Indicators

We use indicators to measure and assess our corporate responsibility performance. The following key figures have undergone a limited assurance by KPMG AG Wirtschaftsprüfungsgesellschaft.

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Indicators: Economics

Net sales, operating result (EBIT) and research and development costs, by business sector

€ million	Healthcare	Life Science	Performance Materials	Group[1]
2015				
Net sales	6,934	3,355	2,556	**12,845**
Operating result (EBIT)	1,097	301	878	**1,843**
R&D costs	1,310	197	197	**1,709**
2016				
Net sales	6,855	5,658	2,511	**15,024**
Operating result (EBIT)	1,593	556	823	**2,481**
R&D costs	1,496	260	213	**1,976**

1 As a non-operating segment, Corporate and Other is not shown here as a separate item, but rather under Segment Reporting in our 2016 Annual Report.

Indicators: compliance

Internal audits on corruption and Human Rights Charter

	2013	2014	2015	2016[1]
Number of audits relating to corruption	30	36	49	55
% of audits relating to corruption	64	68	64	68
Number of audits relating to the workplace requirements of our Human Rights Charter	27	32	41	47

