amounts. This could lead to the recognition of additional impairment losses in the future or – except in the case of goodwill – to reversals of previously recognized impairment losses if developments are contrary to expectations.

A sensitivity analysis undertaken for the impairment testing of goodwill was based on a 10% reduction in future cash flows, a 10% increase in the weighted average cost of capital or a one-percentage-point reduction in the long-term growth rate. The sensitivity analysis showed that an impairment loss of €1.1 billion would need to be recognized for the cash-generating unit Consumer Health in the event of a 10% reduction in future cash flows or a 10% increase in the weighted average cost of capital. A one percentage point reduction in Consumer Health's long-term growth rate would result in an impairment loss of €0.6 billion.

4. Segment reporting

At Bayer, the Board of Management – as the chief operating decision-maker – allocates resources to the operating segments and assesses their performance. The reportable segments and regions are identified, and the disclosures selected, in line with the internal financial reporting system (management approach) and based on the Group accounting policies outlined in Note [3].

As of December 31, 2018, the Bayer Group comprises the four reportable segments Pharmaceuticals, Consumer Health, Crop Science and Animal Health. Their activities are as follows:

B 4/1

Activities of the Segments

Segment	Activities
Pharmaceuticals	Development, production and marketing of prescription products, especially for cardiology and women's health; specialty therapeutics in the areas of oncology, hematology and ophthalmology; diagnostic imaging equipment and the necessary contrast agents
Consumer Health	Development, production and marketing of mainly nonprescription (OTC = over-the-counter) products in the dermatology, nutritional supplements, pain, digestive health, allergy, cough and cold, foot care and sun protection categories
Crop Science	Development, production and marketing of a broad portfolio of products in seeds and plant traits, crop protection and nonagricultural pest control
Animal Health	Development, production and marketing of prescription and nonprescription veterinary products

In connection with the acquisition of Monsanto, the reporting structure of the Crop Science segment was adjusted to reflect the future relative sizes of the various strategic business entities.

Business activities that cannot be allocated to any other segment are reported under "All Other Segments." These primarily include the services provided by the service areas: Business Services and Currenta.

The items in "Corporate Functions and Consolidation" mainly comprise the Bayer holding companies and Leaps by Bayer, which focuses on the development of crucial, cross-species innovations. Also recognized are gains and losses incurred upon the ongoing revaluation of nonmonetary assets and liabilities and of equity according to IAS 29 (Financial Reporting in Hyperinflationary Economies) for Bayer S.A. in Argentina. They also include the increase or decrease in expenses for Group-wide long-term stock-based compensation arising from fluctuations in the performance of Bayer stock, and the consolidation of intersegment sales (2018: €2.8 billion; 2017: €2.4 billion), along with expenses, income, assets, liabilities and certain contingent liabilities of comparable central functions of the acquired Monsanto Group.

The segment data are calculated as follows:

- // The intersegment sales reflect intra-Group transactions effected at transfer prices fixed on an arm's-length basis.
- // The net cash provided by operating activities is the cash flow from operating activities as defined in IAS 7 (Statement of Cash Flows).
- // The segment assets comprise all assets serving the respective segment, stated as of December 31, including material participating interests of direct relevance to business operations.
- // The equity items reflect the earnings and carrying amounts of investments accounted for using the equity method.

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Key Data by Segment

€ million	Pharmaceuticals 2017	Pharmaceuticals 2018	Consumer Health 2017	Consumer Health 2018	Crop Science 2017	Crop Science 2018	Animal Health 2017	Animal Health 2018
Net sales (external)	16,847	16,746	5,862	5,450	9,577	14,266	1,571	1,501
Currency-adjusted change[1]	+ 4.3%	+ 3.1%	−1.7%	−1.3%	−2.2%	+ 53.3%	+ 4.1%	+ 0.5%
Intersegment sales	38	37	14	3	33	39	8	9
Net sales (total)	16,885	16,783	5,876	5,453	9,610	14,305	1,579	1,510
EBIT[1]	4,325	3,213	518	(2,077)	1,235	3,138	307	312
EBITDA before special items[1]	5,711	5,598	1,231	1,096	2,043	2,651	381	358
ROCE[1]	21.0%	16.6%	2.7%	(12.9)%	9.6%	6.3%	47.1%	38.0%
Net cash provided by operating activities	3,867	4,376	1,059	727	1,884	3,743	209	271
Equity-method income (loss)	1	16	1	1	(1)	1	–	–
Equity-method carrying amounts	3	–	11	11	35	140	–	–
Assets	21,753	20,687	14,896	12,224	13,106	76,809	935	1,001
Capital expenditures	1,126	888	181	228	670	1,030	41	55
Depreciation, amortization and impairments	1,251	1,584	627	3,112	481	1,362	45	39
of which impairment losses/ loss reversals	217	603	213	2,732	71	13	9	–
Research and development expenses	2,888	2,893	240	226	1,166	1,950	155	143

[1] For definition see Combined Management Report, Chapter 2.4 “Alternative Performance Measures Used by the Bayer Group.”

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Key Data by Segment

€ million	All Other Segments 2017	All Other Segments 2018	Reconciliation: Corporate Functions and Consolidation 2017	Reconciliation: Corporate Functions and Consolidation 2018	Group 2017	Group 2018
Net sales (external)	1,142	1,605	16	18	35,015	39,586
Currency-adjusted change[1]	+ 10.5%	+ 40.4%	–	–	+ 1.6%	+ 17.2%
Intersegment sales	2,324	2,682	(2,417)	(2,770)	–	–
Net sales (total)	3,466	4,287	(2,401)	(2,752)	35,015	39,586
EBIT[1]	4	397	(486)	(1,069)	5,903	3,914
EBITDA before special items[1]	358	735	(436)	(891)	9,288	9,547
ROCE[1]	–	–	–	–	10.8%	4.4%
Net cash provided by operating activities	256	324	(664)	(1,524)	6,611	7,917
Equity-method income (loss)	–	–	19	50	20	68
Equity-method carry amounts	–	–	3,958	364	4,007	515
Assets	2,206	2,977	22,191	12,587	75,087	126,285
Capital expenditures	359	354	41	9	2,418	2,564
Depreciation, amortization and impairments	243	240	13	15	2,660	6,352
of which impairment losses/loss reversals	2	5	–	–	512	3,353
Research and development expenses	3	1	52	33	4,504	5,246

[1] For definition see Combined Management Report, Chapter 2.4 “Alternative Performance Measures Used by the Bayer Group.”

Reconciliations

The reconciliations of the segments' assets to Group assets and of EBITDA before special items, EBIT before special items and EBIT to Group income before income taxes are given in the following tables:

B 4/3

Reconciliation of Segments' Assets to Group Assets

€ million	2017	2018
Operating segments' assets	52,896	113,698
Corporate Functions and Consolidation assets	4,207	613
Nonallocated assets	17,984	11,974
Group assets	**75,087**	**126,285**

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Reconciliation of Segments' EBITDA Before Special Items to Group Income Before Income Taxes

€ million	2017	2018
EBITDA before special items of segments	9,724	10,438
EBITDA before special items of Corporate Functions and Consolidation	(436)	(891)
EBITDA before special items[1]	**9,288**	**9,547**
Depreciation, amortization and impairment losses/loss reversals before special items of segments	(2,145)	(3,052)
Depreciation, amortization and impairment losses/loss reversals before special items of Corporate Functions and Consolidation	(13)	(15)
Depreciation, amortization and impairment losses/loss reversals before special items	**(2,158)**	**(3,067)**
EBIT before special items of segments	7,579	7,386
EBIT before special items of Corporate Functions and Consolidation	(449)	(906)
EBIT before special items[1]	**7,130**	**6,480**
Special items of segments	(1,190)	(2,403)
Special items of Corporate Functions and Consolidation	(37)	(163)
Special items[1]	**(1,227)**	**(2,566)**
EBIT of segments	6,389	4,983
EBIT of Corporate Functions and Consolidation	(486)	(1,069)
EBIT[1]	**5,903**	**3,914**
Financial result	(1,326)	(1,596)
Income before income taxes	**4,577**	**2,318**

[1] For definition see Combined Management Report, Chapter 2.4 "Alternative Performance Measures Used by the Bayer Group."

Information on geographical areas

The following table provides a regional breakdown of external sales by market and of intangible assets, property, plant and equipment:

B 4/5

Information on Geographical Areas

	Net sales (external) – by market		Intangible assets and property, plant and equipment	
€ million	2017	2018	2017	2018
Europe/Middle East/Africa	**13,388**	**14,143**	**21,356**	**26,478**
of which Germany	3,392	3,819	10,856	16,167
of which Switzerland	485	449	5,190	5,469
North America	**10,143**	**11,569**	**10,354**	**55,644**
of which United States	8,561	9,793	10,056	54,073
Asia/Pacific	**7,637**	**8,115**	**1,771**	**1,997**
of which China	2,594	2,927	853	529
Latin America	**3,847**	**5,759**	**577**	**3,717**
of which Brazil	1,647	2,869	209	2,573
Total	**35,015**	**39,586**	**34,058**	**87,836**

Information on major customers

Revenues from transactions with a single customer in no case exceeded 10% of Bayer Group sales in 2018 or 2017.

5. Scope of consolidation; subsidiaries and affiliates

5.1 Changes in the scope of consolidation

Changes in the scope of consolidation in 2018 were as follows:

B 5.1/1

Change in the Number of Consolidated Companies

Bayer AG and consolidated companies	Germany	Other countries	Total
December 31, 2017	50	187	237
Changes in scope of consolidation	+ 4	+ 2	+ 6
Additions	+ 2	+ 194	+ 196
Retirements	– 1	– 18	– 19
December 31, 2018	**55**	**365**	**420**

The increase in the total number of consolidated companies in 2018 was primarily due to the acquisition of the Monsanto Group.

In conjunction with the acquisition of the consumer care business of Merck & Co., Inc., United States, Bayer entered into a strategic collaboration with that company in 2014. This collaboration is included in the consolidated financial statements as a joint operation. Bayer and Merck & Co., Inc., have mutually agreed to collaborate on the development, production, life-cycle management and marketing of active ingredients and products in the field of soluble guanylate cyclase (sGC) modulation.

Five (2017: four) associates and ten (2017: eight) joint ventures were accounted for in the consolidated financial statements using the equity method. Details of these companies are given in Note [16].

Flagship Ventures V Agricultural Fund, L.P., United States, was included in the consolidated financial statements for the first time in 2015 and classified as an associate. Bayer has no control over this associate despite owning 99.9% of the capital, but is able to significantly influence its financial and operating policy decisions.

Nanjing Baijingyu Pharmaceutical Co., Ltd., China, was classified as an associate in view of Bayer's representation on its executive committee and supervisory board. This enables Bayer to significantly influence its financial and operating policy decisions despite owning only 15% of its voting rights and capital.

A total of 67 (2017: 76) subsidiaries, including one (2017: one) structured entity and 17 (2017: 12) associates or joint ventures that in aggregate are immaterial to the Bayer Group's financial position and results of operations are neither consolidated nor accounted for using the equity method, but are recognized at fair value. The immaterial subsidiaries accounted for less than 0.2% of Group sales, less than 0.2% of equity and less than 0.1% of total assets.

Details of the companies included in the consolidated financial statements, the subsidiary and affiliated companies of the Bayer Group pursuant to Section 313, Paragraph 2 of the German Commercial Code, and a list of domestic subsidiaries that availed themselves in 2018 of certain exemptions granted under Section 264, Paragraph 3, and Section 264b of the German Commercial Code, are included in the audited consolidated financial statements that have been submitted for publication in the electronic version of the Federal Gazette. This information can also be accessed at www.bayer.com/shareownership2018.

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5.2 Business combinations and other acquisitions

Business combinations and other acquisitions in 2018

The purchase price of the acquisitions made in 2018 was €48,066 million (2017: €158 million). The purchase price of the acquired businesses was settled mainly in cash. Goodwill amounted to €24,503 million (2017: €51 million).

Bayer acquired 100% of the outstanding shares of Monsanto Company, St. Louis, Missouri, United States (Monsanto), on June 7, 2018. The acquisition of Monsanto brings together two strong and highly complementary businesses: Bayer's innovative chemical and biological crop protection portfolio and Monsanto's exceptional expertise in the field of seeds and traits. Among the production sites maintained by Monsanto are facilities in Luling, Muscatine and Soda Springs (all United States), Antwerp (Belgium), Zarate (Argentina) and Camacari (Brazil). Monsanto's portfolio of established brands includes Dekalb™, Asgrow™ and Roundup™, among others. The purchase price of €48,029 million pertained mainly to intangible assets for technologies in the areas of seeds and traits (useful lives of between 9 and 30 years), herbicides (useful lives of between 5 and 20 years) and digital platforms (useful lives of 15 years), as well as for research and development projects, brands (useful lives of between 10 and 30 years), customer relationships (useful lives of between 20 and 30 years), property, plant and equipment, inventories and goodwill. No value was assigned to the company name "Monsanto".

The goodwill included expected synergies in administration processes and infrastructure, including cost savings in the selling, R&D and general administration functions, as well as expected sales synergies resulting from the combined offering of products. The goodwill is non-tax-deductible.

Sales of €5,328 million and an after-tax loss of €1,341 million were recorded for the acquired businesses since the date of first-time consolidation.

The following bonds with total nominal volumes of US$15 billion and €5 billion in total were issued in June 2018 to finance the acquisition:

B 5.2/1

Newly issued bonds

Issuer	Coupon (%)	Nominal volume	Issue date	Maturity date
Bayer U.S. Finance II LLC, U.S.A.				
	3.5	US$1,250 million	Jun. 25, 2018	Jun. 25, 2021
	3-month USD LIBOR + 0.63	US$1,250 million	Jun. 25, 2018	Jun. 25, 2021
	3.875	US$2,250 million	Jun. 25, 2018	Dec. 15, 2023
	3-month USD LIBOR + 1.01	US$1,250 million	Jun. 25, 2018	Dec. 15, 2023
	4.25	US$2,500 million	Jun. 25, 2018	Dec. 15, 2025
	4.375	US$3,500 million	Jun. 25, 2018	Dec. 15, 2028
	4.625	US$1,000 million	Jun. 25, 2018	Jun. 25, 2038
	4.875	US$2,000 million	Jun. 25, 2018	Jun. 25, 2048
Bayer Capital Corporation B.V., Netherlands				
	3-month EURIBOR + 0.55	€750 million	Jun. 26, 2018	Jun. 26, 2022
	0.625	€1,000 million	Jun. 26, 2018	Dec. 15, 2022
	1.5	€1,750 million	Jun. 26, 2018	Jun. 26, 2026
	2.125	€1,500 million	Jun. 26, 2018	Dec. 15, 2029

As part of the acquisition, bonds with a nominal volume of US$6.9 billion were taken over from Monsanto.

The purchase price allocation of the Monsanto acquisition was adjusted as of December 31, 2018, resulting in a €1,457 million net reduction in acquired assets/increase in assumed liabilities and a corresponding increase in goodwill in the statement of financial position as compared with the amounts recognized in June 2018.

On May 2, 2018, Bayer increased its interest in the joint venture Bayer Zydus Pharma Private Limited, Thane, India, from 50% to 75% plus one share. A purchase price of €28 million was agreed. Bayer is obligated to purchase the remaining 25% minus one share of Bayer Zydus Pharma by 2021 and has recognized a liability of €9 million in connection with this obligation. As a result, the accounting method used for this business changed from the equity method to full consolidation, with 100% of the shares of Bayer Zydus Pharma being consolidated. Remeasurement of the shares previously accounted for using the equity method resulted in an amount of €18 million. The gain of €15 million resulting from the derecognition of the shares previously accounted for using the equity method was recognized in the financial result. The purchase price pertained mainly to goodwill that in turn was based primarily on a control premium. Bayer Zydus Pharma is active in core segments of the Indian pharmaceutical market and focuses on women's health, diagnostic imaging, cardiovascular disease, diabetes treatment and oncology. This acquisition increases Bayer's presence in the Indian pharmaceutical market.

The effects of these transactions and the adjustment of the purchase price allocation of the Monsanto acquisition on the Group's assets and liabilities are shown in the table. Net of acquired cash and cash equivalents, they resulted in the following cash outflow:

B 5.2/2

Acquired Assets and Assumed Liabilities (Fair Values at the Respective Acquisition Dates)

€ million	2017	2018	Of which Zydus	Of which Monsanto June 30, 2018	Adjustment of purchase price allocation	Of which Monsanto December 31, 2018
Goodwill	51	24,503	48	22,998	1,457	24,455
Patents and technologies	–	17,152	–	17,350	(198)	17,152
Trademarks	85	3,941	–	4,195	(254)	3,941
Marketing and distribution rights	–	845	–	821	24	845
R&D projects	–	4,637	–	4,300	337	4,637
Production rights	4	11	–	–	11	11
Other rights	–	360	–	394	(34)	360
Property, plant and equipment	–	5,655	–	6,293	(638)	5,655
Investments accounted for using the equity method	–	52	–	52	–	52
Other financial assets	–	201	3	250	(52)	198
Inventories	18	4,821	3	4,882	(64)	4,818
Receivables	–	7,281	2	7,201	78	7,279
Other current assets	–	27	–	27	–	27
Cash and cash equivalents	–	2,659	2	2,657	–	2,657
Deferred tax assets	–	1,799	2	1,548	249	1,797
Provisions for pensions and other post-employment benefits	–	(389)	–	(367)	(22)	(389)
Other provisions	–	(2,597)	(1)	(1,529)	(1,067)	(2,596)
Refund liabilities	–	(3,322)	(1)	(3,321)	–	(3,321)
Financial liabilities	–	(8,657)	(1)	(8,656)	–	(8,656)
Other liabilities	–	(2,860)	(2)	(2,870)	12	(2,858)
Deferred tax liabilities	–	(7,858)	–	(8,019)	161	(7,858)
Net assets	**158**	**48,261**	**55**	**48,206**	**–**	**48,206**
Changes in noncontrolling interest	–	(177)	–	(177)	–	(177)
Remeasurement of previously held equity interest	–	(18)	(18)	–	–	–
Consideration transferred	**158**	**48,066**	**37**	**48,029**	**–**	**48,029**
Acquired cash and cash equivalents	–	(2,659)	(2)	(2,657)	–	(2,657)
Noncash components	–	(91)	(9)	(82)	–	(82)
Net cash (inflow from) outflow for acquisitions	**158**	**45,316**	**26**	**45,290**	**–**	**45,290**

The fair value of the acquired receivables in the amount of €7.3 billion primarily comprises trade accounts receivable. As of the date of the acquisition, the gross amount of the contractual receivables amounted to €7.7 billion, with €0.3 billion of this figure assessed as irrecoverable.

If the aforementioned acquisitions had already been made as of January 1, 2018, the Bayer Group would have had total sales of €46,289 million. Income after income taxes would have been €2,093 million, and earnings per share €2.22. This takes into account significant effects relating to financing costs and purchase price allocations for 2018. In particular, the remeasurement of inventories at fair value and their subsequent utilization as well as planned amortization had a negative impact. No adjustment was made for special items.

The purchase price allocation for Monsanto currently remains incomplete pending compilation and review of the relevant financial information. It is therefore possible that changes will be made in the allocation of the purchase price to the individual assets and liabilities.

Acquisitions in 2017

On January 3, 2017, Bayer Animal Health acquired the Cydectin™ portfolio in the United States from Boehringer Ingelheim Vetmedica, Inc., St. Joseph, Missouri, United States. The acquisition comprises the Cydectin™ Pour-On, Cydectin™ Injectable and Cydectin™ Oral Drench endectocides for cattle and sheep. The acquisition is intended to strengthen the antiparasitics portfolio in the United States through the addition of endectocides. A purchase price of €158 million was agreed. The purchase price pertained mainly to trademarks and goodwill, which, as expected, is fully tax-deductible.

On September 13, 2017, Bayer and Gingko Bioworks, Inc., Boston, Massachusetts, United States, founded the joint venture Joyn Bio LLC, Boston, Massachusetts, United States. The joint venture will focus on technologies to improve plant-associated microbes with a major focus on nitrogen fixation, which is important in agriculture.

5.3 Divestments, material sale transactions and discontinued operations

Divestments in 2018

In connection with the acquisition of Monsanto, Bayer signed an agreement with BASF on October 13, 2017, concerning the sale of selected Crop Science businesses. All of the transactions closed on August 1, 2018, apart from the divestment of the vegetable seed business, which closed on August 16, 2018. In accordance with the conditions imposed by antitrust authorities, the divestment of Crop Science businesses to BASF also comprises further significant obligations by Bayer that will be fulfilled over a number of years subsequent to the date of divestment. Another of these conditions is for deliveries under the supply agreement (finished products and active ingredients) to be made at prices based on the respective variable costs. In this connection, a contract liability of €0.2 billion was determined based on customary sales prices and recognized in the statement of financial position. It will be dissolved as the obligations are fulfilled. The final purchase price provisionally amounts to approximately €7.4 billion, and income before taxes to €4.1 billion. The divested net assets amounted to €2.8 billion and pertained mainly to property, plant and equipment, goodwill and other assets and provisions.

On September 4, 2018, the U.S. activities of the prescription dermatology business within the Consumer Health segment were transferred to the acquirer LEO Pharma A/S, Ballerup, Denmark. The base purchase price amounted to €58 million. The global prescription dermatology business outside the United States is recognized as held for sale.

On June 30, 2018, the Pharmaceuticals segment sold its MK Generics business in Central America and the Caribbean to Tecnoquímicas S.A., Cali, Colombia. The divested business includes the Bonima production plant in El Salvador. The base purchase price was €44 million.

Divestments in 2017

In October 2015, Bayer successfully floated the former MaterialScience subgroup on the stock market under the name “Covestro”. In view of the remaining majority interest, Covestro was fully consolidated in the Bayer Group until the end of September 2017. Bayer ceded de facto control of Covestro on September 30, 2017. Accordingly, the Covestro Group was deconsolidated at the end of the third quarter and, in view of Bayer’s remaining significant influence, was recognized for the first time as an associate.

As of September 30, 2017, the fair value of the remaining interest, €3.6 billion, was determined on the basis of the share price. The deconsolidation and remeasurement of the remaining interest in Covestro resulted in overall income before taxes of €3.1 billion, which is included in income from discontinued operations. This figure reflects a gain of €2.4 billion from the remeasurement of the remaining interest, a gain of €0.5 billion from the deconsolidation, and a gain of €0.2 billion from the performance of the shares sold on September 29, 2017, in the fourth quarter of 2017. The overall gain after taxes amounted to €3.0 billion. A deferred tax expense of €32 million was accounted for as part of the remeasurement of the remaining interest. In addition, an amount of minus €0.6 billion recognized in other comprehensive income was reclassified to retained earnings attributable to Bayer AG stockholders.

Discontinued operations

Bayer ceded de facto control of Covestro and deconsolidated the company at the end of September 2017. As of the loss of control, Covestro fulfills the conditions for presentation as a discontinued operation. In connection with the sale of Covestro AG shares in 2017, Bayer AG entered into derivative contracts. These resulted in exchange gains of €8 million through the second quarter of 2018.

The income statements for the discontinued operations are given below:

B 5.3/1

Income Statements for Discontinued Operations

	Covestro		Diabetes Care		Total	
€ million	2017	2018	2017	2018	2017	2018
Net sales	**10,556**	**–**	**501**	**–**	**11,057**	**–**
Cost of goods sold	(6,973)	–	(28)	–	(7,001)	–
Gross profit	**3,583**	**–**	**473**	**–**	**4,056**	**–**
Selling expenses	(1,016)	–	(4)	–	(1,020)	–
Research and development expenses	(200)	–	–	–	(200)	–
General administration expenses	(345)	–	(8)	–	(353)	–
Other operating income/expenses	3,150	8	(3)	–	3,147	8
EBIT[1]	**5,172**	**8**	**458**	**–**	**5,630**	**8**
Financial result	**(124)**	**–**	**–**	**–**	**(124)**	**–**
Income before income taxes	**5,048**	**8**	**458**	**–**	**5,506**	**8**
Income taxes	(580)	(8)	(80)	–	(660)	(8)
Income after income taxes	**4,468**	**–**	**378**	**–**	**4,846**	**–**
of which attributable to noncontrolling interest	759	–	–	–	759	–
of which attributable to Bayer AG stockholders (net income)	3,709	–	378	–	4,087	–

[1] For definition see Combined Management Report, Chapter 2.4 “Alternative Performance Measures Used by the Bayer Group.”

The cash flows for the discontinued operations are as follows:

B 5.3/2

Cash Flows from Discontinued Operations

	Covestro		Diabetes Care		Total	
€ million	2017	2018	2017	2018	2017	2018
Net cash provided by (used in) operating activities	1,473	–	50	–	1,523	–
Net cash provided by (used in) investing activities	(742)	–	–	–	(742)	–
Net cash provided by (used in) financing activities	(224)	–	(50)	–	(274)	–
Change in cash and cash equivalents	**507**	**–**	**–**	**–**	**507**	**–**

Assets held for sale

Bayer signed an agreement on July 27, 2018, to divest the Consumer Health prescription dermatology business to LEO Pharma A/S, Ballerup, Denmark. The global prescription dermatology business excluding the U.S. activities is expected to be transferred to LEO Pharma A/S in the second half of 2019 subject to the fulfillment of the closing conditions. The portfolio being divested comprises prescription brands including Advantan™, Skinoren™ and Travocort™. The base purchase price amounts to €555 million and is subject to customary purchase price adjustments.

The assets and liabilities held for sale are presented below:

B 5.3/3

Assets and Liabilities Held for Sale

€ million	Dec. 31, 2017	Dec. 31, 2018
Goodwill	479	156
Other intangible assets	287	32
Property, plant and equipment	1,062	42
Other assets	41	4
Deferred taxes	63	–
Inventories	149	–
Assets held for sale	**2,081**	**234**
Provisions for pensions and other post-employment benefits	11	5
Other provisions	79	–
Financial liabilities	14	–
Other liabilities	4	–
Deferred taxes	3	7
Liabilities directly related to assets held for sale	**111**	**12**

Assets and liabilities held for sale in 2017 mainly comprised the businesses sold to BASF.

Notes to the Income Statements

6. Net sales

Total reported net sales for 2018 amounted to €39,586 million, rising by €4,571 million, or 13.1%, compared with 2017. They were derived primarily from product deliveries. Breakdowns of net sales by segment and geographical area are given in the overview provided in Note [4].

Sales of €667 million were recognized in 2018 from performance obligations already satisfied in previous years. These sales primarily resulted from adjustments to refund liabilities for expected product returns, from rebates to be granted and from right-to-use licenses granted against sales-based royalties. Contractually agreed sales volumes pertaining to performance obligations not yet satisfied as of December 31, 2018, are expected to be reclassified to profit or loss as follows, taking into account anticipated sales deductions:

B 6/1

Allocation of Transaction Price to Unfulfilled Performance Obligations

€ million	
Transaction price outstanding as of Dec. 31, 2018	**2,107**
of which to be recognized within 1 year	281
of which to be recognized between 1 and 2 years	266
of which to be recognized between 2 and 3 years	220
of which to be recognized between 3 and 4 years	163
of which to be recognized between 4 and 5 years	155
of which to be recognized after more than 5 years	1,022

The description above only accounts for customer contracts with an original contractual term of more than one year.

The change in contract liabilities between January 1, 2018, and December 31, 2018, was due to the following factors:

B 6/2

Roll Forward of Contract Liabilities

€ million	
Contract liability balance as of Jan. 1, 2018	**1,530**
Changes due to business combinations	418
Additions	5,845
Revenue recognized in the current year that was included in the contract liability balance as of Jan. 1	(770)
Revenue recognized in the current year that was not included in the contract liability balance as of Jan. 1	(2,782)
Exchange differences	(20)
Contract liability balance as of Dec. 31, 2018	**4,221**

Contract liabilities mainly result from advance payments by customers for product deliveries and are predominantly recognized as sales within one year. In connection with the acquisition of Monsanto, certain Crop Science businesses were transferred to BASF. Portions of the purchase price were recognized as contract liabilities since certain payment components were not yet earned. Further significant amounts of contract liabilities comprised milestone payments already received for right-to-access licenses. The contract liabilities relating to these two factors will be recognized as sales over a period of more than five years.

7. Other operating income

Other operating income was comprised as follows:

B 7/1

Other Operating Income

€ million	2017	2018
Gains on retirements of noncurrent assets	173	4,310
Reversal of impairment losses on receivables	23	184
Reversals of unutilized provisions	26	12
Gains from derivatives	291	217
Miscellaneous operating income	351	334
Total	**864**	**5,057**

Gains on retirements of noncurrent assets included proceeds of €4.1 billion from the sale of certain Crop Science businesses to BASF in connection with the acquisition of Monsanto (Crop Science segment). Furthermore, the divestment of several noncore brands at Consumer Health resulted in a gain of €49 million. The sale of a property in Berlin resulted in a gain of €41 million (Pharmaceuticals segment). The sale of the U.S. prescription dermatology business to LEO Pharma A/S, Ballerup, Denmark, generated a further gain of €25 million (Consumer Health segment).

Income from the reversal of impairment losses on receivables primarily resulted from the reversal of impairment losses under IFRS 9 and from improved receivables management in Brazil.

Within miscellaneous operating income, the proportionate assumption of costs by Janssen Research & Development, LLC, United States, a subsidiary of Johnson & Johnson, in connection with a development collaboration resulted in income of €189 million (Pharmaceuticals segment).

In the previous year, gains on retirements of noncurrent assets included a gain of €81 million from the sale of trademark rights (Consumer Health segment). Furthermore, the sale of capitalized transfer rights by Bayer 04 Leverkusen Fußball GmbH, Germany, resulted in a gain of €49 million (All Other Segments).

8. Other operating expenses

Other operating expenses were comprised as follows:

B 8/1

Other Operating Expenses

€ million	2017	2018
Losses on retirements of noncurrent assets	(39)	(35)
Impairment losses on receivables	(139)	(199)
Expenses related to significant legal risks	(258)	(677)
Losses from derivatives	(258)	(209)
Miscellaneous operating expenses	(254)	(1,874)
Total	**(948)**	**(2,994)**

Of the impairment losses on receivables, €75 million (2017: €74 million) pertained to past-due receivables in Brazil.

Miscellaneous operating expenses included €1,547 million in impairment losses recognized on the goodwill of Consumer Health, along with donations to charitable causes (all segments) and subsidies for patient assistance programs with government agencies and partners of health care systems (Pharmaceuticals segment) in the amount of €123 million (2017: €52 million).

Information on the legal risks can be found in Note [29].

9. Personnel expenses and employee numbers

Personnel expenses for continuing operations rose by €2,020 million to €11,548 million in 2018 (2017: €9,528 million). The change was mainly due to the higher headcount in connection with the acquisition of Monsanto.

B 9/1

Personnel Expenses

€ million	2017	2018
Salaries	7,567	9,192
Social expenses and expenses for pensions and other benefits	1,961	2,356
of which for defined contribution pension plans	488	495
of which for defined benefit and other pension plans	445	429
Total	**9,528**	**11,548**

The interest portion of the allocation to personnel-related provisions – mainly for pensions and other post-employment benefits – is included in the financial result under other financial expenses (Note [10.3]).

The average numbers of employees, classified by corporate function, were as shown in the table below:

B 9/2

Employees

	2017	2018
Production	39,298	44,734
Marketing and distribution	37,147	40,295
Research and development	13,958	16,538
General administration	9,359	9,271
Total	**99,762**	**110,838**
Apprentices	1,918	1,823

The number of employees on either permanent or temporary contracts is stated in full-time equivalents (FTE), with part-time employees included on a pro-rated basis in line with their contractual working hours. The figures do not include apprentices.

10. Financial result

The financial result for 2018 was minus €1,596 million (2017: minus €1,326 million), comprising equity-method income of €68 million (2017: €20 million), financial expenses of €2,574 million (2017: €1,635 million) and financial income of €910 million (2017: €289 million). Details of the components of the financial result are provided in the following sections.

10.1 Income (loss) from investments in affiliated companies

The net income (loss) from investments in affiliated companies was comprised as follows:

B 10.1/1

Income (Loss) from Investments in Affiliated Companies

€ million	2017	2018
Net income (loss) from investments accounted for using the equity method (equity-method income/loss)	20	68
Expenses		
Losses from the sale of investments in affiliated companies	(1)	–
Miscellaneous expenses from investments in affiliated companies	(1)	(459)
Income		
Gains from the sale of investments in affiliated companies	5	304
Miscellaneous income from investments in affiliated companies	7	–
Total	**30**	**(87)**

Income from investments in affiliated companies accounted for using the equity method primarily comprised equity-method income of €103 million (2017: €51 million) from the interest in Covestro, which until May 2018 was accounted for in the Bayer Group consolidated financial statements as an associate using the equity method. The other main components of this item were equity-method losses of €26 million (2017: €15 million) from the BlueRock joint ventures and €22 million (2017: €16 million) from the Casebia Group.

Miscellaneous expenses from investments in affiliated companies included changes in the fair value of the remaining interest in Covestro, which has been presented as an equity instrument since May 2018.

Gains from the sale of investments in affiliated companies included the income from the sale of our interest in Covestro AG, which was accounted for using the equity method.

Further details of the companies accounted for using the equity method are given in Note [16].

10.2 Net interest expense

The net interest expense was comprised as follows:

B 10.2/1

Net Interest Expense

€ million	2017	2018
Interest and similar expenses	**(685)**	**(1,386)**
of which interest expense relating to nonfinancial liabilities	(54)	(92)
Interest and similar income	**272**	**321**
of which interest income relating to nonfinancial assets	96	65
Total	**(413)**	**(1,065)**

The change in the liability of a redeemable noncontrolling interest (IAS 32) is reflected in interest income or expense. In 2018, a €3 million (2017: €49 million) increase in this liability was recognized as interest expense.

10.3 Other financial income and expenses

Other financial income and expenses were comprised as follows:

B 10.3/1

Other Financial Income and Expenses

€ million	2017	2018
Expenses		
Interest portion of interest-bearing provisions	(189)	(202)
Exchange gain (loss)	(326)	(271)
Miscellaneous financial expenses	(433)	(256)
Income		
Miscellaneous financial income	5	285
Total	**(943)**	**(444)**

The interest portion of noncurrent provisions comprised €168 million (2017: €191 million) in interest expense for pension and other post-employment benefit provisions and minus €34 million (2017: €2 million) in effects of interest expense and interest-rate fluctuations for other provisions and corresponding overfunding. The interest expense for pension and other post-employment benefit provisions included €584 million (2017: €539 million) for the unwinding of discount on the present value of the defined benefit obligation and €416 million (2017: €348 million) in interest income from plan assets.

The miscellaneous financial expenses included €124 million (2017: €210 million) in commitment fees and other fees related to the syndicated bank financing for the acquisition of Monsanto. The €230 million in positive fair value changes (2017: €172 million in negative fair value changes) of the debt instruments (exchangeable bond) issued in June 2017 was recognized in miscellaneous financial income.

11. Taxes

The breakdown of tax expenses by origin was as follows:

B 11/1

Tax Expense by Origin

	2017		2018	
€ million		Of which income taxes		Of which income taxes
Taxes paid or accrued				
Current income taxes				
Germany	(794)	(794)	(1,210)	(1,210)
Other countries	(737)	(737)	(1,329)	(1,329)
Other taxes				
Germany	(87)		(75)	
Other countries	(118)		(162)	
	(1,736)	**(1,531)**	**(2,776)**	**(2,539)**
Deferred taxes				
from temporary differences	70	70	2,058	2,058
from tax loss and interest carryforwards and tax credits	132	132	(126)	(126)
	202	**202**	**1,932**	**1,932**
Total	**(1,534)**	**(1,329)**	**(844)**	**(607)**

Other taxes mainly included land, vehicle and other indirect taxes and are reflected in the respective functional cost items.

The deferred tax assets and liabilities were allocable to the following items in the statements of financial position:

B 11/2

Deferred Tax Assets and Liabilities

	Dec. 31, 2017		Dec. 31, 2018	
€ million	Deferred tax assets	Deferred tax liabilities	Deferred tax assets	Deferred tax liabilities
Intangible assets	799	1,469	860	6,995
Property, plant and equipment	79	323	451	882
Financial assets	204	81	158	193
Inventories	1,117	15	1,405	214
Receivables	60	464	154	568
Other assets	39	2	177	176
Provisions for pensions and other post-employment benefits	2,520	367	2,792	408
Other provisions	610	64	1,580	54
Liabilities	534	101	831	285
Tax loss and interest carryforwards	486	–	540	–
Tax credits	200	–	483	–
	6,648	**2,886**	**9,431**	**9,775**
of which noncurrent	5,194	2,214	7,159	8,715
Set-off	(1,733)	(1,733)	(5,154)	(5,154)
Total	**4,915**	**1,153**	**4,278**	**4,621**

The use of tax loss carryforwards reduced current income taxes in 2018 by €157 million (2017: €47 million). The use of tax credits reduced current income taxes by €78 million (2017: €16 million).

Of the total tax loss and interest carryforwards of €8,677 million, including interest carryforwards of €174 million (2017: €6,443 million, including interest carryforwards of €148 million), an amount of €4,254 million, including interest carryforwards of €0 million (2017: €2,890 million, including interest carryforwards of €1 million) is expected to be usable within a reasonable period. The increase in tax loss and interest carryforwards mainly resulted from the transfer of tax loss carryforwards from Monsanto, and from impairments. Deferred tax assets of €540 million (2017: €486 million) were recognized for the amount of tax loss and interest carryforwards expected to be usable.

The use of €4,442 million of tax loss and interest carryforwards, including interest carryforwards of €174 million (2017: €3,553 million, including interest carryforwards of €147 million) was subject to legal or economic restrictions. Consequently, no deferred tax assets were recognized for this amount. If these tax loss and interest carryforwards had been fully usable, deferred tax assets of €378 million (2017: €351 million) would have been recognized.

Tax credits of €509 million were recognized in 2018 (2017: €200 million) as deferred tax assets. The increase in tax credits was mainly due to the acquisition of Monsanto. The use of €32 million (2017: €28 million) of tax credits was subject to legal or economic restrictions. Consequently, no deferred tax assets were recognized for this amount.

B 11/3

Expiration of Unusable Tax Credits and of Tax Loss and Interest Carryforwards

€ million	Tax credits Dec. 31, 2017	Tax credits Dec. 31, 2018	Tax loss and interest carryforwards Dec. 31, 2017	Tax loss and interest carryforwards Dec. 31, 2018
Within one year	4	1	17	22
Within two years	–	1	15	105
Within three years	–	2	114	222
Within four years	1	2	28	91
Within five years	19	–	70	69
Thereafter	4	26	3,309	3,913
Total	**28**	**32**	**3,553**	**4,422**

In 2018, subsidiaries that reported losses for 2018 or 2017 recognized net deferred tax assets totaling €1,487 million (2017: €2,303 million) from temporary differences and tax loss carryforwards. These assets were considered to be unimpaired because the companies concerned were expected to generate taxable income in the future.

Deferred tax liabilities of €44 million were recognized in 2018 (2017: €22 million) for planned dividend payments by subsidiaries. Deferred tax liabilities were not recognized for differences on €15,827 million (2017: €18,272 million) of retained earnings of subsidiaries because these earnings are to be reinvested for an indefinite period.

The reconciliation of expected to reported income tax expense (2018: €52 million; 2017: €246 million) and of the expected to the effective tax rate for the Group was as follows:

B 11/4

Reconciliation of Expected to Actual Income Tax Expense

	2017 € million	2017 %	2018 € million	2018 %
Expected income tax expense[1] and expected tax rate	**1,083**	**23.7**	**555**	**23.9**
Reduction in taxes due to tax-free income				
Income related to the operating business	(135)	(3.0)	(216)	(9.3)
Income from affiliated companies and divestment proceeds	(16)	(0.3)	(164)	(7.1)
First-time recognition of previously unrecognized deferred tax assets on tax loss and interest carryforwards	(31)	(0.7)	(58)	(2.5)
Use of tax loss and interest carryforwards on which deferred tax assets were not previously recognized	(4)	(0.1)	(11)	(0.5)
Increase in taxes due to non-tax-deductible expenses				
Expenses related to the operating business	168	3.7	215	9.3
Impairment losses on investments in affiliated companies	–	–	14	0.6
New tax loss and interest carryforwards unlikely to be usable	69	1.5	64	2.8
Existing tax loss and interest carryforwards on which deferred tax assets were previously recognized but which are unlikely to be usable	1	–	76	3.3
Tax income (–) and expenses (+) relating to other periods	(128)	(2.8)	(42)	(1.8)
Tax effects of changes in tax rates	384	8.4	(208)	(9.0)
Other tax effects	(62)	(1.4)	382	16.5
Actual income tax expense and effective tax rate	**1,329**	**29.0**	**607**	**26.2**

[1] Expected income tax expense is calculated by applying an expected weighted average tax rate to the pre-tax income of the Group. This average rate was determined on the basis of expected tax rates for the individual Group companies.

The reported tax expense contains a one-time effect in the amount of €175 million that is due to the integration of Monsanto into Bayer's corporate structures, along with an amount of €140 million resulting from the impairment losses recognized on the goodwill of Consumer Health. The reported tax expense for 2017 contained one-time effects of €455 million in connection with the tax reform in the United States (€409 million from changes in the tax rate and €46 million due to prior-period tax expense).

12. Income/losses attributable to noncontrolling interest

Income attributable to noncontrolling interest amounted to €16 million (2017: €791 million). Losses attributable to noncontrolling interest amounted to €0 million (2017: €33 million). This income primarily related to BCS Limited, India. The income and losses in the prior year were mainly attributable to Covestro.

13. Earnings per share

Earnings per share are determined according to IAS 33 by dividing the net income for the period attributable to Bayer AG stockholders by the weighted average number of shares. As no dilutive financial instruments were in circulation at the end of the reporting period, diluted earnings per share were equivalent to basic earnings per share.

In April 2018, the Republic of Singapore subscribed to 31 million new Bayer shares through a subsidiary, for total gross proceeds of €3 billion. The subscription rights of existing stockholders were excluded from this capital increase. In June 2018, a capital increase with subscription rights for existing stockholders was implemented, raising around €6 billion in net proceeds. Approximately 74.6 million new shares were issued.

In November 2016, Bayer placed €4 billion in mandatory convertible notes without granting subscription rights to existing stockholders of the company. According to IAS 33.23, the weighted average number of shares increases as soon as the notes contract is signed, and this increase must be taken into account in calculating earnings per share. The new weighted average number of shares is based on the maximum conversion ratio resulting from the currently applicable minimum conversion price of €83.99. In accordance with the terms, the minimum conversion price had to be adjusted following the payment of the dividend and the capital increase with subscription rights. An adjustment is not undertaken for financing expenses incurred in connection with the mandatory convertible notes because the interest component was recognized outside profit or loss when the notes were placed.

Further details of the mandatory convertible notes and capital increases are provided in Note [21].

B 13/1

Earnings per Share

	€ million		Earnings per share (€)	
	2017	**2018**	**2017**	**2018**
Income after income taxes (attributable to Bayer AG stockholders)	**7,336**	**1,695**	**8.29**	**1.80**
of which income after income taxes from continuing operations (attributable to Bayer AG stockholders)	3,249	1,695	3.67	1.80
of which income after income taxes from discontinued operations (attributable to Bayer AG stockholders)	4,087	–	4.62	–
Weighted average number of shares[1]	**885,186,889**	**940,754,504**		

[1] The weighted average number of shares was restated for all periods prior to June 2018 to reflect the effect of the bonus component of the subscription rights issued for the June 2018 capital increase.

Notes to the Statements of Financial Position

14. Goodwill and other intangible assets

Changes in intangible assets in 2018 were as follows:

B 14/1

Changes in Intangible Assets

€ million	Acquired goodwill	Patents and technologies	Trademarks	Marketing and distribution rights	Production rights	R&D projects	Other rights and advance payments	Total
Cost of acquisition or generation, December 31, 2017	**14,751**	**12,861**	**10,453**	**1,911**	**1,923**	**1,044**	**1,564**	**44,507**
Acquisitions	24,503	17,152	3,941	845	11	4,637	360	51,449
Capital expenditures	–	46	–	358	–	53	243	700
Retirements	–	(26)	(7)	(55)	–	(149)	(41)	(278)
Transfers	–	3	–	334	–	(280)	(57)	–
Transfers (IFRS 5)	(318)	(273)	(40)	(17)	(76)	(109)	(22)	(855)
Divestments/Changes in scope of consolidation	–	–	(4)	–	–	–	(2)	(6)
Inflation adjustment (IAS 29)	20	6	–	1	–	–	6	33
Exchange differences	737	498	299	50	(1)	126	24	1,733
December 31, 2018	**39,693**	**30,267**	**14,642**	**3,427**	**1,857**	**5,322**	**2,075**	**97,283**
Accumulated amortization and impairments, December 31, 2017	**–**	**9,638**	**4,041**	**1,283**	**1,836**	**117**	**1,167**	**18,082**
Retirements	–	(23)	(10)	(31)	–	(149)	(27)	(240)
Amortization and impairment losses	1,547	1,300	1,477	149	23	65	202	4,763
Amortization	–	1,300	429	138	23	–	200	2,090
Impairment losses	1,547	–	1,048	11	–	65	2	2,673
Impairment loss reversals	–	–	–	–	–	–	–	–
Transfers	–	–	–	–	–	46	(46)	–
Transfers (IFRS 5)	–	(230)	(29)	(8)	(76)	–	(24)	(367)
Divestments/Changes in scope of consolidation	–	–	3	–	–	–	–	3
Inflation adjustment (IAS 29)	–	6	–	1	–	–	5	12
Exchange differences		47	56	24	(1)	–	12	138
December 31, 2018	**1,547**	**10,738**	**5,538**	**1,418**	**1,782**	**79**	**1,289**	**22,391**
Carrying amounts, December 31, 2018	**38,146**	**19,529**	**9,104**	**2,009**	**75**	**5,243**	**786**	**74,892**
Carrying amounts, December 31, 2017	**14,751**	**3,223**	**6,412**	**628**	**87**	**927**	**397**	**26,425**

In the Consumer Health segment, an impairment loss of €1,547 million was recognized on goodwill due especially to a further increase in competition, challenges posed by the transformation of the Consumer Health business as a result of changes in consumer behavior, and a higher cost of capital. Against this backdrop, impairment losses were also recognized on other intangible assets, primarily allergy brands (Claritin™ €584 million, Aerius™ €37 million) and cold medicines (Afrin™ €292 million) acquired in 2014 from Merck & Co. We also recognized impairment losses on skincare brands (Kang Wang™ €78 million and Pi Kang Wang™ €43 million) acquired in 2014 from Dihon Pharmaceutical Group Co. Ltd.

In the Pharmaceuticals segment, impairment losses were recognized in connection with the termination of research and development projects, primarily in the field of ophthalmology (€43 million), oncology (€10 million) and pulmonology/anti-infectives (€8 million).

Details of acquisitions and divestments are provided in Notes [5.2] and [5.3]. The impairment testing procedure for goodwill and other intangible assets is explained in Note [3].

Changes in intangible assets in 2017 were as follows:

B 14/2

Changes in Intangible Assets (Previous Year)

€ million	Acquired goodwill	Patents and technol-ogies	Trade-marks	Marketing and distribution rights	Production rights	R&D projects	Other rights and advance payments	Total
Cost of acquisition or generation, December 31, 2016	**16,312**	**13,162**	**11,045**	**2,044**	**2,138**	**887**	**2,666**	**48,254**
Acquisitions	51	–	85	–	4	–	–	140
Capital expenditures	–	78	–	54	–	458	167	757
Retirements	–	(61)	(31)	(4)	–	(220)	(365)	(681)
Transfers	–	–	1	45	–	17	(63)	–
Transfers (IFRS 5)	(481)	(123)	(40)	(14)	(118)	(43)	(403)	(1,222)
Divestments/Changes in scope of consolidation	(254)	(31)	(5)	(105)	(96)	–	(322)	(813)
Inflation adjustment (IAS 29)	5	–	–	–	–	–	–	5
Exchange differences	(882)	(164)	(602)	(109)	(5)	(55)	(116)	(1,933)
December 31, 2017	**14,751**	**12,861**	**10,453**	**1,911**	**1,923**	**1,044**	**1,564**	**44,507**
Accumulated amortization and impairments, December 31, 2016	**–**	**9,312**	**3,673**	**1,268**	**2,027**	**235**	**1,860**	**18,375**
Retirements	–	(36)	(20)	(4)	–	(201)	(356)	(617)
Amortization and impairment losses	–	596	580	170	21	98	228	1,693
Amortization	–	596	369	133	21	–	118	1,237
Impairment losses	–	–	211	37	–	98	110	456
Impairment loss reversals	–	–	–	–	–	–	–	–
Transfers	–	–	–	1	–	–	(1)	–
Transfers (IFRS 5)	–	(86)	(39)	(9)	(118)	(2)	(199)	(453)
Divestments/Changes in scope of consolidation	–	(13)	(5)	(77)	(90)	–	(295)	(480)
Exchange differences	–	(135)	(148)	(66)	(4)	(13)	(70)	(436)
December 31, 2017	**–**	**9,638**	**4,041**	**1,283**	**1,836**	**117**	**1,167**	**18,082**
Carrying amounts, December 31, 2017	**14,751**	**3,223**	**6,412**	**628**	**87**	**927**	**397**	**26,425**
Carrying amounts, December 31, 2016	**16,312**	**3,850**	**7,372**	**776**	**111**	**652**	**806**	**29,879**

Goodwill and other intangible assets with an indefinite useful life that are of material significance for the Bayer Group are allocated to the following cash-generating units or unit groups as of the end of the reporting period:

B 14/3

Intangible Assets with an Indefinite Useful Life

Reporting segment	Cash-generating unit/unit group	Goodwill (€ million)	Material intangible assets with indefinite useful life (€ million)
Pharmaceuticals	Pharmaceuticals	7,247	510
Consumer Health	Consumer Care	4,274	32
Crop Science	Crop Science	26,528	4,788
Animal Health	Animal Health	97	21

In the case of research and development projects, the point in time from which a capitalized asset can be expected to generate an economic benefit for the company cannot be determined. Such assets are therefore classified as having an indefinite useful life. Research and development projects were capitalized at a total amount of €5,243 million as of the end of 2018 (2017: €927 million).

Another intangible asset classified as having an indefinite useful life is the Bayer Cross, which was reacquired for the North America region in 1994, having been awarded to the United States and Canada under the reparations agreements at the end of the First World War. The period for which the Bayer Group will derive an economic benefit from this name cannot be determined as Bayer intends to make continuous use of it. The Bayer Cross is capitalized at €108 million.

15. Property, plant and equipment

Changes in property, plant and equipment in 2018 were as follows:

B 15/1

Changes in Property, Plant and Equipment

€ million	Land and buildings	Plant installations and machinery	Furniture, fixtures and other equipment	Construction in progress and advance payments	Total
Cost of acquisition or construction, December 31, 2017	**6,706**	**8,646**	**1,721**	**1,763**	**18,836**
Acquisitions	2,209	2,167	318	961	5,655
Capital expenditures	196	378	183	1,108	1,865
Retirements	(79)	(370)	(174)	(6)	(629)
Transfers	370	704	49	(1,123)	–
Transfers (IFRS 5)	(356)	(329)	(79)	170	(594)
Divestments/Changes in the scope of consolidation	(2)	–	4	1	3
Inflation adjustment (IAS 29)	63	58	13	10	144
Exchange differences	88	79	1	11	179
December 31, 2018	**9,195**	**11,333**	**2,036**	**2,895**	**25,459**
Accumulated depreciation and impairments, December 31, 2017	**3,661**	**6,267**	**1,256**	**19**	**11,203**
Retirements	(39)	(353)	(150)	(6)	(548)
Depreciation and impairment losses	473	802	235	471	1,981
Depreciation	316	752	233	–	1,301
Impairment losses	157	50	2	471	680
Impairment loss reversals	–	–	–	–	–
Transfers	4	7	(11)	–	–
Transfers (IFRS 5)	(116)	(101)	(47)	–	(264)
Divestments/Changes in the scope of consolidation	–	–	2	–	2
Inflation adjustment (IAS 29)	34	46	10	–	90
Exchange differences	28	26	(4)	1	51
December 31, 2018	**4,045**	**6,694**	**1,291**	**485**	**12,515**
Carrying amounts, December 31, 2018	**5,150**	**4,639**	**745**	**2,410**	**12,944**
Carrying amounts, December 31, 2017	**3,045**	**2,379**	**465**	**1,744**	**7,633**

Impairment losses on property, plant and equipment amounted to €680 million, including in particular €519 million resulting from the decision regarding Factor VIII facilities in Wuppertal and Berkeley in the Pharmaceuticals segment, along with €132 million pertaining to a Chinese production facility in the Consumer Health segment.

In 2018, borrowing costs of €56 million (2017: €31 million) were capitalized as components of the cost of acquisition or construction of qualifying assets, applying an average interest rate of 3.5% (2017: 2.5%).

Capitalized property, plant and equipment included assets with a total net value of €353 million (2017: €231 million) held under finance leases. The cost of acquisition or construction of these assets as of the closing date totaled €511 million (2017: €368 million). They comprised buildings with a carrying amount of €136 million (2017: €98 million), plant installations and machinery with a carrying amount of €151 million (2017: €75 million), and other property, plant and equipment with a carrying amount of €66 million (2017: €58 million). For information on the liabilities arising from finance leases, see Note [24].

In 2018, rental payments of €565 million (2017: €385 million) were made for assets leased under operating leases as defined in IAS 17 (Leases).

Sublease agreements exist primarily for company cars and accommodation for employees on overseas assignments. Minimum lease payments expected to be received under these subleases in the future amount to €30 million, while the rental expenses thereunder in 2018 amounted to €26 million.

Through its acquisition of Monsanto, Bayer acquired a property that was transferred to the County of St. Louis, Missouri, United States, in 2013 in return for industrial revenue bonds. This property was then leased back to Monsanto through December 31, 2026. A buyback option exists at the end of the rental period. In view of the economic substance of the agreement, the rental payment obligations are netted against the right to receive payment from the industrial revenue bonds in the statement of financial position.

Bayer leases buildings under operating leases, some of which Bayer can extend when the original term of the lease expires. Of these leases, some contain an early termination option that in certain cases involves a compensation payment. Some leases are subject to price adjustments based on the market rates prevailing at the time or due to changes in the value of regional price indices.

Changes in property, plant and equipment in 2017 were as follows:

B 15/2

Changes in Property, Plant and Equipment (Previous Year)

€ million	Land and buildings	Plant installations and machinery	Furniture, fixtures and other equipment	Construction in progress and advance payments	Total
Cost of acquisition or construction, December 31, 2016	**10,346**	**20,335**	**2,297**	**2,551**	**35,529**
Acquisitions	–	–	–	–	–
Capital expenditures	286	460	193	1,022	1,961
Retirements	(82)	(304)	(143)	–	(529)
Transfers	282	699	52	(1,033)	–
Transfers (IFRS 5)	(498)	(601)	(66)	(240)	(1,405)
Divestments/Changes in the scope of consolidation	(3,167)	(11,059)	(500)	(455)	(15,181)
Inflation adjustment (IAS 29)	5	–	–	–	5
Exchange differences	(466)	(884)	(112)	(82)	(1,544)
December 31, 2017	**6,706**	**8,646**	**1,721**	**1,763**	**18,836**
Accumulated depreciation and impairments, December 31, 2016	**5,592**	**15,111**	**1,685**	**27**	**22,415**
Retirements	(60)	(280)	(125)	–	(465)
Depreciation and impairment losses	334	893	223	5	1,455
Depreciation	310	860	222	–	1,392
Impairment losses	24	33	1	5	63
Impairment loss reversals	(7)	(6)	–	–	(13)
Transfers	6	4	(1)	(9)	–
Transfers (IFRS 5)	(82)	(214)	(31)	–	(327)
Divestments/Changes in the scope of consolidation	(1,923)	(8,631)	(420)	(1)	(10,975)
Exchange differences	(199)	(610)	(75)	(3)	(887)
December 31, 2017	**3,661**	**6,267**	**1,256**	**19**	**11,203**
Carrying amounts, December 31, 2017	**3,045**	**2,379**	**465**	**1,744**	**7,633**
Carrying amounts, December 31, 2016	**4,754**	**5,224**	**612**	**2,524**	**13,114**

Investment property

The total carrying amount of investment property as of December 31, 2018, was €96 million (December 31, 2017: €97 million). The fair value of this property was €383 million (2017: €336 million). The rental income from investment property was €14 million (2017: €14 million), and the operating expenses directly allocable to this property amounted to €5 million (2017: €4 million).

16. Investments accounted for using the equity method

Five (2017: four) associates and 10 (2017: eight) joint ventures were accounted for in the consolidated financial statements using the equity method. A list of these companies is available at www.bayer.com/shareownership2018.

The following table contains a summary of the aggregated income statement data and aggregated carrying amounts of the associates and joint ventures accounted for using the equity method (excluding the Covestro Group):

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Earnings Data and Carrying Amounts of Companies Accounted for Using the Equity Method

	Associates		Joint ventures	
€ million	2017	2018	2017	2018
Income after income taxes	7	(2)	(48)	(75)
Other comprehensive income after income taxes	28	30	–	–
Total comprehensive income after income taxes	35	28	(48)	(75)
Share of income after income taxes	**1**	**(1)**	**(32)**	**(34)**
Share of total comprehensive income after income taxes	29	17	(32)	(34)
Carrying amount as of December 31	**37**	**95**	**343**	**420**

Information on the Covestro Group

The Covestro Group was deconsolidated at the end of the third quarter of 2017, and, in view of Bayer's remaining significant influence, was then recognized for the first time as an associate and accounted for using the equity method. The equity-method carrying amount recognized at that time was €3.6 billion.

In the first quarter of 2018, Bayer sold 21.0 million shares of Covestro AG to institutional investors at a price of €86.25 per share. In the second quarter of 2018, Bayer sold a further 28.81 million shares of Covestro AG to institutional investors at a price of €75.50. In addition, 13.79 million shares of Covestro AG were acquired from Bayer Pension Trust e. V., which no longer holds any Covestro shares. Bayer AG now holds a 7.5% interest in Covestro to service the exchangeable bond issued in 2017 that matures in 2020. The total gain from the disposals in 2018 amounted to €304 million.

Through May 2018, the Covestro interest was accounted for in the Bayer Group consolidated financial statements as an associate using the equity method. The share disposals outlined in the previous paragraph led to the loss of significant influence on the financial and business policy decisions of Covestro. This in turn resulted in a change in the accounting method applied. Since May 2018, Bayer has reported the Covestro interest as an equity instrument, with changes in its fair value recognized through profit and loss.

In 2018, the equity-method income of the Covestro Group amounted to €103 million (2017: €51 million), while its carrying amount was €0 (2017: €3,627 million).

17. Other financial assets

The other financial assets were comprised as follows:

B 17/1

Other Financial Assets

	Dec. 31, 2017		Dec. 31, 2018	
€ million	**Total**	**Of which current**	**Total**	**Of which current**
LaR[1]	1,718	1,501	–	–
AfS[1]	2,728	1,502	–	–
of which debt instruments	2,463	1,499	–	–
of which equity instruments	265	3	–	–
HtM[1]	57	15	–	–
AC[2]	–	–	430	285
FVTPL[2]	–	–	2,355	665
of which debt instruments	–	–	1,759	665
of which equity instruments	–	–	596	–
FVTOCI[2]	–	–	330	–
of which equity instruments (no recycling)	–	–	330	–
Receivables from derivatives	647	509	253	216
Receivables under lease agreements	13	2	10	–
Total	**5,163**	**3,529**	**3,378**	**1,166**

[1] Measurement category in accordance with IAS 39; applicable until December 31, 2017
AfS: available for sale; at fair value through other comprehensive income
HtM: held to maturity; at amortized cost
LaR: loans and receivables; at amortized cost
[2] Measurement category in accordance with IFRS 9; applicable as of January 1, 2018
AC: at amortized cost
FVTOCI: at fair value through other comprehensive income
FVTPL: at fair value through profit or loss

The AC category included €270 million (2017, LaR category: €1,390 million) in bank deposits. No material impairment losses were recognized for expected credit losses in 2018.

The debt instruments in the FVTPL category included capital of €643 million (2017, AfS category: €605 million) provided to Bayer-Pensionskasse VVaG (Bayer-Pensionskasse) for its effective initial fund, and jouissance right capital (Genussrechtskapital) of €152 million (2017, AfS category: €152 million), also provided to Bayer-Pensionskasse. Also reported in this category were investments of €598 million (2017, AfS category: €1,497 million) in money market funds.

The equity instruments in the FVTPL category comprised the interest in Covestro AG.

The equity instruments in the FVTOCI category comprised the following investments:

B 17/2

Equity Instruments Measured at Fair Value Through Other Comprehensive Income

Company name	Fair value as of Dec. 31, 2017[1]	Fair value as of Dec. 31, 2018
CRISPR Therapeutics AG, Switzerland	101	143
Innovative Seed Solutions LLC, U.S.A.	–	41
Flagship Ventures Fund V, L.P., U.S.A.	12	20
Medopad Ltd., U.K.	–	13
Hokusan Co. Ltd., Japan	6	12
Other investments	146	101
Total	**265**	**330**

[1] In 2017, equity instruments were recognized in the AfS category in accordance with IAS 39.

No material equity investments were deconsolidated in 2018 and no material dividends were received.

Further information on the accounting for receivables from derivatives is given in Note [27].

18. Inventories

Inventories were comprised as follows:

B 18/1

Inventories

€ million	Dec. 31, 2017	Dec. 31, 2018
Raw materials and supplies	1,761	2,541
Work in process, finished goods and goods purchased for resale	4,776	7,205
Rights of return	–	85
Advance payments	13	1,130
Total	**6,550**	**10,961**

Inventories increased by €4,411 million, mainly due to the acquisition of Monsanto.

Impairment losses recognized on inventories were reflected in the cost of goods sold. They were comprised as follows:

B 18/2

Impairments of Inventories

€ million	2017	2018
Accumulated impairment losses, January 1	**(416)**	**(331)**
Divestments/changes in the scope of consolidation	13	–
Impairment losses in the reporting period	(235)	(240)
Impairment loss reversals or utilization	261	321
Exchange differences	45	24
Transfers (IFRS 5)	1	95
Accumulated impairment losses, December 31	**(331)**	**(131)**

19. Trade accounts receivable

Trade accounts receivable less impairment losses amounted to €11,836 million (2017: €8,582 million) on the closing date and were comprised as follows: This increase was attributable to the acquired Monsanto business. There are significant concentrations in the following regions and countries:

B 19/1

Trade Accounts Receivable

€ million	2017	2018
North America	1,379	3,248
of which U.S.A.	1,291	3,066
Europe/Middle East/Africa	3,488	3,764
of which Germany	1,365	1,202
Asia/Pacific	1,648	2,054
Latin America	2,492	3,413
of which Brazil	1,668	1,952
Trade accounts receivable (before impairments)	**9,007**	**12,479**
Accumulated impairment losses	(425)	(643)
Carrying amount, December 31	8,582	11,836
of which noncurrent	97	665

Noncurrent trade accounts receivable comprised receivables of €540 million in connection with rights to use technologies that were outlicensed to a customer acquired through the acquisition of Monsanto. Beyond this, there are no material concentrations of individual customers.

The gross carrying amounts of trade accounts receivable were broken down as follows:

B 19/2

Trade Accounts Receivable – Gross Carrying Amounts

€ million	Trade accounts receivable for which lifetime expected credit losses are calculated (collectively assessed)	Trade accounts receivable that are credit-impaired	Total
Gross carrying amounts as of January 1, 2018	**8,209**	**798**	**9,007**
Changes resulting from trade accounts receivable recognized, derecognized or written-off in the reporting period	(1,714)	(535)	(2,249)
Transfer to credit-impaired trade accounts receivable	(367)	367	–
Other changes:			
From acquisitions/divestments	6,015	16	6,031
From exchange differences	(276)	(34)	(310)
Gross carrying amounts as of December 31, 2018	**11,867**	**612**	**12,479**

Credit losses on trade accounts receivable were as follows:

B 19/3

Trade Accounts Receivable – Loss Allowances

€ million	Lifetime expected credit losses (collectively assessed)	Trade accounts receivable that are credit-impaired	Total
Loss allowances as of January 1, 2018	**113**	**405**	**518**
Changes resulting from loss allowances newly recognized or derecognized in the reporting period and additions/reductions to existing loss allowances	23	78	101
Changes due to write-offs		(27)	(27)
Transfer to loss allowances for credit-impaired trade accounts receivable	(106)	106	–
Other changes:			
From changes in the scope of consolidation	101	16	117
From exchange differences	(19)	(47)	(66)
Loss allowances as of December 31, 2018	**112**	**531**	**643**

Receivables from government health service institutions, especially in Greece, Italy, Portugal and Spain, are under special observation in view of the government debt crisis. Although there were no material defaults on such receivables in 2018 or 2017, it is possible that future developments in these countries could result in payment delays and/or defaults. This could necessitate the recognition of impairment losses due to new occurrences. Trade accounts receivable from government health service institutions in the above countries at the end of 2018 totaled €103 million (2017: €102 million).

An excess-of-loss policy exists for the Pharmaceuticals, Consumer Health and Animal Health segments as part of a global credit insurance program. More than 80% of the receivables of these segments are insured up to a maximum total annual compensation payment of €150 million (2017: €150 million). A global excess-of-loss policy is in place for the Crop Science segment (excluding the newly acquired Monsanto business). In this global credit insurance program, more than 80% of this segment's receivables are insured up to a maximum total annual compensation payment of €300 million (2017: €300 million). Local credit insurance contracts are in place in certain countries for the newly acquired Monsanto business.

A further €992 million (2017: €696 million) of receivables was secured by advance payments, letters of credit or guarantees or by liens on land, buildings or harvest yields.

20. Other receivables

Other receivables were comprised as follows:

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Other Receivables

	Dec. 31, 2017		Dec. 31, 2018	
€ million	**Total**	**Of which current**	**Total**	**Of which current**
Other tax receivables	554	541	794	734
Deferred charges	298	192	390	344
Reimbursement claims	85	71	84	80
Net defined benefit asset	36	–	84	–
Receivables from employees	47	46	46	46
Miscellaneous receivables	656	426	988	671
Total	**1,676**	**1,276**	**2,386**	**1,875**

Other receivables are stated net of impairment losses of €71 million (2017: €70 million), of which €66 million related to tax reimbursement claims that were impaired in 2018. The prior-year figure included an impairment loss recognized on a receivable in the amount of €67 million from the Venezuelan exchange control authority reflecting the right to receive U.S. dollars at a preferential rate.

21. Equity

The foremost objectives of our financial management are to help bring about a sustained increase in Bayer's value for the benefit of all stakeholders and to ensure the Group's creditworthiness and liquidity. The pursuit of these goals means reducing our cost of capital, optimizing our capital structure, improving our financing cash flow and effectively managing risk.

Due to the acquisition of Monsanto, the contracted rating agencies have adjusted their ratings and now assess Bayer as follows: S & P Global gives Bayer a long-term rating of BBB and a short-term rating of A-2 with stable outlook. Moody's gives a Baa1 / P-2 with negative outlook and Fitch an A- / F2 with stable outlook. These investment grade ratings from all three agencies reflect the company's high solvency and ensure access to a broad investor base for financing purposes. Our stated aim is to also achieve the single "A" rating category in the long term from S & P Global Ratings and Moody's.

Apart from utilizing cash inflows from our operating business to reduce net financial debt, we are implementing our financial strategy by way of vehicles such as the subordinated hybrid bonds issued in July 2014 and April 2015, the mandatory convertible notes issued in November 2016, the authorized and conditional capital, and a potential share buyback program.

On April 16, 2018, the Republic of Singapore subscribed to 31 million new Bayer shares through a subsidiary, at an issue price close to market prices (for total gross proceeds of €3.0 billion). This corresponded to around 3.6% of the capital stock as of the acquisition date. The transaction increased Temasek's interest in Bayer AG to approximately 4%. This capital increase against cash contributions excluded the subscription rights of existing shareholders.

On June 3, 2018, with the consent of the Supervisory Board, the Board of Management of Bayer AG resolved to execute a capital increase out of authorized capital against cash contributions and with subscription rights for existing Bayer stockholders. For this purpose, Bayer issued 74,604,156 new registered (no-par value) shares with an entitlement to dividends as of January 1, 2018.

For every 23 Bayer shares they held, stockholders were able to acquire two new shares at a subscription price of €81.00 per new share by way of indirect subscription rights. This option was exercised for 73,343,177 shares. The 1,261,039 shares not subscribed to were purchased by institutional investors at an average placement price of €96.6437 per share under a private placement. After deducting transaction costs, net proceeds totaled €6 billion.

Together with the mandatory convertible notes issued in November 2016, the two capital increases completed the equity component, announced in September 2016, to finance the acquisition of Monsanto.

Capital stock

The capital stock of Bayer AG on December 31, 2018, amounted to €2,387 million (2017: €2,117 million), divided into 932,551,964 (2017: 826,947,808) registered no-par shares, and was fully paid in. Each no-par share confers one voting right.

Authorized and conditional capital

The authorized and conditional capital was comprised as follows:

B 21/1

Authorized and Conditional Capital

Capital	Resolution	Amount / shares	Expires	Purpose
Authorized capital I	April 29, 2014	€530 million	April 28, 2019	Increase the capital stock by issuing new no-par shares against cash contributions and / or contributions in kind, the latter not to exceed €423 million
Authorized capital II	April 29, 2014	€212 million	April 28, 2019	Increase the capital stock by issuing new no-par shares against cash contributions
Conditional capital	April 29, 2014	€212 million / up to 82,694,750 no-par shares	April 28, 2019	Increase the capital stock by granting no-par shares to the holders of bonds with warrants or convertible notes, profit participation certificates or income bonds; the authorizations to issue such instruments are limited to a total nominal amount of €6 billion.

Capital increases are effected by issuing new, registered no-par shares. Stockholders must normally be granted subscription rights. However, subscription rights may be excluded under certain conditions stated in the authorization resolution. Absent a further resolution by the Annual Stockholders' Meeting on the exclusion of stockholders' subscription rights, the Board of Management will only use the existing authorizations to increase the capital stock out of the authorized capital or the conditional capital – while excluding stockholders' subscription rights – up to a total amount of 20% of the capital stock that existed when the respective resolutions were adopted by the Annual Stockholders' Meeting on April 29, 2014. All issuances or sales of no-par shares or of bonds with warrants or conversion rights or obligations that are effected while excluding stockholders' subscription rights also count toward this 20% limit. Details of the authorized and conditional capital are provided in the Notice of the Annual Stockholders' Meeting of April 29, 2014, and on the Bayer website.

The capital increase resolved on June 3, 2018, and implemented thereafter entailed the utilization of €191 million out of authorized capital I. The amount of authorized capital I still available as of December 31, 2018, was therefore €339 million.

The capital increase implemented on April 16, 2018, resulted in the utilization of €79 million out of authorized capital II. The amount of authorized capital II still available as of December 31, 2018, was therefore €133 million.

On November 22, 2016, Bayer placed mandatory convertible notes in the amount of €4.0 billion without granting subscription rights to existing stockholders of the company. The notes, denominated in units of €100,000, were issued by Bayer Capital Corporation B.V., Netherlands, under the subordinated guarantee of Bayer AG. At maturity, the outstanding amount of the notes will be mandatorily converted into registered no-par shares of Bayer AG. The proceeds were the subject of an intra-Group transfer to Bayer AG. The mandatory convertible notes are reflected in payables to subsidiaries until maturity. The issuance of the mandatory convertible notes constituted a utilization of conditional capital.

Accumulated comprehensive income

Accumulated comprehensive income comprises retained earnings and accumulated other comprehensive income. The retained earnings comprise prior years' undistributed income of consolidated companies and all remeasurements of the net defined benefit liability for pension or other post-employment benefits that are recognized outside profit or loss. The accumulated other comprehensive income comprises exchange differences, the changes in fair values of cash flow hedges and equity instruments (until 2017: changes in fair values of available-for-sale financial assets), the revaluation surplus and reserves for the change in the company's own credit risk. In 2018, an amount of €4 million (2017: €4 million) corresponding to the annual amortization/depreciation of the respective assets was transferred from the revaluation surplus to retained earnings.

Dividend

Under the German Stock Corporation Act (AktG), the dividend payment is determined by the distributable profit reported in the annual financial statements of Bayer AG, which are prepared according to the German Commercial Code. Retained earnings were diminished by payment of the dividend of €2.80 per share for 2017. The proposed dividend for the 2018 fiscal year is €2.80 per share, which – based on the current number of shares – would result in a total dividend payment of €2,611 million. Payment of the proposed dividend is contingent upon approval by the stockholders at the Annual Stockholders' Meeting and therefore is not recognized as a liability in the consolidated financial statements.

Equity attributable to non-controlling interest

The changes in noncontrolling interest in equity during 2017 and 2018 are shown in the following table:

B 21/2

Changes in Noncontrolling Interest in Equity

€ million	2017	2018
January 1	**1,564**	**60**
Changes in equity not recognized in profit or loss		
Remeasurements of the net liability under defined benefit pension plans	49	(1)
Changes in fair value of cash flow hedges	–	–
Changes in fair value of securities	–	–
Exchange differences on translation of operations outside the eurozone	(155)	(7)
Other changes in equity	(2,025)	108
Dividend payments	(131)	(5)
Income after income taxes	**758**	**16**
December 31	**60**	**171**

As of December 31, 2018, there were two principal subsidiaries with third-party noncontrolling interest holders: Bayer CropScience Limited, India, where the interest and share of voting rights attributable to noncontrolling interest amounted to 31.3% as of December 31, 2018 (December 31, 2017: 31.3%), and the equity attributable to this noncontrolling interest stood at €42 million (2017: €52 million); and Monsanto India Ltd, India, where the interest and share of voting rights attributable to noncontrolling interest amounted to 20.6% as of December 31, 2018, and the equity attributable to this noncontrolling interest stood at €121 million.

22. Provisions for pensions and other post-employment benefits

Provisions were established for defined benefit obligations pertaining to pensions and other post-employment benefits. The net liability was accounted for as follows:

B 22/1

Net Defined Benefit Liability Reflected in the Statement of Financial Position

	Pensions		Other post-employment benefits		Total	
€ million	Dec. 31, 2017	Dec. 31, 2018	Dec. 31, 2017	Dec. 31, 2018	Dec. 31, 2017	Dec. 31, 2018
Provisions for pensions and other post-employment benefits (net liability)	**7,798**	**8,445**	**222**	**272**	**8,020**	**8,717**
of which Germany	6,778	7,215	–	–	6,778	7,215
of which other countries	1,020	1,230	222	272	1,242	1,502
Net defined benefit asset	**36**	**83**	**–**	**1**	**36**	**84**
of which Germany	22	23	–	–	22	23
of which other countries	14	60	–	1	14	61
Net defined benefit liability	**7,762**	**8,362**	**222**	**271**	**7,984**	**8,633**
of which Germany	6,756	7,192	–	–	6,756	7,192
of which other countries	1,006	1,170	222	271	1,228	1,441

Provisions for pensions and other post-employment benefits in the amount of €389 million were assumed in connection with the acquisition of Monsanto.

The expenses for defined benefit plans for pensions and other post-employment benefits comprised the following components:

B 22/2

Expenses for Defined Benefit Plans

	Pension plans						Other post-employment benefit plans	
	Germany		Other countries		Total		Other countries	
€ million	2017	2018	2017	2018	2017	2018	2017	2018
Current service cost	312	295	93	132	405	427	13	13
Past service cost	20	11	(3)	(22)	17	(11)	(2)	(6)
of which plan curtailments	–	–	(2)	(48)	(2)	(48)	(2)	(6)
Plan settlements	–	–	8	–	8	–	–	–
Plan administration cost paid out of plan assets	3	3	1	3	4	6	–	–
Net interest	135	124	43	30	178	154	13	14
Total	**470**	**433**	**142**	**143**	**612**	**576**	**24**	**21**

In addition, a total of minus €612 million (2017: €1,236 million) in effects of remeasurements of the net defined benefit liability was recognized in 2018 outside profit or loss. Of this amount, minus €654 million (2017: €1,223 million) related to pension obligations, €34 million (2017: €1 million) to other post-employment benefit obligations, and €8 million (2017: €12 million) to the effects of the asset ceiling. The plan curtailments totaling €54 million (2017: €2 million) were primarily effected in the United States, where they mainly pertained to a former Monsanto plan.

The net defined benefit liability developed as follows:

B 22/3

Changes in Net Defined Benefit Liability

€ million	Defined benefit obligation	Fair value of plan assets	Effects of the asset ceiling	Net defined benefit liability
Germany				
January 1, 2018	**(17,837)**	**11,081**	**–**	**(6,756)**
Acquisitions	(18)	–	–	(18)
Divestments/changes in the scope of consolidation	–	–	–	–
Current service cost	(295)			(295)
Past service cost	(11)			(11)
Net interest	(333)	209	–	(124)
Net actuarial gain/(loss)	(62)			(62)
of which due to changes in financial parameters	175			175
of which due to changes in demographic parameters	(232)			(232)
of which due to experience adjustments	(5)			(5)
Return on plan assets excluding amounts recognized as interest income		(498)		(498)
Employer contributions		141		141
Employee contributions	(35)	35		–
Payments due to plan settlements	(53)	38		(15)
Benefits paid out of plan assets	201	(201)		–
Benefits paid by the company	424			424
Plan administration cost paid from plan assets		(3)		(3)
Reclassification to current assets/liabilities held for sale	71	(46)		25
December 31, 2018	**(17,948)**	**10,756**	**–**	**(7,192)**
Other countries				
January 1, 2018	**(6,655)**	**5,458**	**(31)**	**(1,228)**
Acquisitions	(2,384)	2,192		(192)
Divestments/changes in the scope of consolidation	–	–		–
Current service cost	(145)			(145)
Past service cost	28			28
Gains/(losses) from plan settlements	–			–
Net interest	(251)	210	(3)	(44)
Net actuarial gain/(loss)	423			423
of which due to changes in financial parameters	448			448
of which due to changes in demographic parameters	42			42
of which due to experience adjustments	(67)			(67)
Return on plan assets excluding amounts recognized as interest income		(483)		(483)
Remeasurement of asset ceiling			8	8
Employer contributions		75		75
Employee contributions	(15)	15		–
Payments due to plan settlements	(87)	65		(22)
Benefits paid out of plan assets	350	(350)		–
Benefits paid by the company	148			148
Plan administration costs paid out of plan assets		(3)		(3)
Reclassification to current assets/liabilities held for sale	145	(79)	–	66
Exchange differences	(178)	103	3	(72)
December 31, 2018	**(8,621)**	**7,203**	**(23)**	**(1,441)**
of which other post-employment benefits	(700)	429	–	(271)
Total, December 31, 2018	**(26,569)**	**17,959**	**(23)**	**(8,633)**

B 22/4

Changes in Net Defined Benefit Liability (Previous Year)

€ million	Defined benefit obligation	Fair value of plan assets	Effects of the asset ceiling	Net defined benefit liability
Germany				
January 1, 2017	**(20,962)**	**11,809**	**–**	**(9,153)**
Acquisitions	–	–	–	–
Divestments/changes in the scope of consolidation	3,021	(2,075)	–	946
Current service cost	(368)			(368)
Past service cost	(32)			(32)
Net interest	(358)	208	–	(150)
Net actuarial gain/(loss)	206			206
of which due to changes in financial parameters	180			180
of which due to changes in demographic parameters	(1)			(1)
of which due to experience adjustments	27			27
Return on plan assets excluding amounts recognized as interest income		755		755
Employer contributions		593		593
Employee contributions	(39)	39		–
Payments due to plan settlements	–	–		–
Benefits paid out of plan assets	216	(216)		–
Benefits paid by the company	441			441
Plan administration cost paid from plan assets		(3)		(3)
Reclassification to current assets/liabilities held for sale	38	(29)		9
December 31, 2017	**(17,837)**	**11,081**	**–**	**(6,756)**
Other countries				
January 1, 2017	**(8,033)**	**6,127**	**(49)**	**(1,955)**
Acquisitions	–	–	–	–
Divestments/changes in the scope of consolidation	840	(589)	3	254
Current service cost	(109)			(109)
Past service cost	8			8
Gains/(losses) from plan settlements	(8)			(8)
Net interest	(244)	183	(3)	(64)
Net actuarial gain/(loss)	(166)			(166)
of which due to changes in financial parameters	(191)			(191)
of which due to changes in demographic parameters	21			21
of which due to experience adjustments	4			4
Return on plan assets excluding amounts recognized as interest income		429		429
Remeasurement of asset ceiling			12	12
Employer contributions		125		125
Employee contributions	(14)	14		–
Payments due to plan settlements	32	(41)		(9)
Benefits paid out of plan assets	300	(300)		–
Benefits paid by the company	94			94
Plan administration costs paid out of plan assets		(1)		(1)
Reclassification to current assets/liabilities held for sale	10	(8)	–	2
Exchange differences	635	(481)	6	160
December 31, 2017	**(6,655)**	**5,458**	**(31)**	**(1,228)**
of which other post-employment benefits	(671)	449		(222)
Total, December 31, 2017	**(24,492)**	**16,539**	**(31)**	**(7,984)**

Covestro is included in the net defined benefit liability.

The benefit obligations pertained mainly to Germany (68%; 2017: 73%), the United States (19%; 2017: 12%) and the United Kingdom (7%; 2017: 8%). In Germany, current employees accounted for about 43% (2017: 43%), retirees or their surviving dependents for about 50% (2017: 50%) and former employees with vested pension rights for about 7% (2017: 7%) of entitlements under defined benefit plans. In the United

States, current employees accounted for about 30% (2017: 21%), retirees or their surviving dependents for about 56% (2017: 65%) and former employees with vested pension rights for about 14% (2017: 14%) of entitlements under defined benefit plans.

The actual return on the assets of defined benefit plans for pensions or other post-employment benefits amounted to minus €537 million (2017: €1,517 million) and minus €24 million (2017: €58 million), respectively.

The following table shows the defined benefit obligations for pensions and other post-employment benefits along with the funded status of the funded obligations.

B 22/5

Defined Benefit Obligation and Funded Status

	Pension obligation		Other post-employment benefit obligation		Total	
€ million	2017	2018	2017	2018	2017	2018
Defined benefit obligation	**23,821**	**25,869**	**671**	**700**	**24,492**	**26,569**
of which unfunded	1,117	1,244	64	136	1,181	1,380
of which funded	22,704	24,625	607	564	23,311	25,189
Funded status of funded obligations						
Overfunding	67	106	–	1	67	107
Underfunding	6,681	7,196	158	136	6,839	7,332

Pension and other post-employment benefit obligations

Group companies provide retirement benefits for most of their employees, either directly or by contributing to privately or publicly administered funds. The benefits vary depending on the legal, fiscal and economic conditions of each country. The obligations relate both to existing retirees' pensions and to pension entitlements of future retirees.

Bayer has set up funded pension plans for its employees in various countries. The most appropriate investment strategy is determined for each defined benefit pension plan based on the risk structure of the obligations (especially demographics, the current funded status, the structure of the expected future cash flows, interest sensitivity, biometric risks, etc.), the regulatory environment and the existing level of risk tolerance or risk capacity. A strategic target investment portfolio is then developed in line with the plan's risk structure, taking capital market factors into consideration. Further determinants are risk diversification, portfolio efficiency and the need for both a country-specific and a global risk/return profile centered on ensuring the payment of all future benefits. As the capital investment strategy for each pension plan is developed individually in light of the plan-specific conditions listed above, the investment strategies for different pension plans may vary considerably. The investment strategies are generally aligned less toward maximizing absolute returns and more toward the maximum probability of being able to finance pension commitments over the long term. For pension plans, stress scenarios are simulated and other risk analyses (such as value at risk) undertaken with the aid of risk management systems.

Bayer-Pensionskasse VVaG (Bayer-Pensionskasse), Leverkusen, Germany, is by far the most significant of the pension plans. It has been closed to new members since 2005. This legally independent fund is regarded as a life insurance company and therefore is subject to the German Insurance Supervision Act. The benefit obligations covered by Bayer-Pensionskasse comprise retirement, surviving dependents' and disability pensions. It constitutes a multi-employer plan, to which the active members and their employers contribute. The company contribution is a certain percentage of the employee contribution. This percentage is the same for all participating employers, including those outside the Bayer Group, and is set by agreement between the plan's executive committee and its supervisory board, acting on a proposal from the responsible actuary. It takes into account the differences between the actuarial estimates and the actual values for the factors used to determine liabilities and contributions. Bayer may also adjust the company contribution in agreement with the plan's executive committee and its supervisory board, acting on a proposal from the responsible actuary. The plan's liability is governed by Section 1, Paragraph 1, Sentence 3 of the German Law on the Improvement of Occupational Pensions. This means that if the pension plan exercises its right under the articles of association to reduce benefits, each participating employer has to make up the resulting difference. Bayer is not liable for the obligations of participating employers outside the Bayer Group, even if they cease to participate in the plan.

Pension entitlements for people who joined Bayer in Germany in 2005 or later are granted via Rheinische Pensionskasse VVaG, Leverkusen. Future pension payments from this plan are based on contributions and the return on plan assets; a guaranteed interest rate applies.

Another important pension provision vehicle is Bayer Pension Trust e. V. (BPT). This covers further retirement provision arrangements of the Bayer Group, such as deferred compensation, pension obligations previously administered by Schering Altersversorgung Treuhand e. V., and components of other direct commitments.

The defined benefit pension plans in the United States are frozen and no significant new entitlements can be earned under these plans. The assets of all the U.S. pension plans are held within master trusts for reasons of efficiency. The applicable regulatory framework is based on the Employee Retirement Income Security Act (ERISA), which includes a statutory 80% minimum funding requirement to avoid benefit restrictions. The actuarial risks, such as investment risk, interest-rate risk and longevity risk, remain with the company. The defined benefit pension plans in the United Kingdom have been closed to new members for some years. Plan assets in the U.K. are administered by independent trustees, who are legally obligated to act solely in the interests of the beneficiaries. A technical assessment is performed every three years in line with U.K. regulations. This serves as the basis for developing a plan to cover any potential financing requirements. Here, too, the actuarial risks remain with the company.

The other post-employment benefit obligations outside Germany mainly comprised health care benefit payments for retirees in the United States.

The fair value of the plan assets to cover pension and other post-employment benefit obligations was as follows:

B 22/6

Fair Value of Plan Assets as of December 31

	Pension obligations				Other post-employment benefit obligations	
	Germany		Other countries		Other countries	
€ million	2017	2018	2017	2018	2017	2018
Plan assets based on quoted prices in active markets						
Real estate and special real estate funds	–	–	181	214	16	15
Equities and equity funds	3,617	1,988	1,739	2,443	158	146
Callable debt instruments	–	–	27	27	–	–
Noncallable debt instruments	–	–	602	565	127	124
Bond funds	3,737	4,777	1,631	2,592	94	93
Derivatives	11	10	–	3	–	–
Cash and cash equivalents	164	611	74	77	13	9
Other	–	–	–	25	–	–
	7,529	**7,386**	**4,254**	**5,946**	**408**	**387**
Plan assets for which quoted prices in active markets are not available						
Real estate and special real estate funds	496	514	179	296	–	–
Equities and equity funds	121	143	71	69	–	–
Callable debt instruments	1,399	1,241	–	–	–	–
Noncallable debt instruments	1,394	1,366	–	–	–	–
Bond funds	–	–	74	73	–	–
Derivatives	–	–	–	–	–	–
Other	142	106	431	390	41	42
	3,552	**3,370**	**755**	**828**	**41**	**42**
Total plan assets	**11,081**	**10,756**	**5,009**	**6,774**	**449**	**429**

The fair value of plan assets in Germany included real estate leased by Group companies, recognized at a fair value of €82 million (2017: €82 million), and Bayer AG shares and bonds held through investment funds, recognized at their fair values of €21 million (2017: €37 million) and €6 million (2017: €3 million), respectively.

In May 2018, Bayer AG acquired 6.8% of Covestro shares from Bayer Pension Trust e. V. (BPT) at market value for a total amount of €1.1 billion to service the exchangeable bond that matures in 2020.

In 2018, Bayer AG did not deposit any additional shares it held in Covestro AG with BPT (2017: 8 million). The market value of BPT's total shareholding in Covestro AG amounted to €0 million as of December 31, 2018 (2017: €1,549 million).

The other plan assets comprised mortgage loans granted, other receivables and qualified insurance policies.

Risks

The risks from defined benefit plans arise partly from the defined benefit obligations and partly from the investment in plan assets. These risks include the possibility that additional contributions will have to be made to plan assets in order to meet current and future pension obligations, and negative effects on provisions and equity.

Demographic / biometric risks

Since a large proportion of the defined benefit obligations comprises lifelong pensions or surviving dependents' pensions, longer claim periods or earlier claims may result in higher benefit obligations, higher benefit expense and / or higher pension payments than previously anticipated.

Investment risks

If the actual return on plan assets were below the return anticipated on the basis of the discount rate, the net defined benefit liability would increase, assuming there were no changes in other parameters. This could happen as a result of a drop in share prices, increases in market rates of interest, default of individual debtors or the purchase of low-risk but low-interest bonds, for example.

Interest-rate risk

A decline in capital market interest rates, especially for high-quality corporate bonds, would increase the defined benefit obligation. This effect would be at least partially offset by the ensuing increase in the market values of the debt instruments held.

Measurement parameters and their sensitivities

The following weighted parameters were used to measure the obligations for pensions and other post-employment benefits as of December 31 of the respective year:

B 22/7

Parameters for Benefit Obligations

	Germany		Other countries		Total	
%	2017	2018	2017	2018	2017	2018
Pension obligations						
Discount rate	1.90	1.90	2.95	3.55	2.15	2.40
of which U.S.A.			3.40	4.20	3.40	4.20
of which U.K.			2.50	2.80	2.50	2.80
Projected future salary increases	2.75	2.75	3.60	3.65	2.95	3.00
Projected future benefit increases	1.70	1.60	3.25	3.05	2.10	2.05
Other post-employment benefit obligations						
Discount rate	–	–	4.25	4.85	4.25	4.85

In Germany the Heubeck RT 2018 G mortality tables were used, in the United States the RP-2014 Mortality Tables, and in the United Kingdom 95% of S1NXA.

In Germany, the RT 2005 G tables had been used in previous years. However, we switched to the new RT 2018 G tables when they were published as we believe that the resulting measurement reflects the economic impact on the respective closing date more accurately than measurement based on the RT 2005 G tables. If we had not switched to the RT 2018 G tables, provisions would have been €232 million lower.

Until May 2018, we applied the Macaulay Duration method when determining the discount rate for measuring pension obligations. However, Bayer decided to switch to the uniform discount rate method in June 2018 because it is used more frequently in the market and is mathematically superior. As of December 31, 2018, both methods resulted in a discount rate of 1.90%.

The following weighted parameters were used to measure the expense for pension and other post-employment benefits in the respective year:

B 22/8

Parameters for Benefit Expense

	Germany		Other countries		Total	
%	2017	2018	2017	2018	2017	2018
Pension obligations						
Discount rate	1.80	1.90	3.25	2.95	2.15	2.15
Projected future salary increases	2.75	2.75	3.50	3.60	2.95	2.95
Projected future benefit increases	1.50	1.70	3.35	3.25	1.95	2.10
Other post-employment benefit obligations						
Discount rate	–	–	4.35	4.25	4.35	4.25

The parameter sensitivities were computed by expert actuaries based on a detailed evaluation similar to that performed to obtain the data presented in Table B 22/3. Altering individual parameters by 0.5 percentage points (mortality by 10% per beneficiary) while leaving the other parameters unchanged would have impacted pension and other post-employment benefit obligations as of year-end 2018 as follows:

B 22/9

Sensitivity of Benefit Obligations

	Germany		Other countries		Total	
€ million	Increase	Decrease	Increase	Decrease	Increase	Decrease
Pension obligations						
0.5%-pt. change in discount rate	(1,408)	1,608	(479)	536	(1,887)	2,144
0.5%-pt. change in projected future salary increases	81	(76)	42	(40)	123	(116)
0.5%-pt. change in projected future benefit increases	903	(825)	132	(101)	1,035	(926)
10% change in mortality	(584)	658	(197)	203	(781)	861
Other post-employment benefit obligations						
0.5%-pt. change in discount rate	–	–	(33)	36	(33)	36
10% change in mortality	–	–	(18)	20	(18)	20

B 22/10

Sensitivity of Benefit Obligations (prior year)

	Germany		Other countries		Total	
€ million	Increase	Decrease	Increase	Decrease	Increase	Decrease
Pension obligations						
0.5%-pt. change in discount rate	(1,417)	1,620	(414)	468	(1,831)	2,088
0.5%-pt. change in projected future salary increases	87	(82)	50	(47)	137	(129)
0.5%-pt. change in projected future benefit increases	921	(841)	146	(110)	1,067	(951)
10% change in mortality	(587)	660	(172)	176	(759)	836
Other post-employment benefit obligations						
0.5%-pt. change in discount rate	–	–	(36)	39	(36)	39
10% change in mortality	–	–	(20)	22	(20)	22

Provisions are also established for the obligations, mainly of U.S. subsidiaries, to provide post-employment benefits in the form of health care cost payments for retirees. The valuation of health care costs was based on the assumption that they will increase at a rate of 6.3% (2017: 6.5%), which should gradually decline to 5.0% by 2023 (assumption in 2017: gradually decline to 5.0% by 2023). The following table shows the impact on other post-employment benefit obligations and total benefit expense of a one-percentage-point change in the assumed cost increase rates:

B 22/11

Sensitivity to Health Care Cost Increases

	Increase of one percentage point		Decrease of one percentage point	
€ million	**2017**	**2018**	**2017**	**2018**
Impact on other post-employment benefit obligations	55	47	(47)	(41)
Impact on benefit expense	3	3	(3)	(2)

Payments made and expected future payments

The following payments or asset contributions correspond to the employer contributions made or expected to be made to funded benefit plans:

B 22/12

Employer Contributions Paid or Expected

	Germany			Other countries		
€ million	**2017**	**2018**	**2019 expected**	**2017**	**2018**	**2019 expected**
Pension obligations	593	141	132	146	90	79
Other post-employment benefit obligations	–	–	–	(21)	(15)	2
Total	**593**	**141**	**132**	**125**	**75**	**81**

Bayer has currently committed to make deficit contributions for its U.K. pension plans of approximately GBP27 million annually through 2023. For its U.S. pension plans, Bayer made payments of US$50 million in 2018 and expects to make zero or only minor payments in 2019 as most are closed and frozen.

Pensions and other post-employment benefits payable in the future from funded and unfunded plans are estimated as follows:

B 22/13

Future Benefit Payments

	Payments out of plan assets				Payments by the company			
	Pensions		Other post-employment benefits		Pensions		Other post-employment benefits	
€ million	**Germany**	**Other countries**	**Other countries**	**Total**	**Germany**	**Other countries**	**Other countries**	**Total**
2019	206	418	24	648	443	140	28	611
2020	209	423	23	655	444	109	27	580
2021	213	433	25	671	450	93	26	569
2022	217	439	26	682	456	96	25	577
2023	222	436	26	684	460	97	26	583
2024–2028	1,172	2,184	139	3,495	2,340	502	140	2,982

The weighted average term of the pension obligations is 17.0 years (2017: 17.0 years) in Germany and 12.8 years (2017: 13.8 years) in other countries. The weighted average term of the obligations for other post-employment benefits in other countries is 10.5 years (2017: 11.5 years).

23. Other provisions

Changes in the various provision categories in 2018 were as follows:

B 23/1

Changes in Other Provisions

€ million	Other Taxes	Environ-mental protec-tion	Restruc-turing	Trade-related commit-ments	Litigations	Personnel commit-ments	Miscella-neous	Total
December 31, 2017	**29**	**243**	**171**	**2,481**	**393**	**2,038**	**355**	**5,710**
Reclassification to refund liabilities	–	–	–	(2,427)	–	–	–	(2,427)
Reclassification to inventories	–	–	–	76	–	–	–	76
Acquisitions	–	480	33	275	596	258	339	1,981
Additions	21	57	720	732	661	2,553	626	5,370
Utilization	(7)	(41)	(122)	(524)	(228)	(1,803)	(168)	(2,893)
Reversal	(6)	(6)	(30)	(108)	(25)	(551)	(108)	(834)
Reclassification to current liabilities	–	–	(1)	–	–	(14)	–	(15)
Interest cost	–	6	–	–	4	3	3	16
Exchange differences	(2)	15	2	6	13	13	2	49
December 31, 2018	**35**	**754**	**773**	**511**	**1,414**	**2,497**	**1,049**	**7,033**
of which current	15	88	230	499	445	1,765	644	3,686

The provisions were partly offset by claims for refunds in the amount of €74 million (2017: €74 million), which were recognized as receivables. These claims predominantly related to product liability.

Restructuring

Provisions for restructuring included €691 million (2017: €116 million) for severance payments and €82 million (2017: €55 million) for other restructuring expenses, which mainly comprised other costs related to the closure of research or production facilities. The breakdown of provisions by segment was as follows: €351 million at Pharmaceuticals (2017: €45 million), €57 million at Consumer Health (2017: €33 million), €240 million at Crop Science (2017: €73 million), €6 million at Animal Health (2017: €6 million) and €119 million at Corporate Functions/All Other Segments (2017: €14 million).

In connection with an extensive restructuring program, provisions were established in almost all segments in 2018. The aim of this program is to strengthen Bayer's core businesses, adjust structures and enhance productivity and profitability by implementing a series of measures through 2022. Provisions were established in 2018 for programs that have been communicated in sufficient detail. Further provisions are anticipated for 2019.

In the Pharmaceuticals segment, provisions were primarily established in view of the planned reorganization of R&D. By integrating research and development into a joint organization, Bayer is looking to enhance value and productivity within the Pharmaceuticals portfolio.

Provisions were also established for the hemophilia business. Due to a significant increase in competition, the factor VIII facility in Wuppertal will not be utilized and the production of all recombinant factor VIII products will in the future be focused in Berkeley, California, United States, where work has already begun on the corresponding restructuring measures for our biotechnology products to enhance production process efficiency.

At Consumer Health, a comprehensive restructuring program called "Fit to Win" was launched to make this segment a market leader by driving the transformation in the health care industry and creating a more agile and faster organization with fewer decision-making levels.

In the Crop Science segment, provisions were established in connection with the restructuring of the distribution organization and the crop protection business in France. In Germany, the focus was on organizational adjustments due to the integration of Monsanto. The restructuring measures implemented in previous years at the Institute site in West Virginia, United States, in connection with the termination of thiodicarb production have for the most part been completed.

Appropriate accounting measures were also taken in the Corporate Functions segment in connection with planned restructuring as part of the integration of Monsanto.

Litigations

The legal risks currently considered to be material, and their development, are described in Note [29].

Personnel commitments

Stock-based compensation programs

Bayer offers stock-based compensation programs collectively to different groups of employees. As required by IFRS 2 (Share-based Payment) for compensation systems involving cash settlement, awards to be made under the stock-based programs are covered by provisions in the amount of the fair value of the obligations existing as of the date of the financial statements vis-à-vis the respective employee group. All resulting valuation adjustments are recognized in profit or loss.

The following table shows the changes in provisions for the various programs:

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Changes in Provisions for Stock-Based Compensation Programs

€ million	Aspire I	Aspire II	Aspire 2.0	Total
December 31, 2017	**6**	**35**	**263**	**304**
Acquisitions/divestments	–	–	–	–
Additions	20	42	279	341
Utilization	(5)	(29)	(8)	(42)
Reversal	(22)	(48)	(254)	(324)
Exchange differences	1	–	9	10
December 31, 2018	**–**	**–**	**289**	**289**

The value of the Aspire tranches that were fully earned at the end of 2018 amounted to €0 million (2017: €34 million). As such, no payment was made in January 2019.

The net expense for all stock-based compensation programs was €21 million (2017: €194 million), including €5 million (2017: €5 million) for the BayShare stock participation program and income of €1 million (2017: expense of €1 million) pertaining to grants of virtual Bayer shares. See Note [27.3] for information on the hedging of obligations under stock-based employee compensation programs.

The fair value of the obligations under the Aspire I and Aspire II programs was calculated using the Monte Carlo simulation method based on the following key parameters:

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Parameters for Monte Carlo Simulation

	2017	2018
Dividend yield	2.46%	3.60%
Risk-free interest rate	(0.35)%	(0.46)%
Volatility of Bayer stock	15.49%	33.26%
Volatility of EURO STOXX 50	9.27%	16.94%
Correlation between Bayer stock price and the EURO STOXX 50	0.71	0.76

Long-term incentive program for members of the Board of Management and other senior executives (Aspire I)

Between 2005 and 2015, members of the Board of Management and other senior executives were entitled to participate in Aspire I on the condition that they purchased a certain number of Bayer shares – determined for each individual according to specific guidelines – and retained them for the full term of the program. A percentage of the executive's annual base salary – according to their position – was defined as a target for variable payments (Aspire target opportunity). Depending on the performance of Bayer stock, both in absolute terms and relative to the EURO STOXX 50 index over a four-year performance period, participants receive a payment of up to 300% of their individual Aspire target opportunity at the end of the period. At the start of 2018, a payment of 20% was made for the tranche issued in 2014. No payment was made for the final tranche issued in 2015.

Long-term incentive program for middle management (Aspire II)

From 2005 through 2015, other senior managers were offered Aspire II, which was similar to Aspire I but did not require a personal investment in Bayer shares. The amount of the payment is based entirely on the absolute performance of Bayer stock over a four-year period. The maximum payment is 250% of each manager's Aspire target opportunity. At the start of 2018, a payment of 40% was made for the tranche issued in 2014. No payment was made for the final tranche issued in 2015.

Long-term incentive program Aspire 2.0

Since 2016, Aspire has been offered to all eligible employees in a new, standardized format named Aspire 2.0. For the Board of Management, there is an additional hurdle in the form of a comparison between the performance of Bayer stock and that of the EURO STOXX 50. Each tranche runs for four years. Aspire 2.0 is also based on a percentage of each employee's annual base salary, the percentage varying according to their position. This target value is multiplied by the employee's STI payment factor for the previous year to give the Aspire grant value. The STI payment factor reflects the employee's individual performance and the business performance under the global short-term incentive program (STI). The Aspire grant value is converted into virtual Bayer shares by dividing it by the share price at the start of the program. The program's performance is based on these virtual shares. The fair value of the obligations is determined from the price of Bayer stock at year-end and the dividends paid up to that time. The payment made at the end of each tranche is determined by multiplying the number of virtual shares by the Bayer share price at that time and adding an amount equivalent to the dividends paid during the period of the tranche. The maximum payment for Aspire 2.0 is 250% of the Aspire grant value.

BayShare 2018

All management levels and nonmanagerial employees are offered an annual stock participation program known as BayShare, under which Bayer subsidizes their personal investments in the company's stock. The discount under this program in 2018 was 20% (2017: 20%) of the subscription amount. Employees stated a fixed amount that they wished to invest in shares. The maximum subscription amount in Germany was set at €2,500 (2017: €2,500) or €5,000 (2017: €5,000), depending on the employee's position. These shares must be retained until December 31, 2019.

In 2018, employees purchased a total of about 369,000 shares (2017: 229,000 shares) under the BayShare program.

24. Financial liabilities

Financial liabilities were comprised as follows:

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Financial Liabilities

€ million	Dec. 31, 2017 Total	Dec. 31, 2017 Of which current	Dec. 31, 2018 Total	Dec. 31, 2018 Of which current
Bonds and notes/promissory notes	12,436	505	35,402	2,302
Liabilities to banks	534	513	4,865	606
Liabilities under finance leases	238	32	399	50
Liabilities from derivatives	240	221	172	172
Other financial liabilities	970	664	556	552
Total	**14,418**	**1,935**	**41,394**	**3,682**

The financial liabilities of the Bayer Group increased by €27 billion in 2018, mainly due to the acquisition of Monsanto.

A breakdown of financial liabilities by contractual maturity is given below.

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Maturities of Financial Liabilities

€ million	Dec. 31, 2017	€ million	Dec. 31, 2018
2018	1,935	2019	3,682
2019	2,155	2020	1,043
2020	1,248	2021	9,035
2021	2,096	2022	2,062
2022	89	2023	3,558
2023 or later	6,895	2024 or later	22,014
Total	**14,418**	**Total**	**41,394**

In addition to promissory notes in the amount of €45 million (2017: €45 million), the Bayer Group has issued the following bonds and notes:

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Bonds and Notes

	Nominal volume as of Dec. 31, 2017	Carrying amount as of Dec. 31, 2017 € million	Nominal volume as of Dec. 31, 2018	Carrying amount as of Dec. 31, 2018 € million
Hybrid bonds[1]				
Hybrid bond 2014/2024[2]/2074	EUR 1,500 million	1,495	EUR 1,500 million	1,496
Hybrid bond 2015/2022[2]/2075	EUR 1,300 million	1,292	EUR 1,300 million	1,293
Hybrid bond 2014/2020[2]/2075	EUR 1,750 million	1,746	EUR 1,750 million	1,748
Mandatory convertible notes[1]/exchangeable bond[1]				
Mandatory convertible notes[3] 2016/2019	EUR 4,000 million	–	EUR 4,000 million	–
Exchangeable bond[4] 2017/2020	EUR 1,000 million	1,220	EUR 1,000 million	996
USD bonds[1, 5]				
Maturity < 1 year	–	–	USD 2,500 million	2,178
Maturity > 1 year < 5 years	USD 3,500 million	2,909	USD 8,250 million	7,160
Maturity > 5 years	USD 2,100 million	1,751	USD 16,414 million	14,031
EUR bonds[1, 5]				
Maturity < 1 year	–	–	–	–
Maturity > 1 year < 5 years	EUR 750 million	753	EUR 3,000 million	2,996
Maturity > 5 years	EUR 500 million	498	EUR 3,250 million	3,222
JPY bonds[1]				
Maturity < 1 year	JPY 15 billion	111	JPY 10 billion	79
Maturity > 1 year < 5 years	JPY 30 billion	222	JPY 20 billion	158
Maturity > 5 years	–	–	–	–
GBP bonds[1]				
Maturity < 1 year	GBP 350 million	394	GBP 350 million	–
Total		**12,391**		**35,357**

[1] The bonds are issued in the functional currency of the issuing entity (except GBP bonds) and mainly have a fixed coupon.
[2] Date of first option to early redeem the bond at par
[3] The mandatory convertible notes were allocated to capital reserves and to other financial liabilities.
[4] Bond can be redeemed in cash, Covestro shares or a combination thereof
[5] Bonds with a nominal volume of USD2,500 million and €750 million have a variable rate.

Hybrid bonds

The hybrid bonds issued by Bayer AG are subordinated, and 50% of their amount is treated by the rating agencies as equity. They therefore have a more limited effect on the Group's rating-specific debt indicators than senior borrowings.

Mandatory convertible notes

On November 22, 2016, Bayer Capital Corporation B.V. placed subordinated mandatory convertible notes in the amount of €4,000 million, which will be converted into no-par shares of Bayer AG at maturity. The mandatory convertible notes were recognized in capital reserves and other financial liabilities.

Exchangeable bond

On June 14, 2017, Bayer AG issued bonds with a nominal value of €1 billion which mature in 2020. The issue price was 105.25% of the principal amount and the initial exchange price was fixed at €80.93. These bonds can be settled in cash, by delivery of Covestro shares or by a combination thereof at or prior to maturity. The debt instruments were designated as financial liabilities at fair value through profit or loss upon first-time recognition. As of December 31, 2018, the fair value was €1 billion, and Bayer AG held 13.8 million Covestro shares with a fair value of €0.6 billion. Assuming repayment is made in Covestro shares, Bayer AG would have to make an additional payment of €0.4 billion.

Other bonds

Measures undertaken to finance the Monsanto acquisition included the issuance in June 2018 of US$15 billion and €5 billion in bonds via our subsidiaries Bayer U.S. Finance II LLC, Pittsburgh, United States, and Bayer Capital Corporation B.V., Mijdrecht, Netherlands, respectively.

As part of the acquisition, bonds with a nominal volume of US$6.9 billion were taken over from Monsanto. In July 2018, about 83% of these bonds were exchanged for Bayer bonds through a bond exchange program.

Liabilities under finance leases

Lease payments totaling €557 million (2017: €365 million), including €158 million (2017: €127 million) in interest, are to be made under finance leases to the respective lessors in future years.

The liabilities under finance leases mature as follows:

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Lease Liabilities

€ million	Dec. 31, 2017		
Maturity	Lease payments	Interest component	Liabilities under finance leases
2018	49	17	32
2019	44	13	31
2020	39	12	27
2021	31	11	20
2022	25	10	15
2023 or later	177	64	113
Total	**365**	**127**	**238**

€ million	Dec. 31, 2018		
Maturity	Lease payments	Interest component	Liabilities under finance leases
2019	71	21	50
2020	59	16	43
2021	51	14	37
2022	43	13	30
2023	32	12	20
2024 or later	301	82	219
Total	**557**	**158**	**399**

Other financial liabilities

Other financial liabilities as of December 31, 2018, included €309 million (2017: €525 million) relating to the mandatory convertible notes issued in November 2016. Other financial liabilities as of December 31, 2017, included commercial paper in the amount of €292 million.

Other information

The increase in liabilities to banks mainly resulted from the utilization of the bridge financing for the acquisition of Monsanto. The outstanding acquisition financing as of December 31, 2018, amounted to US$4.9 billion.

As of December 31, 2018, the Group had undrawn credit facilities at its disposal totaling €4.5 billion (2017: €47 billion, of which €43 billion comprised bridge financing for the Monsanto acquisition).

Further information on the accounting for liabilities from derivatives is given in Note [27].

The development of financial liabilities is outlined in Note [30].

25. Trade accounts payable

Trade accounts payable comprised €5,380 million (2017: €5,116 million) due within one year and €34 million (2017: €13 million) due after one year.

26. Other liabilities

Other liabilities comprised the following:

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Other Liabilities

€ million	Dec. 31, 2017 Total	Dec. 31, 2017 Of which current	Dec. 31, 2018 Total	Dec. 31, 2018 Of which current
Other tax liabilities	420	418	654	653
Deferred income	1,156	195	65	19
Liabilities to employees	181	164	252	231
Liabilities for social expenses	138	130	141	136
Accrued interest on liabilities	149	139	268	257
Liabilities from derivatives	321	306	327	165
Miscellaneous liabilities	403	300	764	661
Total	**2,768**	**1,652**	**2,471**	**2,122**

The deferred income included €30 million (2017: €48 million) in grants and subsidies received from governments, of which €3 million (2017: €17 million) was reversed through profit or loss.

Other miscellaneous liabilities included financing commitments of US$141 million (2017: US$195 million) for the joint venture Casebia Therapeutics LLP, United Kingdom, established in December 2015 with CRISPR Therapeutics AG, Switzerland, and a further financing commitment of US$60 million (2017: US$70 million) for the joint venture Joyn Bio LLC, United States, established in September 2017 with Ginkgo Bioworks, Inc., United States, which will operate in the area of the plant microbiome.

27. Financial instruments

The system used by the Bayer Group to manage credit risks, liquidity risks and the different types of market price risk (interest-rate, currency and commodity-price risks), together with its objectives, methods and procedures, is outlined in the Opportunity and Risk Report, which forms part of the Combined Management Report.

27.1 Financial instruments by category

The following table shows the carrying amounts and fair values of financial assets and liabilities by category of financial instrument under IFRS 9 and a reconciliation to the corresponding line items in the statements of financial position. Since the line items “Trade accounts receivable,” “Other receivables” and “Other liabilities” contain both financial instruments and nonfinancial assets or liabilities (such as other tax receivables), the reconciliation is shown in the column headed “Nonfinancial assets/liabilities.”

The transition effects from the reclassification and remeasurement of financial assets upon the first-time application of IFRS 9 are detailed in Note [2] “Effects of new financial reporting standards.”

B 27.1/1

Carrying Amounts and Fair Values of Financial Instruments

Dec. 31, 2018

	Carried at amortized cost	Carried at fair value [fair value for information[5]]			Nonfinancial assets/liabilities	
Measurement category (IFRS 9)[1]		Based on quoted prices in active markets (Level 1)	Based on observable market data (Level 2)	Based on unobservable inputs (Level 3)		
€ million	**Carrying amount**	**Carrying amount**	**Carrying amount**	**Carrying amount**	**Carrying amount**	**Carrying amount in the statement of financial position**
Trade accounts receivable	11,686				150	11,836
AC	11,686					11,686
Nonfinancial assets					150	150
Other financial assets	440	1,584	241	1,113		3,378
AC	440		[441]			440
FVTPL[2]		1,432	28	895		2,355
FVTOCI (no recycling)[3]		144		186		330
Derivatives that qualify for hedge accounting			101			101
Derivatives that do not qualify for hedge accounting		8	112	32		152
Other receivables	516			42	1,828	2,386
AC	516		[516]			516
FVTPL[2]				42		42
Nonfinancial assets					1,828	1,828
Cash and cash equivalents	4,052					4,052
AC	4,052		[4,052]			4,052
Total financial assets	**16,694**	**1,584**	**241**	**1,155**		**19,674**
of which AC	16,694					16,694
of which FVTPL		1,432	28	937		2,397
Financial liabilities	40,226	996	172			41,394
AC	40,226	[32,395]	[7,091]			40,226
FVTPL (nonderivative)[4]		996				996
Derivatives that qualify for hedge accounting			35			35
Derivatives that do not qualify for hedge accounting			137			137
Trade accounts payable	5,414					5,414
AC	5,414					5,414
Other liabilities	1,136	7	320	20	988	2,471
AC	1,136		[1,136]			1,136
FVTPL (nonderivative)[4]				20		20
Derivatives that qualify for hedge accounting			297			297
Derivatives that do not qualify for hedge accounting		7	23			30
Nonfinancial liabilities					988	988
Total financial liabilities	**46,776**	**1,003**	**492**	**20**		**48,291**
of which AC	46,776					46,776
of which FVTPL (nonderivative)		996		20		1,016
of which derivatives that qualify for hedge accounting			332			332
of which derivatives that do not qualify for hedge accounting		7	160			167

[1] AC: at amortized cost
FVTOCI: at fair value through other comprehensive income
FVTPL: at fair value through profit or loss
[2] Measured at fair value through profit or loss as required by IFRS 9
[3] Measured at fair value through other comprehensive income in accordance with paragraph 5.7.5 of IFRS 9
[4] Designated as FVTPL upon first-time recognition in accordance with IFRS 9
[5] Fair value of the financial instruments at amortized cost under IFRS 7 paragraph 29(a)

The category AC (measured at amortized cost) within other financial assets and financial liabilities also include receivables and liabilities under finance leases in which Bayer is the lessor or lessee and which are therefore measured in accordance with IAS 17.

Due to the short maturities of most trade accounts receivable and payable, other receivables and liabilities, and cash and cash equivalents, their carrying amounts at the closing date do not significantly differ from the fair values.

The fair values of financial assets and liabilities measured at amortized cost that are given for information are the present values of the respective future cash flows. The present values are determined by discounting the cash flows at a closing-date interest rate, taking into account the term of the assets or liabilities and the creditworthiness of the counterparty. Where a market price is available, however, this is deemed to be the fair value.

The fair values of financial assets measured at fair value correspond to quoted prices in active markets (Level 1), or are determined using valuation techniques based on observable market data as of the end of the reporting period (Level 2) or are the present values of the respective future cash flows, determined on the basis of unobservable inputs (Level 3).

The fair values of derivatives for which no publicly quoted prices exist in active markets (Level 1) are determined using valuation techniques based on observable market data as of the end of the reporting period (Level 2). In applying valuation techniques, credit value adjustments are determined to allow for the contracting party's credit risk.

Currency and commodity forward contracts are measured individually at their forward rates or forward prices on the closing date. These depend on spot rates or prices, including time spreads. The fair values of interest-rate hedging instruments and cross-currency interest-rate swaps were determined by discounting future cash flows over the remaining terms of the instruments at market rates of interest, taking into account any foreign currency translation as of the closing date.

Fair values measured using unobservable inputs are categorized within Level 3 of the fair value hierarchy. This applies to certain debt or equity instruments, in some cases to the fair values of embedded derivatives, and to obligations for contingent consideration in business combinations. Credit risk is frequently the principal unobservable input used to determine the fair values of debt instruments classified as “FVTPL – at fair value through profit or loss” by the discounted cash flow method. Here the credit spreads of comparable issuers are applied. A significant increase in credit risk could result in a lower fair value, whereas a significant decrease could result in a higher fair value. However, a relative change of 10% in the credit spread does not materially affect the fair value.

Embedded derivatives are separated from their respective host contracts, provided these are not financial instruments. Such host contracts are generally sale or purchase agreements relating to the operational business. The embedded derivatives cause the cash flows from the contracts to vary with exchange-rate or price fluctuations. The internal measurement of embedded derivatives is mainly performed using the discounted cash flow method, which is based on unobservable inputs. These include planned sales and purchase volumes, and prices derived from market data. Regular monitoring is carried out based on these fair values as part of quarterly reporting.

The financial liabilities arising from the debt instruments (exchangeable bond) issued in June 2017 that can be converted into Covestro shares are measured at fair value through profit or loss. This exchangeable bond is a hybrid financial instrument containing a debt instrument as a nonderivative host contract and multiple embedded derivatives.

Until May 2018, the interest in Covestro was accounted for in the Bayer Group consolidated financial statements as an associate using the equity method. Various share disposals led to the loss of significant influence on the financial and business policy decisions of Covestro. This in turn resulted in a change in the accounting method. Since May 2018, Bayer has reported the Covestro interest as an equity instrument. Changes in its fair value are recognized through profit or loss.

The changes in the amount of financial assets and liabilities recognized at fair value based on unobservable inputs (Level 3) for each financial instrument category were as follows:

B 27.1/2

Development of Financial Assets and Liabilities (Level 3)

€ million	Assets – FVTPL[1]	FVTOCI[1] (no recycling)	Derivatives (net)	Liabilities – FVTPL[1] (non-derivative)	Total
Carrying amounts (net), January 1, 2018	**821**	**68**	**10**	**(7)**	**892**
Gains (losses) recognized in profit or loss	28	–	5	(5)	28
of which related to assets/liabilities recognized in the statements of financial position	28	–	–	(5)	23
Gains (losses) recognized outside profit or loss	–	13	–	–	13
Additions of assets/(liabilities)	102	116	17	(10)	225
Settlements of (assets)/liabilities	(14)	(7)	–	1	(20)
Disposals from divestments/changes in scope of consolidation	–	(4)	–	1	(3)
Carrying amounts (net), December 31, 2018	**937**	**186**	**32**	**(20)**	**1,135**

[1] See table B 27.1/1 for definition of measurement categories.

The changes recognized in profit or loss were included in other operating income/expenses, as well as in the financial result in interest income, exchange gains or losses and in other financial income and expenses.

Income, expense, gains and losses on financial instruments can be assigned to the following categories:

B 27.1/3

Income, Expense, Gains and Losses on Financial Instruments

€ million	Assets – AC[1]	Assets – FVTPL[1]	FVTOCI[1] (no recycling)	Derivatives that do not qualify for hedge accounting	Liabilities – AC[1]	Liabilities – FVTPL[1] (non-derivative)	Total
							2018
Interest income	111	95	–	–	50	–	256
Interest expense	(65)	–	–	(2)	(1,226)	(1)	(1,294)
Income/expenses from affiliated companies	–	–	–	–	–	–	–
Changes in fair value	–	(444)	–	41	–	230	(173)
Impairment losses	(200)	–	–	–	–	–	(200)
Impairment loss reversals	185	–	–	–	–	–	185
Exchange gains/losses	249	–	–	87	(497)	–	(161)
Gains/losses from retirements	–	–	–	–	–	–	–
Other financial income/expenses	(17)	6	–	–	(15)	(2)	(28)
Net result	**263**	**(343)**	**–**	**126**	**(1,688)**	**227**	**(1,415)**

[1] See table B 27.1/1 for definition of measurement categories.

The interest income and expense from assets and liabilities within the AC category also included income and expenses from interest-rate derivatives that qualified for hedge accounting.

The changes in the fair value of assets within the FVTPL category included changes in the fair value of the Covestro interest, which has been presented as an equity instrument since May 2018. The changes in the fair value of derivatives that do not qualify for hedge accounting related mainly to forward commodity contracts and embedded derivatives.

The changes of €230 million (2017: negative changes of €172 million) in the fair value of (nonderivative) liabilities within the FVTPL category contain fair value adjustments pertaining to the debt instruments (exchangeable bond) issued in June 2017. The changes in fair value relating to credit risks were not material.

Derivatives that form part of a master netting arrangement, constitute a financial asset or liability and can only be netted in the event of breach of contract by, or insolvency of, one of the contracting parties do not satisfy, or only partially satisfy, the criteria for offsetting in the statement of financial position according to IAS 32. The volume of such derivatives with positive fair values was €166 million (2017: €654 million), and the volume with negative fair values was €455 million (2017: €520 million). Included here is an amount of €104 million (2017: €312 million) in positive and negative fair values of derivatives concluded with the same contracting party.

The following table shows the carrying amounts and fair values of financial assets and liabilities by category of financial instrument for the comparative period under IAS 39.

B 27.1/4

Carrying Amounts and Fair Values of Financial Instruments

						Dec. 31, 2017
	Carried at amortized cost			Carried at fair value [fair value for information[2]]	Nonfinancial assets/ liabilities	
Measurement category (IAS 39)[1]		Based on quoted prices in active markets (Level 1)	Based on observable market data (Level 2)	Based on unobserv-able inputs (Level 3)		
€ million	**Carrying amount**	**Carrying amount**	**Carrying amount**	**Carrying amount**	**Carrying amount**	**Carrying amount in the statement of financial position**
Trade accounts receivable	8,582					8,582
LaR	8,582					8,582
Other financial assets	1,823	452	2,085	803		5,163
LaR	1,731		[1,731]			1,731
AfS	35	448	1,452	793		2,728
HtM	57		[58]			57
Derivatives that qualify for hedge accounting			296			296
Derivatives that do not qualify for hedge accounting		4	337	10		351
Other receivables	380			46	1,250	1,676
LaR	380		[380]			380
AfS				46		46
Nonfinancial assets					1,250	1,250
Cash and cash equivalents	7,581					7,581
LaR	7,581		[7,581]			7,581
Total financial assets	**18,366**	**452**	**2,085**	**849**		**21,752**
of which LaR	18,274					18,274
of which AfS	35	448	1,452	839		2,774
Financial liabilities	12,958	1,220	240			14,418
Carried at amortized cost	12,958	[11,327]	[2,183]			12,958
Carried at fair value (nonderivative)		1,220				1,220
Derivatives that qualify for hedge accounting			187			187
Derivatives that do not qualify for hedge accounting			53			53
Trade accounts payable	4,568				561	5,129
Carried at amortized cost	4,568					4,568
Nonfinancial liabilities					561	561
Other liabilities	681	2	319	7	1,759	2,768
Carried at amortized cost	681		[681]			681
Carried at fair value (nonderivative)				7		7
Derivatives that qualify for hedge accounting			288			288
Derivatives that do not qualify for hedge accounting		2	31			33
Nonfinancial liabilities					1,759	1,759
Total financial liabilities	**18,207**	**1,222**	**559**	**7**		**19,995**
of which at amortized cost	18,207					18,207
of which derivatives that qualify for hedge accounting			475			475
of which derivatives that do not qualify for hedge accounting		2	84			86

[1] AfS: available for sale; at fair value through other comprehensive income
HtM: held to maturity; at amortized cost
LaR: loans and receivables; at amortized cost

[2] Fair value of the financial instruments at amortized cost under IFRS 7. Paragraph 29(a)

The following table shows the changes in the financial assets and liabilities recognized at fair value based on unobservable inputs (Level 3) for each financial instrument category for the comparative period under IAS 39:

B 27.1/5

Development of Financial Assets and Liabilities (Level 3)

€ million	AfS[1]	Derivatives (net)	Liabilities – at fair value (nonderivative)	Total
Carrying amounts (net), January 1, 2017	**851**	**(8)**	**(8)**	**835**
Gains (losses) recognized in profit or loss	15	21	–	36
of which related to assets/liabilities recognized in the statements of financial position	15	21	–	36
Gains (losses) recognized outside profit or loss	(16)	–	–	(16)
Additions of assets/(liabilities)	6	–	–	6
Settlements of (assets)/liabilities	(17)	–	1	(16)
Disposals from divestments/changes in scope of consolidation	–	(3)	–	(3)
Carrying amounts (net), December 31, 2017	**839**	**10**	**(7)**	**842**

[1] See table 27.1/4 for definition of measurement category.

The following table shows the income, expense, gains and losses on financial instruments for the comparative period under IAS 39:

B 27.1/6

Income, Expense, Gains and Losses on Financial Instruments

	2017						
€ million	LaR[1]	HtM[1]	AfS[1]	Held for trading	Liabilities – at amortized cost	Liabilities – at fair value (non-derivative)	Total
Interest income	61	–	37	–	78	–	176
Interest expense	–	–	–	(3)	(628)	–	(631)
Income/expenses from affiliated companies	–	–	2	–	–	–	2
Changes in fair value	–	–	–	17	–	(172)	(155)
Impairment losses	(139)	–	(1)	–	–	–	(140)
Impairment loss reversals	23	–	5	–	–	–	28
Exchange gains/losses	(733)	–	–	(232)	620	–	(345)
Gains/losses from retirements	–	–	5	–	–	–	5
Other financial income/expenses	(14)	–	(7)	–	–	–	(21)
Net result	**(802)**	**–**	**41**	**(218)**	**70**	**(172)**	**(1,081)**

[1]See table 27.1/4 for definition of measurement categories.

27.2 Maturity analysis

The liquidity risks to which the Bayer Group was exposed from its financial instruments at the end of the reporting period comprised obligations for future interest and repayment installments on financial liabilities and the liquidity risk arising from derivatives.

There were also loan commitments under an as yet unpaid €965 million (2017: €1,005 million) portion of the effective initial fund of Bayer-Pensionskasse VVaG, which may result in further payments by Bayer AG in subsequent years.

B 27.2/1

Maturity Analysis of Financial Instruments

€ million	Dec. 31, 2018 Carrying amount	2019	2020	2021	2022	2023	after 2023
		Interest and repayment					
Refund liabilities	3,789	3,622	152	15	–	–	–
Financial liabilities							
Bonds and notes/promissory notes	35,402	3,235	2,094	5,762	2,951	4,414	29,610
Liabilities to banks	4,865	751	158	4,345	–	–	3
Remaining liabilities	955	627	60	53	43	32	303
Trade accounts payable	5,414	5,380	32	1	1	–	–
Other liabilities							
Accrued interest on liabilities	268	257	1	1	1	1	7
Remaining liabilities	888	791	56	17	8	3	13
Liabilities from derivatives							
Derivatives that qualify for hedge accounting	332	172	66	70	26	–	–
Derivatives that do not qualify for hedge accounting	167	167	–	–	–	–	–
Receivables from derivatives							
Derivatives that qualify for hedge accounting	101	42	9	3	–	–	–
Derivatives that do not qualify for hedge accounting	152	121	(1)	(10)	–	–	–
Loan commitments	–	965	–	–	–	–	–
Financial guarantees	–	–	–	–	–	–	–

B 27.2/2

Maturity Analysis of Financial Instruments

€ million	Dec. 31, 2017 Carrying amount	2018	2019	2020	2021	2022	after 2022
		Interest and repayment					
Financial liabilities							
Bonds and notes/promissory notes	12,436	719	2,096	1,487	2,288	236	7,125
Liabilities to banks	534	527	20	–	–	–	–
Remaining liabilities	1,208	716	359	40	32	26	177
Trade accounts payable	4,568	4,555	11	2	–	–	–
Other liabilities							
Accrued interest on liabilities	149	140	1	1	1	1	5
Remaining liabilities	539	455	66	3	2	2	11
Liabilities from derivatives							
Derivatives that qualify for hedge accounting	475	443	34	–	6	–	–
Derivatives that do not qualify for hedge accounting	86	88	1	2	–	–	–
Receivables from derivatives							
Derivatives that qualify for hedge accounting	296	144	62	17	2	–	–
Derivatives that do not qualify for hedge accounting	351	331	4	1	1	–	–
Loan commitments	–	1,005	–	–	–	–	–
Financial guarantees	–	12	–	–	–	–	–

27.3 Information on derivatives

Asset and liability fair values and future cash flows are exposed to currency, interest-rate and commodity price risks. Derivatives are used to reduce this risk. In some cases they are designated as hedging instruments in a hedge accounting relationship.

Currency risks

Foreign currency receivables and liabilities are hedged using foreign exchange derivatives without the existence of a hedge accounting relationship. A bond of Bayer AG denominated in British pounds was swapped on the issuance date into a fixed-rate euro bond by means of a cross-currency interest-rate swap, which was designated as a cash flow hedge. Cross-currency interest-rate swaps used to hedge intra-Group loans were also designated as cash flow hedges.

Fluctuations in future cash flows resulting from forecasted foreign currency transactions and procurement activities are avoided partly through derivatives contracts, most of which are designated as cash flow hedges.

Foreign currency risks related to the acquisition of Monsanto Company were partially hedged with currency derivatives designated as cash flow hedges. The fair value of these derivatives was reclassified from other comprehensive income to goodwill in the statement financial position as of the acquisition date.

Interest-rate risk

The interest-rate risks from fixed-interest borrowings are managed in part using interest-rate swaps. Two interest-rate swaps in the total amount of €200 million were designated as fair value hedges for the €750 million bond issued in 2014 and maturing in 2021. The carrying amount of this bond as of December 31, 2018, was €747 million. A hedge-related fair value adjustment of €6 million resulted in the carrying amount increasing to €753 million. No material ineffective portions of hedges required recognition through profit or loss in 2018 or 2017.

Interest-rate risks in connection with the financing of the Monsanto acquisition were partially hedged through interest-rate derivatives designated as cash flow hedges. The fair values of these derivatives as of the acquisition date will be amortized from reserves for cash flow hedges into interest income and expense over the term of the bonds issued to finance the acquisition.

Commodity price risks

Hedging contracts are also used to partly reduce exposure to fluctuations in future cash outflows and inflows resulting from price changes on procurement and selling markets. Some of these contracts are designated as cash flow hedges or fair value hedges.

The carrying amount of inventories designated as the hedged item in fair value hedges was €63 million as of December 31, 2018. A hedge-related fair value adjustment of minus €11 million reduced the carrying amount to €52 million. No material ineffective portions of hedges required recognition through profit or loss in 2018.

Hedging of obligations under stock-based employee compensation programs

A portion of the obligations to make variable payments to employees under stock-based compensation programs (Aspire) is hedged against share price fluctuations using derivatives contracts that are settled in cash at maturity. These derivatives are designated as cash flow hedges.

Further information on cash flow hedges

Other comprehensive income from cash flow hedges increased by €125 million in 2018 (2017: decreased by €144 million) due to changes in the fair values of derivatives. Total changes of €124 million in the fair values of derivatives were expensed in 2018 (2017: €3 million).

The following table shows changes in reserves for cash flow hedges (before taxes), broken down by risk category:

B 27.3/1

Changes in Reserves for Cash Flow Hedges (before taxes)

€ million	Currency hedging of recorded transactions	Currency hedging of forecasted transactions	Interest-rate hedging of forecasted transactions	Commodity price hedging	Hedging of stock-based employee compen-sation programs	Total
December 31, 2017	**21**	**(95)**	**(19)**	**–**	**(4)**	**(97)**
Changes in fair values	(10)	100	283	(17)	(231)	125
Reclassified to profit or loss	–	(3)	(19)	–	146	124
Reclassified to goodwill	–	(37)	–	–	–	(37)
December 31, 2018	**11**	**(35)**	**245**	**(17)**	**(89)**	**115**

No material ineffective portions of hedges required recognition through profit or loss in 2018.

The fair values of the derivatives in the major categories as of year-end are indicated in the following table together with the included volumes of hedges.

B 27.3/2

Fair Values of Derivatives

€ million	Dec. 31, 2017 Notional amount[1]	Dec. 31, 2017 Positive fair value	Dec. 31, 2017 Negative fair value	Dec. 31, 2018 Notional amount[1]	Dec. 31, 2018 Positive fair value	Dec. 31, 2018 Negative fair value
Currency hedging of recorded transactions[2,3]	**12,321**	**233**	**(240)**	**18,165**	**129**	**(172)**
Forward exchange contracts	10,399	144	(53)	16,942	83	(137)
Cross-currency interest-rate swaps	1,922	89	(187)	1,223	46	(35)
of which cash flow hedges	1,880	87	(187)	1,198	45	(35)
Currency hedging of forecasted transactions[2,4]	**9,475**	**116**	**(194)**	**4,233**	**35**	**(70)**
Forward exchange contracts	9,292	105	(194)	4,169	35	(69)
of which cash flow hedges	9,205	103	(192)	3,941	34	(64)
Currency options	183	11	–	64	–	(1)
of which cash flow hedges	183	11	–	64	–	(1)
Interest-rate hedging of recorded transactions[2,3]	**200**	**11**	**–**	**200**	**8**	**–**
Interest-rate swaps	200	11	–	200	8	–
of which fair value hedges	200	11	–	200	8	–
	–	–	–	–	–	–
Interest-rate hedging of forecasted transactions[2,4]	**9,086**	**64**	**(81)**	**–**	**–**	**–**
Interest-rate swaps	9,086	64	(81)	–	–	–
of which cash flow hedges	9,086	64	(81)	–	–	–
Commodity price hedging[2,4]	**420**	**6**	**(3)**	**936**	**32**	**(14)**
Forward commodity contracts	414	6	(3)	934	31	(14)
of which fair value hedges	–	–	–	87	–	(3)
of which cash flow hedges	–	–	–	464	14	(3)
Commodity option contracts	6	–	–	2	1	–
of which fair value hedges	–	–	–	–	–	–
of which cash flow hedges	–	–	–	–	–	–
Hedging of stock-based employee compensation programs[2,4]	**544**	**20**	**(15)**	**731**	**–**	**(226)**
Share price options	75	5	–	–	–	–
of which cash flow hedges	75	5	–	–	–	–
Forward share transactions	469	15	(15)	731	–	(226)
of which cash flow hedges	469	15	(15)	731	–	(226)
Total	**32,046**	**450**	**(533)**	**24,265**	**204**	**(482)**
of which current derivatives	30,259	317	(499)	23,169	171	(320)
for currency hedging	20,678	242	(415)	22,253	145	(242)
for interest-rate hedging[5]	9,086	64	(81)	–	–	–
for commodity price hedging	420	6	(3)	746	26	(14)
for hedging of stock-based employee compensation programs	75	5	–	170	–	(64)

[1] The notional amount is reported as gross volume, which also contains economically closed hedges.
[2] Derivatives with positive fair values are recognized under "Other financial assets" in the statement of financial position.
[3] Derivatives with negative fair values are recognized under "Financial liabilities" in the statement of financial position.
[4] Derivatives with negative fair values are recognized under "Other liabilities" in the statement of financial position.
[5] The portion of the fair value of long-term interest-rate swaps that relates to current interest payments was classified as current.

The following table provides an overview of the hedging rates for the material derivatives that existed at year-end and qualified for hedge accounting:

B 27.3/3

Hedging Rates of Derivatives that Qualify for Hedge Accounting

	Dec. 31, 2018			
	Short-term derivatives		Long-term derivatives	
	Nominal value (million)	**Ø hedging rate**	**Nominal value (million)**	**Ø hedging rate**
Currency hedging of recorded transactions				
Cross-currency interest-rate swaps – cash flow hedges				
	Sell			
EUR/TRY	120 TRY	3.2287	–	–
EUR/USD	1,350 USD	1.1544	–	–
Currency hedging of forecasted transactions				
Forward exchange contracts – cash flow hedges				
	Sell			
EUR/AUD	243 AUD	1.6242	–	–
EUR/BRL	1,685 BRL	4.5360	–	–
EUR/CAD	499 CAD	1.5765	–	–
EUR/CNH	5,900 CNH	8.1207	–	–
EUR/GBP	326 GBP	0.8918	–	–
EUR/JPY	51,690 JPY	130.1871	–	–
EUR/KRW	122,670 KRW	1,322.7477	–	–
EUR/MXN	2,629 MXN	24.7583	–	–
EUR/RUB	16,835 RUB	78.8858	–	–
EUR/TWD	1,929 TWD	35.5132	–	–
EUR/USD	883 USD	1.1998	–	–
EUR/ZAR	1,236 ZAR	16.9930	–	–
USD/CAD	151 CAD	1.3050	–	–
	Buy			
EUR/USD	150 USD	1.1813	–	–
AUD/USD	14 USD	0.7145	–	–
Hedging of stock-based employee compensation programs	**Number of shares (thousands)**	**Ø hedging rate (€)**	**Number of shares (thousands)**	**Ø hedging rate (€)**
Forward share transactions – cash flow hedges				
	Buy		Buy	
Bayer shares	1,517	104.29	6,971	82.42

28. Contingent liabilities and other financial commitments

Contingent liabilities

The following warranty contracts, guarantees and other contingent liabilities existed at the end of the reporting period:

B 28/1

Contingent Liabilities

€ million	Dec. 31, 2017	Dec. 31, 2018
Warranties	88	88
Guarantees	148	82
Other contingent liabilities	614	816
Total	**850**	**986**

The guarantees mainly comprise a declaration issued by Bayer AG to the trustees of the U.K. pension plans guaranteeing the pension obligations of Bayer Public Limited Company, Reading, United Kingdom, and Bayer CropScience Limited, Cambridge, United Kingdom. Under the declaration, Bayer AG – in addition to the two companies – undertakes to make further payments into the plans upon receipt of a payment request from the trustees. The net liability with respect to these defined benefit plans as of December 31, 2018, declined to €82 million (December 31, 2017: €148 million).

Other financial commitments

The other financial commitments were as follows:

B 28/2

Other Financial Commitments

€ million	Dec. 31, 2017	Dec. 31, 2018
Operating leases	801	1,271
Commitments under purchase agreements for property, plant and equipment	493	811
Contractual obligation to acquire intangible assets	83	224
Capital contribution commitments	149	464
Binding acquisition agreement with Monsanto Company, St. Louis, Missouri, U.S.A.[1]	47,000	–
Unpaid portion of the effective initial fund	1,005	965
Potential payment obligations under collaboration agreements	2,349	2,121
Revenue-based milestone payment commitments	1,923	2,187
Total	**53,803**	**8,043**

[1] The contingent financial commitment of approximately US$56 billion was translated at the closing rate and rounded.

On June 7, 2018, Bayer acquired 100% of the outstanding shares of Monsanto Company, St. Louis, Missouri, United States, against a cash payment of US$128 per share. Further details of the acquisition of the Monsanto Company, St. Louis, Missouri, United States, are given in Note [5.2].

The maturities of the other financial commitments are as follows:

B 28/3

Maturities of Other Financial Liabilities

	Operating leases		Payment obligations under collaboration agreements		Revenue-based milestone payment commitments	
€ million	2017	2018	2017	2018	2017	2018
Maturing within 1 year	166	356	157	315	21	87
Maturing in 1–5 years	433	626	850	715	138	65
Maturing after 5 years	202	289	1,342	1,091	1,764	2,035
Total	**801**	**1,271**	**2,349**	**2,121**	**1,923**	**2,187**

The Bayer Group has entered into cooperation agreements with third parties under which it has agreed to fund various projects or has assumed other payment obligations based on the achievement of certain milestones or other specific conditions. The amounts shown represent the maximum payments to be made, and it is unlikely that they will all fall due. Since the achievement of the conditions for payment is highly uncertain, both the amounts and the dates of the actual payments may vary considerably from those stated in the table.

29. Legal risks

As a global company with a diverse business portfolio, the Bayer Group is exposed to numerous legal risks, particularly in the areas of product liability, competition and antitrust law, anticorruption, patent disputes, tax assessments and environmental matters. The outcome of any current or future proceedings cannot normally be predicted. It is therefore possible that legal or regulatory judgments or future settlements could give rise to expenses that are not covered, or not fully covered, by insurers' compensation payments and could significantly affect our revenues and earnings.

Legal proceedings currently considered to involve material risks are outlined below. The legal proceedings referred to do not represent an exhaustive list.

Product-related litigation

Mirena™: As of January 28, 2019, lawsuits from approximately 2,360 users of Mirena™, a levonorgestrel-releasing intrauterine system providing long-term contraception, had been served upon Bayer in the United States (excluding lawsuits no longer pending). Plaintiffs allege personal injuries resulting from the use of Mirena™, including perforation of the uterus, ectopic pregnancy or idiopathic intracranial hypertension, and seek compensatory and punitive damages. Plaintiffs claim, inter alia, that Mirena™ is defective and that Bayer knew or should have known of the risks associated with it and failed to adequately warn its users. Additional lawsuits are anticipated. In 2017, most of the cases pending in U.S. federal courts in which plaintiffs allege idiopathic intracranial hypertension were consolidated in a multidistrict litigation ("MDL") proceeding for common pre-trial management. As of January 28, 2019, lawsuits from approximately 700 users of Mirena™ alleging idiopathic intracranial hypertension had been served upon Bayer in the United States. Another MDL proceeding concerning perforation cases has been dismissed. The Second Circuit Court of Appeals affirmed the perforation MDL district court's summary judgment order of 2016 dismissing approximately 1,230 cases pending before that court. In April 2018, a master settlement agreement regarding the global settlement of the perforation cases for a total amount of US$12.2 million was executed. Plaintiffs did not reach the 98% participation threshold as required under the settlement agreement, and therefore a US$200,000 reduction in the total settlement amount was negotiated. Upon completion of the settlement, the vast majority of filed cases nationwide have been (or will be) dismissed with 15 claimants affirmatively opting out of the settlement. Almost all the other non-participating claimants (approximately 200) have not filed cases and are presently unreachable by plaintiffs' attorneys. As of January 28, 2019, a total of approximately 3,800 cases would be included in the settlement.

As of January 28, 2019, five Canadian lawsuits relating to Mirena™ seeking class action certification had been served upon Bayer. Bayer believes it has meritorious defenses and intends to defend itself vigorously.

Xarelto™: As of January 28, 2019, U.S. lawsuits from approximately 24,900 recipients of Xarelto™, an oral anticoagulant for the treatment and prevention of blood clots, had been served upon Bayer. Plaintiffs allege personal injuries from the use of Xarelto™, including cerebral, gastrointestinal or other bleeding and death, and seek compensatory and punitive damages. They claim, among other things, that Xarelto™ is defective and that Bayer knew or should have known of these risks associated with the use of Xarelto™ and failed to adequately warn its users. Additional lawsuits are anticipated. Cases pending in U.S. federal courts have been consolidated in an MDL for common pre-trial management. In 2017, the first three MDL trials resulted in complete defense verdicts. In January 2018, after the first trial to proceed in Pennsylvania state court had initially resulted in a judgment in favor of the plaintiff, the trial judge vacated the jury's verdict and granted judgment in favor of Bayer. In April and August 2018, the second and third Pennsylvania state court trials also resulted in complete defense verdicts. Appeals are pending in all of the six cases. Additional Pennsylvania state court trials are currently scheduled for May and September 2019 and into the second quarter of 2020. Bayer anticipates that additional trials will be scheduled.

As of January 28, 2019, ten Canadian lawsuits relating to Xarelto™ seeking class action certification had been served upon Bayer. One of the proposed class actions has been certified. Bayer has filed a motion for leave to appeal. Bayer believes it has meritorious defenses and intends to defend itself vigorously.

Essure™: As of January 28, 2019, U.S. lawsuits from approximately 29,400 users of Essure™, a medical device offering permanent birth control with a nonsurgical procedure, had been served upon Bayer. The significant increase in filings was triggered by the statutes of limitations in some states. Plaintiffs allege personal injuries from the use of Essure™, including hysterectomy, perforation, pain, bleeding, weight gain, nickel sensitivity, depression and unwanted pregnancy, and seek compensatory and punitive damages. Additional lawsuits are anticipated.

As of January 28, 2019, two Canadian lawsuits relating to Essure™ seeking class action certification had been served upon Bayer. Bayer believes it has meritorious defenses and intends to defend itself vigorously.

Class actions over neonicotinoids in Canada: Proposed class actions against Bayer were filed in Quebec and Ontario (Canada) concerning crop protection products containing the active substances imidacloprid and clothianidin (neonicotinoids). Plaintiffs are honey producers, who have filed a proposed nationwide class action in Ontario and a Quebec-only class action in Quebec. Plaintiffs claim for damages and punitive damages and allege Bayer and another crop protection company were negligent in the design, development, marketing and sale of neonicotinoid pesticides. The proposed Ontario class action is in a very early procedural phase. In Quebec, a court certified a class proposed by plaintiffs in February 2018. Bayer believes it has meritorious defenses and intends to defend itself vigorously.

Roundup™ (Glyphosate): As of January 28, 2019, lawsuits from approximately 11,200 plaintiffs claiming to have been exposed to glyphosate-based products manufactured by Bayer's subsidiary Monsanto had been served upon Monsanto in the United States. Glyphosate is the active ingredient contained in a number of Monsanto's herbicides, including Roundup™-branded products. Plaintiffs allege personal injuries resulting from exposure to those products, including non-Hodgkin lymphoma (NHL) and multiple myeloma, and seek compensatory and punitive damages. Plaintiffs claim, inter alia, that the glyphosate-based herbicide products are defective and that Monsanto knew, or should have known, of the risks allegedly associated with such products and failed to adequately warn its users. Additional lawsuits are anticipated. The majority of plaintiffs have brought actions in state courts in Missouri and California. Cases pending in U.S. federal courts have been consolidated in an MDL in the Northern District of California for common pre-trial management.

In August 2018, a state court jury in San Francisco, California, awarded roughly US$39 million in compensatory and US$250 million in punitive damages to a plaintiff who claimed that a Monsanto product caused his NHL. While the punitive damages were subsequently reduced by the trial court to roughly US$39 million, we still disagree with the verdict and have filed an appeal with the California Court of Appeal. More than 800 scientific studies and regulatory authorities all over the world confirm that glyphosate is safe for use when used according to label instructions. This includes an independent study which followed more than 50,000 licensed pesticide applicators for more than 20 years which found no association between glyphosate-based herbicides and cancer, and the U.S. Environmental Protection Agency's 2017 risk assessment which examined more than 100 studies and concluded that glyphosate is "not likely to be carcinogenic to humans." We continue to believe, therefore, that we have meritorious defenses and we intend to defend ourselves vigorously in all of these lawsuits. The next two trials are currently scheduled for February and March 2019 before a federal court in San Francisco and a state court in California, respectively. Another five trials are currently scheduled in California and Missouri for the remainder of 2019. However, trial dates in all venues remain subject to change depending on court schedules and rulings.

As of January 28, 2019, one Canadian lawsuit relating to Roundup™ seeking class action certification had been served upon Bayer. Bayer believes it has meritorious defenses and intends to defend itself vigorously.

In connection with the above-mentioned product-related litigation, Bayer is insured against statutory product liability claims against Bayer to the extent customary in the respective industries and has, based on the information currently available, taken appropriate accounting measures for anticipated defense costs. However, the accounting measures relating to Essure™ claims exceed the available insurance coverage.

Patent disputes

Adempas™: In January 2018, Bayer filed patent infringement lawsuits in a U.S. federal court against Alembic Pharmaceuticals Limited, Alembic Global Holding SA, Alembic Pharmaceuticals, Inc. and INC Research, LLC (together "Alembic"), against MSN Laboratories Private Limited and MSN Pharmaceuticals Inc. (together "MSN") and against Teva Pharmaceuticals USA, Inc. and Teva Pharmaceutical Industries Ltd. (together "Teva"). In 2017, Bayer had received notices of an Abbreviated New Drug Application with a paragraph IV certification ("ANDA IV") pursuant to which Alembic, MSN and Teva each seek approval of a generic version of Bayer's pulmonary hypertension drug Adempas™ in the United States. In October 2018, the court decided, upon a joint request by Bayer and Teva, that Bayer's patent is valid and infringed by Teva. This terminated the patent dispute with Teva.

Betaferon™/Betaseron™: In 2010, Bayer filed a complaint against Biogen Idec MA Inc. in a U.S. federal court seeking a declaration by the court that a patent issued to Biogen in 2009 is invalid and not infringed by Bayer's production and distribution of Betaseron™, Bayer's drug product for the treatment of multiple sclerosis. Biogen is alleging patent infringement by Bayer through Bayer's production and distribution of Betaseron™ and Extavia™ and has sued Bayer accordingly. Bayer manufactures Betaseron™ and distributes the product in the United States. Extavia™ is also a drug product for the treatment of multiple sclerosis; it is manufactured by Bayer, but distributed in the United States by Novartis Pharmaceuticals Corporation, another defendant in the lawsuit. In 2016, the U.S. federal court decided a disputed issue regarding the scope of the patent in Biogen's favor. Bayer disagrees with the decision, which may be appealed at the conclusion of the proceedings in the U.S. federal court. In February 2018, a jury decided that Biogen's patent is invalid at the end of a trial regarding Biogen's claims against EMD Serono, Inc. ("Serono") and Pfizer Inc. ("Pfizer") for infringement of the same patent. In September 2018, the court overturned the jury decision and granted judgment in favor of Biogen. Serono and Pfizer appealed. The trial of Biogen's claim against Bayer has not yet been scheduled.

Jivi™ (BAY94-9027): In August 2018, Nektar Therapeutics ("Nektar"), Baxalta Incorporated and Baxalta U.S., Inc. (together "Baxalta") filed another complaint in a U.S. federal court against Bayer alleging that BAY94-9027, approved as Jivi™ in the United States for the treatment of hemophilia, infringes five patents by Nektar. The five patents are part of a patent family registered in the name of Nektar and further comprising a European patent application with the title "Branched polymers and their conjugates." This patent family is different from the one at issue in the earlier patent disputes still pending in the United States and Germany. In October 2018, Bayer filed a lawsuit in the administrative court of Munich, Germany, claiming rights to the European patent application based on a past collaboration between Bayer and Nektar in the field of hemophilia. In 2017, Baxalta and Nektar had already filed a complaint in the same U.S. federal court against Bayer alleging that BAY94-9027 infringes seven other patents by Nektar. The seven patents are part of a patent family registered in the name of Nektar and further comprising European patent applications with the title "Polymer-factor VIII moiety conjugates" which are at issue in a lawsuit Bayer had filed against Nektar in 2013 in the district court of Munich, Germany. In this proceeding, Bayer claims rights to the European patent applications based on a past collaboration between Bayer and Nektar in the field of hemophilia. However, Bayer believes that the patent families do not include any valid patent claim relevant for Jivi™.

Stivarga™: In 2016, Bayer filed a patent infringement lawsuit in a U.S. federal court against Apotex, Inc. and Apotex Corp. (together "Apotex"). Bayer had received a notice of an ANDA IV application pursuant to which Apotex seeks approval of a generic version of Bayer's cancer drug Stivarga™ in the United States.

Bayer believes it has meritorious defenses in the above ongoing patent disputes and intends to defend itself vigorously.

Further Legal Proceedings

Trasylol™/Avelox™: A qui tam complaint relating to marketing practices for Trasylol™ (aprotinin) and Avelox™ (moxifloxacin) filed by a former Bayer employee is pending in the United States District Court in New Jersey. Bayer's motion for summary judgment related to the relator's Trasylol claims is pending. The U.S. government has declined to intervene at the present time.

Baycol™: A qui tam complaint (filed by the same relator as in Trasylol™/Avelox™) asserting Bayer fraudulently induced a contract with the Department of Defense is pending in the United States District Court in Minnesota. In October 2018, the District Court judge issued a brief decision denying Bayer's renewed motion to dismiss. The case will now proceed with discovery.

Newark Bay Environmental Matters: In the United States, Bayer is one of numerous parties involved in a series of claims brought by federal and state environmental protection agencies. The claims arise from operations by entities which historically were conducted near Newark Bay or surrounding bodies of water, or which allegedly discharged hazardous waste into these waterways or onto nearby land. Bayer and the other potentially responsible parties are being asked to remediate and contribute to the payment of past and future remediation or restoration costs and damages. In 2016, Bayer learned that two major potentially responsible parties had filed for protection under Chapter 11 of the U.S. Bankruptcy Code. While Bayer remains unable to determine the extent of its liability for these matters, this development is likely to adversely affect the share of costs potentially allocated to Bayer.

In the Lower Passaic River matter, a group of more than sixty companies including Bayer is investigating contaminated sediments in the riverbed under the supervision of the United States Environmental Protection Agency (EPA) and other governmental authorities. Future remediation will involve some form of dredging, the nature and scope of which are not yet defined, and potentially other tasks. The cost of the investigation and the remediation work may be substantial if the final remedy involves extensive dredging and disposal of impacted sediments. In July 2018, Occidental Chemical Company, one of the parties potentially liable for cleanup costs in the Lower Passaic River, filed a lawsuit in New Jersey federal court seeking contribution and cost recovery from dozens of other potentially responsible parties, including a Bayer subsidiary, for past and future cleanup costs. Bayer is currently unable to determine the extent of its liability in this matter. In the Newark Bay matter, an unaffiliated party is currently conducting an investigation of sediments in Newark Bay under EPA supervision. The investigation is in a preliminary stage. Bayer has contributed to certain investigation costs in the past and may incur costs for future investigation and remediation activities in Newark Bay.

Bayer has also been notified by governmental authorities acting as natural resource trustees that it may have liability for natural resource damages arising from the contamination of the Lower Passaic River, Newark Bay and surrounding water bodies. Bayer is currently unable to determine the extent of its liability.

Asbestos: In many cases, plaintiffs allege that Bayer and co-defendants employed third parties on their sites in past decades without providing them with sufficient warnings or protection against the known dangers of asbestos. Additionally, a Bayer affiliate in the United States is the legal successor to companies that sold asbestos products until 1976. Union Carbide has agreed to indemnify Bayer for this liability. Similarly, Bayer's subsidiary Monsanto faces numerous claims based on exposure to asbestos at Monsanto premises without adequate warnings or protections and based on manufacture and sale of asbestos-containing products. Bayer believes it has meritorious defenses and intends to defend itself vigorously.

One A Day™ vitamins: Bayer has been named in a class action lawsuit in the United States alleging Bayer's claims on its One A Day™ vitamins regarding the support of heart health, immunity and physical energy are false and misleading. The class is defined as California, Florida and New York residents who purchased One A Day™ products with the claims at issue. In September 2018, plaintiffs asserted through the filing of an expert report their alleged potential damages. Bayer's challenge of the class certification is currently pending in the Court of Appeals for the Ninth Circuit. Bayer believes it has meritorious defenses and intends to defend itself vigorously.

PCB: Bayer's subsidiary Monsanto has been named in lawsuits brought by various governmental entities in the United States claiming that Monsanto, Pharmacia and Solutia, collectively as a manufacturer of PCBs, should be responsible for a variety of damages due to PCBs in bodies of water, regardless of how PCBs came to be located there. Monsanto also faces numerous lawsuits claiming personal injury and/or property damage due to use of and exposure to PCB products. PCBs are man-made chemicals that were widely used for various purposes until the manufacture of PCBs was prohibited by the Environmental Protection Agency (EPA) in the United States in 1979. We believe that we have meritorious defenses and intend to defend ourselves vigorously.

Tax Proceedings

Stamp taxes in Greece: In 2014, 2016 and 2017, a Greek administrative court of first instance dismissed Bayer's lawsuits against the assessment of stamp taxes and contingent penalties in a total amount of approximately €130 million on certain intra-Group loans to a Greek subsidiary. Bayer is convinced that the decisions are wrong and either has appealed the relevant decisions or plans to do so in due course. Bayer believes it has meritorious arguments to support its legal position and intends to defend itself vigorously.

Notes to the Statements of Cash Flows

The statement of cash flows shows how cash inflows and outflows during the fiscal year affected the cash and cash equivalents of the Bayer Group.

Of the cash and cash equivalents, an amount of €14 million (2017: €17 million) had limited availability due to foreign exchange restrictions. Past experience has shown such restrictions to be of short duration.

The cash flows reported by consolidated companies outside the eurozone are translated at average monthly exchange rates, with the exception of cash and cash equivalents, which are translated at closing rates. The “Change in cash and cash equivalents due to exchange rate movements” is reported in a separate line item.

30. Net cash provided by (used in) operating, investing and financing activities

The operating cash flow (total) declined by 2.7% in 2018, to €7,917 million. Covestro was still included in the prior-year period. The operating cash flow from continuing operations was up 19.8% from the previous year.

The net cash outflow for investing activities in 2018 amounted to €34,152 million (2017: €432 million). There was an outflow of €45,290 million for the acquisition of Monsanto, net of €2,657 million in cash acquired from Monsanto. There was a net inflow of €7,291 million from the divestments to BASF. Additions to property, plant and equipment and intangible assets in 2018 resulted in a cash outflow of €2,593 million (2017: €2,366 million). Cash inflows from sales of property, plant and equipment and intangible assets amounted to €230 million (2017: €241 million). The net cash inflow from noncurrent and current financial assets amounted to €5,717 million (2017: €1,230 million), and included net inflows of €2,909 million from the sale and repurchase of Covestro shares.

There was a net cash inflow of €23,432 million (2017: net cash outflow of €1,881 million) for financing activities. Net borrowings amounted to €17,819 million (2017: net loan repayments of €2,479 million). Cash outflows for dividend payments amounted to €2,407 million (2017: €2,364 million). Net interest payments – including payments for and receipts from interest-rate swaps – increased to €919 million (2017: €732 million). Capital increases resulted in an inflow of €8,986 million.

The change in financial liabilities is presented in the following table:

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Financial Liabilities

		Cash flows	Noncash changes				
€ million	**Dec. 31, 2017**		**Acquisition**	**Currency effects**	**New contracts**	**Fair value changes[1]**	**Dec. 31, 2018**
Bonds and notes/promissory notes	12,436	16,803	5,596	648	–	(81)	35,402
Liabilities to banks	534	3,352	1,072	(93)	–	–	4,865
Liabilities under finance leases	238	(43)	133	9	62	–	399
Liabilities from derivatives	240	(1)	1	(1)	–	(67)	172
Other financial liabilities	970	(2,292)	1,855	14	–	9	556
Total	**14,418**	**17,819**	**8,657**	**577**	**62**	**(139)**	**41,394**

[1] Including discount effects

Other Information

31. Audit fees

Deloitte has been Bayer's auditor since 2017. The Independent Auditor's Report on the consolidated financial statements for fiscal 2018 was signed by Heiner Kompenhans and Prof. Frank Beine. Both signed the Independent Auditor's Report for the first time for the year ended December 31, 2017, and are the responsible audit partners.

The following fees for the services of the worldwide network of Deloitte or Deloitte GmbH Wirtschaftsprüfungsgesellschaft (Deloitte GmbH WPG) were recognized as expenses:

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Audit Fees

	Deloitte		of which Deloitte GmbH WPG	
€ million	**2017**	**2018**	**2017**	**2018**
Financial statements auditing	9	15	3	6
Audit-related services and other audit work	2	3	2	3
Tax consultancy	1	3	–	–
Other services	5	4	4	2
Total	**17**	**25**	**9**	**11**

The fees for the auditing of financial statements mainly comprised those for the audits of the consolidated financial statements of the Bayer Group and the financial statements of Bayer AG and its subsidiaries. The non-audit-related services primarily related to due diligence services concerning business entities considered for divestment (Other services), the assessment of financial and nonfinancial information outside of financial statement auditing (Audit-related services and other audit work), and compliance-related tax consultancy services that had neither a material or direct impact on the annual financial statements or consolidated financial statements.

32. Related parties

Related parties as defined in IAS 24 are those legal entities and natural persons that are able to exert influence on Bayer AG and its subsidiaries or over which Bayer AG or its subsidiaries exercise control or joint control or have a significant influence. They include, in particular, nonconsolidated subsidiaries, joint ventures and associates included in the consolidated financial statements at fair value or using the equity method, and post-employment benefit plans. Related parties also include the corporate officers of Bayer AG whose compensation is reported in Note [33] and in the Compensation Report, which forms part of the Combined Management Report.

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Related Parties

€ million	Sales of goods and services 2017	Sales of goods and services 2018	Purchase of goods and services 2017	Purchase of goods and services 2018	Receivables 2017	Receivables 2018	Liabilities 2017	Liabilities 2018
Nonconsolidated subsidiaries	5	8	6	5	6	8	16	26
Joint ventures	25	1	–	–	3	4	164	178
Associates	84	219	84	36	119	2	87	3
Post-employment benefit plans	–	–	–	–	974	837	70	215

Intercompany profits and losses for companies accounted for in the consolidated financial statements using the equity method were immaterial in 2018 and 2017.

Covestro ceased to be recognized as an associate in May 2018. Receivables and liabilities from associates therefore declined.

In May 2018, Bayer AG acquired 6.8% of Covestro shares from Bayer Pension Trust e. V. at market value for a total amount of €1.1 billion to service the exchangeable bond that matures in 2020. As a result of the stock buyback program implemented by Covestro AG, we held 7.5% of shares in that company as of December 31, 2018.

Bayer AG has undertaken to provide jouissance right capital (Genussrechtskapital) in the form of an interest-bearing loan with a nominal volume of €150 million (2017: €150 million) for Bayer-Pensionskasse VVaG. The entire amount remained drawn as of December 31, 2018. The carrying amount was €152 million (2017: €152 million). Loan capital was first provided to Bayer-Pensionskasse VVaG in 2008 for its effective initial fund. This capital had a nominal volume of €635 million as of December 31, 2018 (2017: €595 million). The carrying amount was €643 million (2017: €605 million). The outstanding receivables, comprised of different tranches, are each subject to a five-year interest-rate adjustment mechanism. Interest income of €16 million (2017: €15 million) and expenses of €8 million due to fair value changes were recognized for 2018.

As in the prior year, we did not recognize any material impairment losses on receivables from associates in 2018.

33. Total compensation of the Board of Management and the Supervisory Board, advances and loans

In 2018, the compensation of the Supervisory Board amounted to €3,897 thousand (2017: €3,703 thousand), and the compensation of the Board of Management totaled €20,552 thousand (2017: €26,168 thousand). The total compensation of the Board of Management included a short-term component of €15,149 thousand (2017: €11,304 thousand) and a long-term component of €5,403 thousand (2017: €12,886 thousand), with stock-based compensation accounting for €1,914 thousand (2017: €8,979 thousand) of this figure.

Pension payments to former members of the Board of Management and their surviving dependents in 2018 amounted to €17,138 thousand (2017: €12,758 thousand). The defined benefit obligation for former members of the Board of Management and their surviving dependents amounted to €185,736 thousand (2017: €184,479 thousand). In addition, severance payments of €0 thousand (2017: €1,978 thousand) were made in connection with the termination of a service contract. There were no advances or loans to members of the Board of Management or the Supervisory Board outstanding as of December 31, 2018, nor at any time during 2018 or 2017.

Further details of the compensation of the Board of Management and Supervisory Board are given in the Compensation Report within the Management Report.

34. Events after the end of the reporting period

Repayment of financial liabilities

The syndicated credit facility drawn in June 2018 to finance the acquisition of Monsanto was reduced by a further US$1.1 billion to US$3.8 billion in February 2019.

PEGylated factor VIII:

In February 2019, a federal court jury awarded US$155 million in damages to Bayer at the end of a trial regarding Bayer's claims against Baxalta Incorporated and Baxalta US Inc. (Baxalta) for infringement of a Bayer patent. In 2016, Bayer had filed a complaint in a U.S. federal court against Baxalta, a subsidiary of Takeda Pharmaceutical Company Limited, for infringement of the patent by Adynovate™ (PEGylated recombinant factor VIII), approved in the United States for the treatment of hemophilia. Baxalta may appeal.

Leverkusen, February 19, 2019

Bayer Aktiengesellschaft

The Board of Management

Responsibility Statement

To the best of our knowledge, and in accordance with the applicable reporting principles for financial reporting, the consolidated financial statements give a true and fair view of the assets, liabilities, financial position and profit or loss of the Bayer Group, and the combined management report includes a fair review of the development and performance of the business and the position of the Bayer Group and Bayer AG, together with a description of the principal opportunities and risks associated with the expected development of the Bayer Group and Bayer AG.

Leverkusen, February 19, 2019
Bayer Aktiengesellschaft

The Board of Management

Werner Baumann
Chairman

Liam Condon

Dr. Hartmut Klusik

Kemal Malik

Wolfgang Nickl

Stefan Oelrich

Heiko Schipper

Independent Auditor's Report

To: Bayer Aktiengesellschaft, Leverkusen

REPORT ON THE AUDIT OF THE CONSOLIDATED FINANCIAL STATEMENTS AND THE COMBINED MANAGEMENT REPORT

Audit opinions

We audited the consolidated financial statements of Bayer Aktiengesellschaft, Leverkusen, and its subsidiaries (the Group) – consisting of the consolidated balance sheet as of December 31, 2018, the consolidated income statement and consolidated statement of comprehensive income, the consolidated statement of cash flows and the consolidated statement of changes in equity for the fiscal year from January 1 through December 31, 2018 and also the Notes to the consolidated financial statements, together with a summary of significant accounting methods. Furthermore, we audited the management report of Bayer Aktiengesellschaft, Leverkusen, combined with the management report of the parent company, for the fiscal year from January 1 through December 31, 2018. In accordance with German statutory provisions, we did not audit the contents of the components of the combined management report named in the Appendix to our auditors' report.

In our opinion, based on the findings of our audit,

// the accompanying consolidated financial statements comply in all material respects with the IFRS as adopted by the EU and the additional requirements of German law pursuant to § 315e (1) HGB and give a true and fair view of the net assets and financial position of the Group as of December 31, 2018 and of its results of operations for the fiscal year from January 1, 2018 through December 31, 2018; and
// the accompanying combined management report provides a suitable overall view of the Group's situation. In all material respects, this combined management report is consistent with the consolidated financial statements, complies with German legal requirements, and suitably presents the opportunities and risks of future development. Our audit opinion on the combined management report does not extend to the content of the components of the combined management report mentioned in the Appendix to the auditors' report.

In accordance with Section 322 (3.1) HGB, we state that our audit has not led to any objections to the correctness of the consolidated financial statements and the combined management report.

Basis for the audit opinions

We conducted our audit of the consolidated financial statements and the combined management report in accordance with Section 317 HGB and the EU Auditors' Regulation (No. 537/2014; hereafter referred to as "EU Audit Regulation") in compliance with the generally accepted German standards for the audit of financial statements promulgated by the Institut der Wirtschaftsprüfer (IDW). We conducted our audit of the consolidated financial statements with additional regard for the International Standards on Auditing (ISA). Our responsibility pursuant to these regulations, principles, and standards is described in more detail in the section "Auditor's responsibility for the audit of the consolidated financial statements and the combined management report" of our Audit Report. We are independent of the Group companies in accordance with European and German commercial and professional regulations and have fulfilled our other German professional obligations in accordance with these requirements. Furthermore we state, in accordance with Article 10 (2f) EU Audit Regulation, that we have rendered no inadmissible non-audit services within the meaning of Article 5 (1) EU Audit Regulation. We believe that the audit evidence we obtained is sufficient and appropriate to provide a basis for our audit opinions on the consolidated financial statements and combined management report.

Particularly important audit issues in the audit of the consolidated financial statements
Particularly important audit issues are those issues that we considered – at our due discretion – to be the most significant in our audit of the consolidated financial statements for the fiscal year from January 1 through December 31, 2018. These issues have been taken into account in connection with our audit of the consolidated financial statements as a whole and in forming our opinion thereon; we do not express a separate opinion on these issues.

We present below what we consider to be the particularly important audit issues:

1. Acquisition of Monsanto Company
2. Intrinsic value (recoverability) of goodwill and brand rights
3. Depiction of risks from product-related legal disputes
4. Depiction of research and development costs
5. Financial instruments – hedge accounting
6. Adjustments to EBITDA and EBIT for special items

We have structured our presentation of these particularly important audit issues as follows:

a) Description of issue (including reference to associated disclosures in the consolidated financial statements)
b) Audit approach

1. Acquisition of Monsanto Company

a) On June 7, 2018, the Bayer Group acquired 100% of the outstanding shares of Monsanto Company, based in St. Louis, Missouri, United States, (Monsanto), for a purchase price of EUR 48bn. Bayer accounts for the business combination in accordance with IFRS 3.

The assets, liabilities, and contingent liabilities recognized at fair value in connection with the acquisition of the Monsanto business are based on values from the purchase price allocation performed by Bayer on the basis of a preliminary valuation opinion prepared on February 8, 2019, by KPMG Aktiengesellschaft, Munich, as a neutral expert. Previously unrecognized intangible assets were recognized primarily for seed and trait technologies, herbicides and digital platforms (EUR 17,152m), research and development projects (EUR 4,637m), and product brand rights (EUR 3,941m). The fair values underlying the purchase price allocation are derived from expert valuations based on asset-specific, maturity-dependent discount rates (6,3% to 11.8%) and were determined on the basis of Bayer's planning as of the acquisition date, with the technologies in particular taking appropriate account of separability and economic value added. Taking into account the other net assets measured at fair value, goodwill amounts to EUR 24,455m (51% of the consideration transferred). The write-downs to assets recognized at fair value, in particular technologies and brands, resulted in expenses of EUR 1,045m in the year under review. The goodwill recognized in the balance sheet is subject to an annual impairment test (cf. topic 2.).

Within the framework of our audit, the matter was of particular significance due to the complexity of the transaction and the associated risk of material misrepresentations of the net assets, financial position, and results of operations as well as the assumptions and discretionary estimates made by Management in carrying out the purchase price allocation.

The Company's disclosures on the acquisition of the Monsanto Group are contained in Section 5.2 of the Notes to the consolidated financial statements.

b) Within the framework of our audit we verified, among other things on the basis of the inter-company agreements and the stipulations of the antitrust authorities as well as the criteria defined in IFRS 10, Management's assessment that Bayer took control of Monsanto on June 7, 2018, and is required to consolidate it in the consolidated financial statements.

Within the framework of the audit of the preliminary purchase price allocation, we evaluated the consideration transferred by Bayer and the methodical approach of the external appraiser engaged by Management with regard to the identification of the acquired assets and the conceptual assessment of the valuation models, taking into account the requirements of IFRS 3. In consultation with our internal valuation specialists, we reconstructed the valuation methods applied, taking into account the requirements of IFRS 13. We analyzed assumptions and discretionary estimates such as growth rates, capital costs, license rates or remaining useful lives to determine the fair values of the acquired and identifiable assets and liabilities and contingent liabilities assumed at the acquisition date to determine whether these correspond to general and industry-specific market expectations. We reconstructed the models on which the valuations are based and plausibilized the expected future cash flows adduced and compared the fair values with the assumptions and expectations of expert external market participants at the time of acquisition. One emphasis of our audit was on determining the fair values of technologies and research projects.

We also examined whether the accounting methods complying with Bayer accounting principles were applied uniformly at the Monsanto companies and whether the tax effects of the business combination were recognized in the balance sheet. We retraced the presentation of the initial consolidation, including the non-controlling interests, in the consolidation system. We also audited the disclosures in the notes to the consolidated financial statements relating to the acquisition of the Monsanto Group according to the relevant requirements of IFRS 3.

2. Intrinsic value (recoverability) of goodwill and brand rights

a) In the consolidated financial statements, an amount of EUR 38,146m (30% of total Group assets) is reported under the balance sheet item "Goodwill". In addition, brand rights of EUR 9,104m (7% of the Group's total assets) are reported under "Other intangible assets". The Company allocates goodwill to the strategic business units or groups of strategic business units within the Bayer Group. Regular impairment tests of goodwill and case-related impairment tests of brand rights compare the respective carrying amounts with their recoverable amounts. Fundamentally, the recoverable amount is determined on the basis of the fair value less costs to sell. The present value of future cash flows is used as a basis, since as a rule no market values are available for the individual strategic business units. The present value is determined using discounted cash flow models based on the Bayer Group's four-year operating planning drawn up by Management and approved by the Supervisory Board and perpetuated with assumptions about long-term growth rates. Discounting is based on the weighted average cost of capital of the reporting segments concerned. The result of this valuation depends to a large extent on the estimates by the Management of the future cash flows of the strategic business unit concerned and the discount rate used and is therefore fraught with considerable uncertainty. In the light of this, and owing to the underlying complexity of the valuation models, this issue was of particular importance within the framework of our audit.

The Company's disclosures on goodwill and brand rights are contained in Sections 3 and 14 of the Notes to the consolidated financial statements.

b) In our audit, among other things we reconstructed the methodology used to perform the impairment tests and assessed the calculation of the weighted cost of capital. We convinced ourselves of the appropriateness of the future cash inflows used in the valuation, among other things by recording and critically assessing the underlying planning process. We also compared this information with the current budget from the four-year plan drawn up by Management and approved by the Supervisory Board, and reconciled it with general and industry-specific market expectations. For this, we also convinced ourselves that the costs of the Group functions included in the Corporate Functions and Consolidation segment of segment reporting were appropriately taken into account in the impairment test of the strategic business unit concerned. We studied intensively the parameters used to determine the discount rate applied and assessed the completeness and correctness of the calculation scheme. Owing to the material significance of goodwill, we further performed additional sensitivity analyses of our own for the strategic business units (carrying amount in comparison to the recoverable amount).

3. Depiction of risks arising from product-related legal disputes

a) Bayer Group companies are involved in legal and out-of-court proceedings with public authorities, competitors, and other parties. These give rise to legal risks, in particular in the areas of product liability, competition and anti-trust law, patent law, tax law, and environmental protection.

In addition, by January 28, 2019, Monsanto, a subsidiary of Bayer AG, had been served in the United States with actions for compensation and punitive damages by approximately 11,200 plaintiffs alleging that their contact with products containing glyphosate manufactured by Monsanto had resulted in damage to their health. In addition, by January 28, 2019, the Bayer Group had been served in the United States with claims for compensation and punitive damages from about 24,900 users of the product Xarelto™. By January 28, 2019, the Bayer Group had been served with lawsuits in the USA by about 29,400 users of Essure™, in each of which compensation and punitive damages were likewise claimed. Against the background of pending and expected product liability lawsuits relating to the product Mirena™, by January 28, 2019 the Bayer Group had been served in the United States with lawsuits from approximately 2,360 users of Mirena™.

Whether a pending legal dispute makes the recognition of a provision to cover the risk necessary and, if so, to what extent, is determined to a large extent by estimates and assumptions by Management. Against this background, and in view of the amount of the claims asserted, the above-mentioned product-related disputes of the Bayer Group were of particular significance from our point of view.

The disclosures about and explanations of the legal disputes mentioned are contained in Section 29 of the Notes to the consolidated financial statements.

b) Within the framework of our audit, we assessed, among other things, the process established by the Company to ensure the recognition, the estimate of the outcome of the proceedings, and the accounting presentation of a legal dispute. Furthermore, we held regular discussions with the Company's internal legal department in order to be informed about current developments and the reasons that led to the corresponding estimates. The development of material legal disputes, including the estimates by Management with regard to the possible outcome of proceedings, was made available to us in writing by Bayer AG's internal legal department. As of the closing date, we furthermore obtained external attorney's certificates, which we compared with the risk assessment made by Management about the product-related disputes named in the "Description of the facts" section. Taking these estimates into account, we also critically assessed the assumptions underlying the provisions for expected defense costs and checked the amount of the provisions for plausibility on the basis of experience from similar proceedings in the past and on other evidence.

4. Depiction of restructuring issues

a) At the end of 2018, the Management of Bayer Aktiengesellschaft announced a comprehensive restructuring program for the entire Bayer Group. The program essentially involves the cutback of up to 12,000 jobs in the next three fiscal years. A provision of EUR 611m was recognized for the severance payment obligations specified up to the end of the fiscal year. A not inconsiderable part of the job cuts is attributable to Germany, where redundancies for operational reasons are excluded until 2025 owing to works agreements. In order to implement the restructuring program, appropriate discussions with employee bodies were already held in 2018, as a basis for job cuts and for the recognition of restructuring provisions. In our opinion, this matter was of particular importance for our audit, as the recognition and measurement of the provision are to a large extent based on estimates and assumptions made by Management.

   The Group's disclosures on the restructuring provision are contained in Section 23 of the Notes to the consolidated financial statements.

b) We investigated whether a restructuring provision that is in accordance with the definition in IAS 37.10 has been recognized. To this end, we verified compliance with the general recognition and measurement requirements for provisions, including the criteria of IAS 37.70 et seq. that further specify these requirements and – insofar as provisions for employee benefits in connection with the termination of employment are involved – with the relevant provisions of IAS 19. For this purpose, we received and verified the corresponding evidence and calculation documents from Management. We critically assessed and verified the plausibility of the estimates and assumptions of Management on which the evidence and calculation principles are based as to the extent to which the recognition and amount of the provisions are appropriate. In particular, we evaluated information documents (resolutions, minutes, presentations) supplied to employee representatives in Germany as to whether the employees were sufficiently informed thereby in concrete terms about the restructuring programs and individual components of the planned restructuring measures in the 2018 fiscal year. We furthermore investigated whether and to what extent Management had informed the employees in the various departments and/or at the various locations about the planned job cuts. Based on this, we examined whether the criteria for the recognition of the provision had been met as of the balance sheet date. In order to check the plausibility of the amount of the provisions, we analyzed, among other things, the job reduction programs developed in the personnel departments with regard to the premises set for the amount of severance offers to employees and the expected acceptance rates. We discussed the restructuring programs in detail with those responsible in the personnel departments and critically questioned the premises that had been set. We also examined the disclosures in the Notes to the consolidated financial statements relating to the restructuring measures in the light of the relevant requirements of IAS 37.

5. Financial instruments - hedge accounting

a) Bayer Group companies conclude a large number of different derivative financial instruments to hedge against currency, commodity price, and interest rate risks from ordinary business operations. The basis for this is the hedging policy prescribed by Management, which is documented in appropriate internal guidelines. The currency risk essentially results from sales and procurement transactions, and also financing transactions in foreign currencies. Raw material price risks are primarily associated with procurement transactions, in particular the procurement of propagated seed. The aim of interest rate hedging is to achieve a reasonable relationship between variable and fixed interest rates. Derivative financial instruments are recognized at their fair value as of balance sheet date. The positive fair values of all derivative financial instruments used as hedges amount to EUR 204m as of the closing date (i.e., 0.2% of total Group assets), the negative fair values amounted to EUR 482m (i.e., 0.4% of total Group assets). To the extent that the financial instruments used by the Bayer Group are effective hedges of future cash flows under hedge accounting in accordance with IFRS 9, changes in fair value are recognized in equity until the due date of the hedged cash flow (effective portion) over the term of the hedge relationship. As of the balance sheet date, a cumulative amount of EUR 115m had been recognized as expenses and income not affecting pre-tax profit or loss. From our point of view, these issues were of particular significance due to the high complexity and large number of transactions as well as the extensive accounting and reporting requirements imposed by IFRS 9, which is to be applied for the first time in 2018.

The disclosures on hedge accounting are contained in Sections 3 and 27 of the Notes to the consolidated financial statements.

b) Within the framework of our audit, and with the support of our internal specialists from the Financial Risk unit, we assessed the contractual and financial fundamentals of the financial instruments, among other things, and reconstructed the accounting, including the effects on equity and earnings of the various hedging transactions. Jointly with our specialists, we also assessed the Company's internal control system in the area of derivative financial instruments, including the internal monitoring of compliance with the hedging policy, and reviewed the controls with regard to design, implementation, and effectiveness. Furthermore, while auditing the fair value measurement of the financial instruments, we also checked, on the basis of market data and within the framework of our risk assessment, the calculation methods of representatively selected samples and reconstructed the correct implementation of the methods in the system. We also based our assessment of the completeness of the transactions recognized on a portfolio comparison with the counterparties. In order to audit the effectiveness of the hedging transactions, we analyzed the various methods (prospectively critical term match method; retrospectively dollar offset method) and, within the framework of our risk assessment, traced their correct implementation in the system. With regard to the expected cash flows, we essentially assessed the past hedging ratios in retrospect.

6. Adjustments to EBITDA and EBIT for special items

a) For management and analysis purposes, the Bayer Group adduces EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortization, and also impairment losses and reinstatements), adjusted for special items (by their nature or amount special effects). Bayer AG's segment reporting in the consolidated financial statements discloses adjustments of EUR 2,566m to EBIT and EUR +719m to EBITDA. EBIT adjusted for special items are used for the calculation of adjusted net income from continuing operations, which is needed to calculate adjusted earnings per share from continuing operations (core EPS). EBITDA adjusted for special items and core EPS are used by Bayer as key financial performance indicators in its capital market communications. These two key indicators are furthermore adduced as the degree of target achievement for the annual performance-based compensation of Bayer Group employees. The adjustments to EBIT and EBITDA were of particular significance within the framework of our audit, as they are made on the basis of the Bayer Group's internal accounting guideline and there is a risk that Management might exercise their discretionary powers one-sidedly.

The Company's disclosures on the adjustments to EBIT and EBITDA and the derivation thereof are presented in Section 4 of the Notes to the consolidated financial statements.

b) We reconstructed the calculation of EBIT and EBITDA adjusted for special items and critically examined the identification of the Group companies' special items taken into account by Management. We analyzed the composition of the adjustments to determine the extent to which the individual components comply with the relevant internal guidelines for special items and have been appropriately eliminated from EBIT and EBITDA. At the same time we made use of the findings of our audit and the information provided to us by Management to examine whether the adjustments were made in accordance with the definitions and procedure set out in the notes to the combined management report and segment reporting.

Other information

Management is responsible for the other information. This other information includes:

- // the components of the combined management report named in the Appendix to the Auditors' Report that were not audited as to their contents,
- // the declaration by Management regarding the consolidated financial statements and the combined management report pursuant to § 297 (2.4) HGB and § 315 (1.5) HGB, and
- // the remaining components of the annual report, with the exception of the audited consolidated financial statements and the combined management report and our Auditors' Report.

Our audit opinions on the consolidated financial statements and on the combined management report do not extend to this other information and, accordingly, we express neither an opinion nor any other form of audit conclusion on them.

In connection with our audit of the consolidated financial statements, it is our responsibility to read the other information and to assess whether the other information

- // displays significant discrepancies with the consolidated financial statements, the combined management report or with our knowledge gained during the audit,
- // otherwise appears to be substantially incorrectly presented.

Should we, on the basis of our work, conclude that there is a material misrepresentation in this other information, we are required to report on this fact. We have nothing to report in this connection.

Responsibility of the Management and the Supervisory Board for the consolidated financial statements and the combined management report

Management is responsible for the preparation of consolidated financial statements which comply in all material respects with the IFRSs as adopted by the EU, and with the additional requirements of German law pursuant to Section 315e (1) HGB, and for ensuring that the consolidated financial statements give a true and fair view of the net assets, financial position, and results of operations of the Group while observing these requirements. Management is furthermore responsible for the internal controls which they have determined are necessary to enable the preparation of consolidated financial statements that are free from material misstatements, whether intentional or unintentional.

In preparing the consolidated financial statements, Management is responsible for assessing the Group's ability to continue its business activities. Furthermore, they are responsible for disclosing matters relating to the continuation of business activities, if relevant. They are moreover responsible for accounting on the basis of the accounting policy of continuing operations, unless there is an intention to liquidate the Group or discontinue operations, or there is no realistic alternative.

Management is also responsible for preparing the combined management report, which as a whole provides a suitable view of the Group's situation and is consistent in all material respects with the consolidated financial statements, complies with German legal requirements and suitably presents the opportunities and risks of future development. Management is further responsible for the arrangements and measures (systems) that they deem necessary to enable the preparation of a combined management report in accordance with the applicable German legal provisions and to provide sufficient suitable evidence for the assertions in the combined management report.

The Supervisory Board is responsible for monitoring the Group's accounting process for preparing the consolidated financial statements and the combined management report.

Auditors' responsibility for the audit of the consolidated financial statements and the combined management report

Our objective is to obtain reasonable assurance as to whether the consolidated financial statements as a whole are free from material – intentional or unintentional – misstatements, and whether the combined management report as a whole provides a suitable view of the Group's situation and is in all material respects consistent with the financial statements and with the findings of the audit, complies with German legal requirements, and suitably presents the opportunities and risks of future development, and to issue an auditors' report containing our audit opinions on the consolidated financial statements and the combined management report.

Reasonable assurance is a high degree of certainty, but there is no guarantee that an audit conducted in accordance with Section 317 HGB and the EU Audit Regulation, observing generally accepted auditing principles for the audit of financial statements promulgated by the Institute of Public Auditors in Germany (IDW), and in supplementary observance of the ISAs will always reveal a material misrepresentation. Misstatements may result from violations or inaccuracies and are considered material if it is reasonable to expect that they will affect, individually or collectively, the economic decisions of addressees made on the basis of these consolidated financial statements and the combined management report.

During the audit, we exercise due discretion and maintain a critical attitude. In addition to this

- we identify and assess the risks of material misstatements – whether intentional or unintentional – in the consolidated financial statements and the combined management report, plan and perform audit procedures in response to these risks, and obtain audit evidence that is sufficient and adequate to serve as a basis for our audit opinions. The risk that material misrepresentations are not detected is higher for violations than for inaccuracies, as violations may involve fraudulent collaboration, forgeries, intentional incompleteness, misleading representations, or the overriding of internal controls.
- we gain an understanding of the internal control system relevant to the audit of the consolidated financial statements and the arrangements and measures relevant to the audit of the combined management report to plan audit procedures that are appropriate in the circumstances, but not with the objective of expressing an audit opinion on the effectiveness of these of the Company's systems.
- we assess the appropriateness of the financial reporting methods applied by Management and the tenability of the estimates and related disclosures made by Management.
- we draw conclusions on the appropriateness of the application of the going-concern accounting principle applied by Management and, on the basis of the audit evidence obtained, whether there is essential uncertainty in connection with events or circumstances that might give rise to significant doubts about the Group's ability to continue operations. If we come to the conclusion that there is essential uncertainty, we are obliged to draw attention to the related disclosures in the consolidated financial statements and the combined management report or, if these disclosures are inappropriate, to modify our relevant audit opinion. We draw our conclusions based on the audit evidence obtained up to the date of our audit opinion. However, future events or circumstances may result in the Group no longer being able to continue its business activities.
- we assess the overall presentation, the structure and content of the consolidated financial statements, including the disclosures, and whether the consolidated financial statements present the underlying transactions and events in such a way that the consolidated financial statements give a true and fair view of the net assets, financial position, and results of operations of the Group in accordance with IFRSs as adopted by the EU and the additional requirements of German law pursuant to Section 315e (1) HGB.
- we obtain sufficient suitable audit evidence for the accounting information of the companies or business activities within the Group in order to give our opinion on the consolidated financial statements and the combined management report. We are responsible for the guidance, supervision, and conduct of the audit of the consolidated financial statements. We bear sole responsibility for our audit opinions.
- we assess the conformity of the combined management report with the consolidated financial statements, its legal compliance, and the view it provides of the Group's situation.

- we perform audit procedures on the forward-looking statements presented by Management in the combined management report. On the basis of adequate and suitable audit evidence, we trace in particular the significant assumptions on which Management's forward-looking statements are based and assess the proper derivation of the forward-looking statements from these assumptions. We do not express a separate audit opinion on the forward-looking statements or on the underlying assumptions. There is a significant, unavoidable risk that future events will differ materially from the forward-looking statements.

We discuss, with those responsible for monitoring, among other things the planned scope and timing of the audit and also significant audit findings, including any deficiencies in the internal control system that we identify during our audit.

We address a declaration that we have complied with the relevant independence requirements to those responsible for monitoring and discuss with them all relationships and other issues reasonably likely to affect our independence, and the safeguards we have put in place.

On the basis of the issues which we discussed with those responsible for monitoring, we determine the issues that were most significant for the audit of the consolidated financial statements in the current reporting period and are therefore the particularly important audit issues. We describe these issues in the auditor's report, unless laws or other legal provisions exclude the disclosure of such issues.

OTHER STATUTORY AND LEGAL REQUIREMENTS

Other disclosures pursuant to Article 10 EU Audit Regulation

We were elected as auditors by the Annual General Meeting on May 25, 2018. We were engaged by the Supervisory Board on July 10, 2018. We have been working uninterruptedly as statutory auditors of the consolidated financial statements of Bayer Aktiengesellschaft, Leverkusen, since the 2017 fiscal year.

We declare that the audit opinions contained in this Auditor's Report are consistent with the additional report to the Audit Committee pursuant to Article 11 EU Audit Regulation (Audit Report).

RESPONSIBLE AUDITOR

The public auditor responsible for the audit is Prof. Dr. Frank Beine.

Munich, February 20, 2019

Deloitte GmbH
Wirtschaftsprüfungsgesellschaft

Heiner Kompenhans	Prof. Dr. Frank Beine
German Public Auditor	German Public Auditor

Appendix to the Auditors' Report: components of the combined management report that were not audited as to their contents

We did not audit the following components of the combined management report as to their contents:

- the parts marked "audited with limited assurance" and the following sections of the non-financial statement integrated in the combined management report pursuant to Sections 289b to 289e, 315b and 315c HGB:

Section	Chapter
Diverse stakeholders in focus	1.2.3 Sustainability Management
Collaboration formats aimed at specific target groups	1.2.3 Sustainability Management
Binding and transparent compensation structures	1.4.1 Employees
Quality management of segments	1.6.1 Product Stewardship
Biodiversity in the segments	1.6.1 Product Stewardship
Commitment to reducing animal studies	1.6.1 Product Stewardship
Global pharmaceutical monitoring system	1.6.1 Product Stewardship
Processes in plant biotechnology	1.6.1 Product Stewardship
Training of farmers and Bayer employees	1.6.1 Product Stewardship
Occupational illnesses	1.6.2 Occupational, Plant and Transportation Safety
Other Direct Air Emissions	1.6.3 Environmental Protection
Water Use in the Bayer Group 2018	1.6.3 Environmental Protection
Waste by Means of Disposal	1.6.3 Environmental Protection
Liaison offices – Contact with poltical stakeholders	4.2 Compliance

- the corporate governance statement pursuant to Section 289f and Section 315d HGB contained in Chapter 4.1 of the combined management report.

Furthermore, we did not audit the content of the following disclosures that are not normally part of the management report. Disclosures that are not normally part of the management report in the combined management report are disclosures that are neither required by Sections 289 to 289f, 315 to 315d of the German Commercial Code (HGB) nor by DRS 20.

- The information in section 2.2.2 of the combined management report on pro forma sales by strategic business unit of the Crop Science Division.

Independent Auditor's Report on a Limited Assurance Engagement on Sustainability Information

To Bayer Aktiengesellschaft, Leverkusen (Germany)

Our engagement

According to our engagement, we have performed a limited assurance engagement on the following information within the combined management report 2018 of Bayer Aktiengesellschaft, Leverkusen (Germany), for the period from January 1 to December 31, 2018: Diverse stakeholders in focus, Collaboration formats aimed at specific target groups, Binding and transparent compensation structures, Quality management of segments, Biodiversity in the segments, Commitment to reducing animal studies, Global pharmaceutical monitoring system, Processes in plant biotechnology, Training of farmers and Bayer employees, Occupational illnesses, Other Direct Air Emissions, Water Use in the Bayer Group 2018, Waste by Means of Disposal and Liaison offices – Contact with political stakeholders.

Our engagement does not include links to web pages.

Responsibility of the executive directors

The executive directors of Bayer Aktiengesellschaft are responsible for the preparation of infor-mation listed above in compliance with the Sustainability Reporting Standards of the Global Reporting Initiative provided in the "Core" option (hereafter: "GRI Standards") as well as for the selection of the disclosures to be assessed.

This responsibility of the company's executive directors includes the selection and application of appropriate methods for the sustainability reporting as well as making assumptions and estimates related to individual sustainability disclosures, which are reasonable in the circumstances. In addition, the executive directors are responsible for such internal controls they have determined necessary to enable the preparation of information listed above that is free from material misstatements, whether intentional or unintentional.

Practitioner's responsibility

Our responsibility is to express a limited assurance conclusion on the disclosures as listed above in the combined management report 2018, based on the assurance engagement we have performed.

We are independent of Bayer Aktiengesellschaft in accordance with the provisions under German commercial law and professional requirements, and we have fulfilled our other ethical responsibilities in accordance with these requirements.

Our audit company applies the German national legal requirements and the German profession's pronouncements for quality control, in particular the by-laws governing the rights and duties of public auditors and chartered accountants (Berufssatzung für Wirtschaftsprüfer und vereidigte Buchprüfer) as well as the IDW Standard on Quality Control 1: Requirements for Quality Control in Audit Firms [IDW Qualitätssicherungsstandard 1: Anforderungen an die Qualitätssicherung in der Wirtschaftsprüferpraxis (IDW QS 1)], which comply with the International Standard on Quality Control 1 (ISQC 1) issued by the International Auditing and Assurance Standards Board (IAASB).

We conducted our assurance engagement in compliance with the International Standard on Assurance Engagements (ISAE) 3000 (Revised): "Assurance Engagements other than Audits or Reviews of Historical Financial Information" issued by the IAASB. This standard requires that we plan and perform the assurance engagement in a form that enables us to conclude with limited assurance that nothing has come to our attention that causes us to believe that the information as listed above in the combined management report 2018 of Bayer Aktiengesellschaft for the period from January 1 to December 31, 2018 has not been prepared, in all material respects, in compliance with the GRI Standards. In a limited assurance engagement the assurance procedures are less in extent than for a reasonable assurance engagement and, therefore, a substantially lower level of assurance is obtained. The assurance procedures selected depend on the practitioner's professional judgment.

Within the scope of our limited assurance engagement, which was performed – with work stoppages – from September 2018 to February 2019, we conducted, amongst others, the following audit procedures and other activities:

- Obtaining an understanding of the structure of the sustainability organization and of the stakeholder engagement
- An on-site visit to Bergkamen, Dormagen, Frankfurt, Knapsack, Leverkusen, Uerdingen and Wuppertal (Germany); Muttenz (Switzerland); Vapi (India); as well as Belford Roxo (Brazil) and Kansas City, Luling, Muscatine, Illiopolis, St. Louis and Soda Springs (USA) as part of an investigation into the processes for collecting, analyzing and aggregating selected data
- Interview of the relevant employees that participated in the preparation of the information listed above about the preparation process, about the internal control system relating to the process as well as about the disclosures
- Identification of the possible risks of material misstatement concerning the information in the annual report as listed above
- Analytical assessment of disclosures in the combined management report as listed above
- Comparison of selected disclosures with corresponding data in the consolidated financial statements, the annual financial statements and combined management report
- Evaluation of the presentation of the disclosures

Practitioner's conclusion

Based on the assurance work performed and evidence obtained, nothing has come to our attention that causes us to believe that the information in the combined management report of Bayer Aktiengesellschaft as listed above, for the period from January 1 to December 31, 2018 has not been prepared, in all material respects, in compliance with the GRI Standards: Option "Core".

Our conclusion does not include links to internet pages.

Purpose of the assurance statement

We issue this report on the basis of the engagement agreed with Bayer Aktiengesellschaft. The limited assurance engagement has been performed for purposes of Bayer Aktiengesellschaft and the report is solely intended to inform Bayer Aktiengesellschaft on the results of the assurance engagement.

Liability

The report is not intended to provide third parties with support in making (financial) decisions. Our responsibility exclusively refers to Bayer Aktiengesellschaft and is also restricted under the engagement agreed with Bayer Aktiengesellschaft on July 18, 2018 as well as in accordance with the "General engagement terms for Wirtschaftsprüfer and Wirtschaftsprüfungsgesellschaften (German public auditors and German public audit firms)" from January 1, 2017 of the Institut der Wirtschaftsprüfer in Deutschland e.V. We do not assume any responsibility to third parties.

Munich (Germany), February 20, 2019

Deloitte GmbH
Wirtschaftsprüfungsgesellschaft

Heiner Kompenhans German Public Auditor	Prof. Dr. Frank Beine German Public Auditor

C Further Information

Governance Bodies

Supervisory Board

Members of the Supervisory Board held offices as members of the supervisory board or a comparable supervising body of the corporations listed (as at December 31, 2018, or the date on which they ceased to be members of the Supervisory Board of Bayer AG) and as shown attended the meetings of the Supervisory Board and committees to which he or she belonged.

Werner Wenning
Leverkusen, Germany
(born October 21, 1946)

Chairman of the Supervisory Board effective October 2012

Chairman of the Supervisory Board of Bayer AG

Memberships on other supervisory boards:

- Henkel Management AG
- Siemens AG (Vice Chairman)

Memberships in comparable supervising bodies of German or foreign corporations:

- Henkel AG & Co. KGaA (Shareholders' Committee)

Attendance at Supervisory Board and committee meetings: 17 of 17

Oliver Zühlke
Solingen, Germany
(born December 11, 1968)

Vice Chairman of the Supervisory Board effective July 2015

Member of the Supervisory Board effective April 2007

Chairman of the Bayer Central Works Council

Attendance at Supervisory Board and committee meetings: 13 of 14

Dr. Paul Achleitner
Munich, Germany
(born September 28, 1956)

Member of the Supervisory Board effective April 2002

Chairman of the Supervisory Board of Deutsche Bank AG

Memberships on other supervisory boards:

- Daimler AG
- Deutsche Bank AG (Chairman)

Memberships in comparable supervising bodies of German or foreign corporations:

- Henkel AG & Co. KGaA (Shareholders' Committee)

Attendance at Supervisory Board and committee meetings: 12 of 12

Dr. rer. nat. Simone Bagel-Trah
Düsseldorf, Germany
(born January 10, 1969)

Member of the Supervisory Board effective April 2014

Chairwoman of the Supervisory Board of Henkel AG & Co. KGaA and Henkel Management AG and of the Shareholders' Committee of Henkel AG & Co. KGaA

Memberships on other supervisory boards:

- Henkel AG & Co. KGaA (Chairwoman)
- Henkel Management AG (Chairwoman)
- Heraeus Holding GmbH

Memberships in comparable supervising bodies of German or foreign corporations:

- Henkel AG & Co. KGaA (Shareholders' Committee, Chairwoman)

Attendance at Supervisory Board meetings: 6 of 7

Dr. Norbert W. Bischofberger
Hillsborough, U.S.A.
(born January 10, 1956)

Member of the Supervisory Board effective April 2017

Executive Vice President Research & Development and Chief Scientific Officer of Gilead Sciences, Inc. (until April 2018)

President and Chief Executive Officer of Kronos Bio, Inc. (effective May 2018)

Memberships in comparable supervising bodies of German or foreign corporations:

- InCarda Therapeutics, Inc. (Board of Directors)
- Kronos Bio, Inc. (Board of Directors) (effective May 2018)

Attendance at Supervisory Board and committee meetings: 8 of 8

André van Broich
Dormagen, Germany
(born June 19, 1970)

Member of the Supervisory Board effective April 2012

Chairman of the Bayer Group Works Council

Chairman of the Works Council of the Dormagen site

Attendance at Supervisory Board and committee meetings: 11 of 11

Thomas Ebeling
Muri bei Bern, Switzerland
(born February 9, 1959)

Member of the Supervisory Board effective April 2012

Chief Executive Officer of ProSiebenSat.1 Media SE (until February 2018)

Independent consultant (effective March 2018)

Memberships on other supervisory boards:

- Apleona GmbH (effective June 2018) (Chairman effective August 2018)
- GfK SE
- ClearVat AG

Memberships in comparable supervising bodies of German or foreign corporations:

- Cullinan Oncology, LLC (Board of Directors)
- Heilpflanzenwohl AG (Board of Directors)
- Ocean Outdoor Ltd. (Board of Directors) (effective October 2018)

Attendance at Supervisory Board meetings: 6 of 7

Dr. Thomas Elsner
Düsseldorf, Germany
(born April 24, 1958)

Member of the Supervisory Board effective April 2017

Chairman of the Bayer Group Managerial Employees' Committee

Chairman of the Managerial Employees' Committee of Bayer AG Leverkusen

Attendance at Supervisory Board and committee meetings: 11 of 11

Johanna W. (Hanneke) Faber
Amstelveen, Netherlands
(born April 19, 1969)

Member of the Supervisory Board effective April 2016

President Europe at Unilever N.V./plc

Attendance at Supervisory Board meetings: 6 of 7

Colleen A. Goggins
Princeton, U.S.A.
(born September 9, 1954)

Member of the Supervisory Board effective April 2017

Independent consultant

Memberships in comparable supervising bodies of German or foreign corporations:

- The Toronto-Dominion Bank (Board of Directors)
- IQVIA Holdings Inc. (Board of Directors)
- SIG Combibloc Services AG (Board of Directors) (effective September 2018)

Attendance at Supervisory Board meetings: 7 of 7

Heike Hausfeld
Leverkusen, Germany
(born September 19, 1965)

Member of the Supervisory Board effective April 2017

Chairwoman of the Works Council of the Leverkusen site

Memberships on other supervisory boards:

- Bayer Business Services GmbH (Vice Chairwoman)

Attendance at Supervisory Board and committee meetings: 9 of 10

Reiner Hoffmann
Wuppertal, Germany
(born May 30, 1955)

Member of the Supervisory Board effective October 2006

Chairman of the German Trade Union Confederation

Attendance at Supervisory Board meetings: 7 of 7

Frank Löllgen
Cologne, Germany
(born June 14, 1961)

Member of the Supervisory Board effective November 2015

North Rhine District Secretary of the German Mining, Chemical and Energy Industrial Union

Memberships on other supervisory boards:

- Evonik Industries AG
- IRR-Innovationsregion Rheinisches Revier GmbH

Attendance at Supervisory Board and committee meetings: 11 of 11

Prof. Dr. Wolfgang Plischke
Aschau im Chiemgau, Germany
(born September 15, 1951)

Member of the Supervisory Board effective April 2016

Independent consultant

Memberships on other supervisory boards:

- Evotec AG (Chairman)

Attendance at Supervisory Board and committee meetings: 12 of 12

Petra Reinbold-Knape
Gladbeck, Germany
(born April 16, 1959)

Member of the Supervisory Board effective April 2012

Member of the Executive Committee of the German Mining, Chemical and Energy Industrial Union

Memberships on other supervisory boards:

- Lausitz Energie Bergbau AG (Vice Chairwoman)
- Lausitz Energie Kraftwerk AG (Vice Chairwoman)

Memberships in comparable supervising bodies of German or foreign corporations:

- DGB Rechtsschutz GmbH (effective February 2018)

Attendance at Supervisory Board and committee meetings: 9 of 9

Detlef Rennings
Krefeld, Germany
(born April 29, 1965)

Member of the Supervisory Board effective June 2017

Chairman of the Central Works Council of CURRENTA

Chairman of the Works Council of CURRENTA of the Uerdingen site

Memberships on other supervisory boards:

- Currenta Geschäftsführungs-GmbH

Attendance at Supervisory Board meetings: 7 of 7

Sabine Schaab
Wuppertal, Germany
(born June 25, 1966)

Member of the Supervisory Board effective October 2017

Vice Chairwoman of the Works Council of the Elberfeld site

Attendance at Supervisory Board and committee meetings: 8 of 8

Michael Schmidt-Kießling
Schwelm, Germany
(born March 24, 1959)

Member of the Supervisory Board effective April 2012

Chairman of the Works Council of the Elberfeld site

Attendance at Supervisory Board meetings: 7 of 7

Dr. Klaus Sturany*
Ascona, Switzerland
(born October 23, 1946)

Member of the Supervisory Board until May 2018

Member of various supervisory boards

Memberships on other supervisory boards:

- Hannover Rück SE (Vice Chairman)

Attendance at Supervisory Board and committee meetings: 5 of 5

Prof. Dr. Dr. h.c. Otmar D. Wiestler
Berlin, Germany
(born November 6, 1956)

Member of the Supervisory Board effective October 2014

President of the Helmholtz Association of German Research Centres

Attendance at Supervisory Board and committee meetings: 8 of 8

Prof. Dr. Norbert Winkeljohann*
Osnabrück, Germany
(born November 5, 1957)

Member of the Supervisory Board effective May 2018

Chairman of the Board of Management of PricewaterhouseCoopers GmbH Wirtschaftsprüfungsgesellschaft (until June 2018)

Chief Executive Officer of PwC Europe SE (until June 2018)

Independent management consultant (effective July 2018)

Memberships on other supervisory boards:

- Deutsche Bank AG (effective August 2018)
- heristo aktiengesellschaft (Chairman) (effective July 2018)

Attendance at Supervisory Board and committee meetings: 6 of 6

* Expert member pursuant to Section 100, Paragraph 5 of the German Stock Corporation Act (AktG)

Standing committees of the Supervisory Board of Bayer AG (as at December 31, 2018)

Presidial Committee / Mediation Committee
Wenning (Chairman), Achleitner, Reinbold-Knape, Zühlke

Audit Committee
Winkeljohann* (Chairman), Elsner, Löllgen, Plischke, Wenning, Zühlke

Human Resources Committee
Wenning (Chairman), Achleitner, Hausfeld, van Broich

Nominations Committee
Wenning (Chairman), Achleitner

Innovation Committee
Plischke (Chairman), Bischofberger, van Broich, Reinbold-Knape, Schaab, Wenning, Wiestler, Zühlke

Board of Management

Members of the Board of Management held offices as members of the supervisory board or a comparable supervising body of the corporations listed (as at December 31, 2018, or the date on which they ceased to be members of the Board of Management of Bayer AG):

Werner Baumann
(born October 6, 1962)
Chairman
Member of the Board of Management effective January 1, 2010, appointed until April 30, 2021

Liam Condon
(born February 27, 1968)
Member of the Board of Management effective January 1, 2016, appointed until December 31, 2023

Dr. Hartmut Klusik
(born July 30, 1956)
Member of the Board of Management effective January 1, 2016, appointed until December 31, 2019
Labor Director
- Currenta Geschäftsführungs-GmbH (Chairman)

Kemal Malik
(born September 29, 1962)
Member of the Board of Management effective February 1, 2014, appointed until January 31, 2022

Wolfgang Nickl
(born May 9, 1969)
Member of the Board of Management effective April 26, 2018, appointed until April 25, 2021
- Bayer Business Services GmbH (Chairman) (effective June 2018)

Stefan Oelrich
(born June 1, 1968)
Member of the Board of Management effective November 1, 2018, appointed until October 31, 2021

Heiko Schipper
(born August 21, 1969)
Member of the Board of Management effective March 1, 2018, appointed until February 28, 2021

Member of the Board of Management until May 31, 2018

Johannes Dietsch
(born January 2, 1962)
- Bayer Business Services GmbH (Chairman)
- Covestro AG
- Covestro Deutschland AG

Member of the Board of Management until March 31, 2018

Erica Mann
(born October 11, 1958)

Member of the Board of Management until October 31, 2018

Dieter Weinand
(born August 16, 1960)
- HealthPrize Technologies LLC (Board of Directors) (until March 2018)
- Replimune Inc. (Board of Directors) (effective June 2018)

Glossary

A

Access to Medicine (ATM) describes activities to promote general access to essential medicines and improve knowledge on health.

B

Biocides are substances and products that control pests such as insects, mice and rats, as well as algae, fungi and bacteria.

Breakthrough innovation is a term used to describe disruptive innovations in the form of pioneering advances in technology and business models with the power to change markets.

C

CDP is a nonprofit organization that works on behalf of institutional investors to compile annual rankings of detailed environmental data, especially in respect of greenhouse gas emissions (CDP-Climate) and water management (CDP-Water), from over 2,400 companies worldwide. According to CDP, more than 650 investors representing fund assets of around US$87 trillion currently draw on this information for their investment decisions.

Consumer-validated concepts are concepts that are assessed in terms of their potential for success through consumer surveys conducted as part of market research activities.

(Corporate) compliance comprises the observance of statutory and company regulations on lawful and responsible conduct.

Corruption Perceptions Index (CPI) Since 1995, NGO Transparency International has produced an annual index of countries by the perceived level of public-sector corruption. The CPI ranks countries according to the extent to which public servants and politicians are believed to engage in bribery and to grant or accept undue advantage.

E

Environmentally relevant sites are Bayer locations with annual net energy consumption of over 1.5 terajoules.

G

GHG Protocol The Greenhouse Gas Protocol is an internationally recognized tool for recording, quantifying and reporting greenhouse gas emissions. Its standards cover all emissions within a company's value chain. Bayer aligns itself to the Corporate Standard for direct (Scope 1) and indirect (Scope 2) greenhouse gas emissions and also to the Corporate Value Chain (Scope 3) Accounting and Reporting Standard, which covers further indirect emissions along the value chain. Dual reporting was introduced for Scope 2. Indirect emissions have to be reported using both the location-based and the market-based methods. The location-based method uses regional or national average emissions factors, while the market-based method applies provider- or product-specific emissions factors based on contractual instruments.

Global commercial paper program Commercial paper (CP) issued under Bayer's program is a short-term, unsecured debt instrument normally issued at a discount and redeemed at nominal value. It is a flexible way of obtaining short-term funding on the capital market. Bayer's commercial paper program allows the company to issue commercial paper on both the U.S. and European markets.

GxP is a collective term for all guidelines that govern "good working practice" and are particularly relevant for the fields of medicine, pharmacy and pharmaceutical chemistry. The "G" stands for "Good" and the "P" for "Practice," while the "x" in the middle is replaced by the respective abbreviation for the specific area of application – such as Good Manufacturing Practice (GMP), Good Laboratory Practice (GLP), Good Clinical Practice (GCP) or Good Agricultural Practice (GAP). These guidelines are established by institutions such as the European Medicines Agency or the U.S. Food and Drug Administration.

H

HSEQ stands for health, safety, environment and quality.

I

ILO core labor standards The eight core labor standards of the ILO (International Labour Organization) that define the minimum requirements for humane working conditions are internationally recognized "qualitative social standards." They represent universal human rights that are deemed valid in all countries regardless of their economic development status.

L

Local procurement at Bayer means that goods and services are ordered from suppliers that are based in the same country as the (Bayer) company that receives them.

N

Neonicotinoids are a chemical class of systemic insecticides.

O

OTC (over-the-counter) designates the business with nonprescription medicines.

P

Pharmacovigilance is defined as activities and the science they are based on that relate to the identification, assessment, comprehension and prevention of side effects or other problems associated with pharmaceutical products.

Phase I-IV studies are clinical phases in the development of a drug product. The active ingredient candidate is generally tested in healthy subjects in Phase I, and in patients in Phases II and III. The studies test the therapeutic tolerability and efficacy of active ingredients in a specific indication. Phase IV studies are conducted following the approval of a new drug product to monitor its safety and efficacy over an extended period of time. The studies are subject to strict legal requirements and documentation procedures.

R

3Rs principle (replace, reduce, refine) Replace: prior to each project, Bayer checks whether an approved method is available that does not rely on animal studies and then applies it. Reduce: in case no alternative method exists, only as many animals are used as are needed to achieve scientifically meaningful results based on statutory requirements. Refine: Bayer ensures that animal studies are performed in a way that minimizes any suffering.

S

Significant locations of operation A selection of countries that accounted for more than 80% of total Bayer Group sales in 2018 (Argentina, Australia, Brazil, Canada, China, France, Germany, India, Italy, Japan, Mexico, Poland, Russia, Spain, Switzerland, Turkey, the United Kingdom and the United States)

Social innovation To tackle the challenges of our time, we need to think and work in a way that goes beyond the boundaries of scientific disciplines and institutions – both in the science sector and social domain. The term defines the process by which new social practices emerge, prevail and become more widespread in various areas of society.

V

Vector control describes methods for the avoidance or targeted control of organisms that transmit pathogens triggering infectious diseases. Vectors include blood-sucking insects such as the Anopheles mosquito, which can transfer malaria parasites, for example.

Financial Calendar

Q1 2019 Interim Report[1]	April 25, 2019
Annual Stockholders' Meeting 2019	April 26, 2019
Planned dividend payment day	May 2, 2019
Half-Year Report 2019	July 30, 2019
Q3 2019 Interim Report[1]	October 30, 2019
Annual Report 2019	February 27, 2020
Q1 2020 Interim Report[1]	April 27, 2020
Annual Stockholders' Meeting 2020	April 28, 2020

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Forward-Looking Statements
This release may contain forward-looking statements based on current assumptions and forecasts made by Bayer management. Various known and unknown risks, uncertainties and other factors could lead to material differences between the actual future results, financial situation, development or performance of the company and the estimates given here. These factors include those discussed in Bayer's public reports which are available on the Bayer website at www.bayer.com. The company assumes no liability whatsoever to update these forward-looking statements or to conform them to future events or developments.

[1] In 2019, Bayer will for the first time publish quarterly statements pursuant to Section 53 of the Exchange Rules for the Frankfurter Wertpapierbörse (FWB) for the first and third quarters.

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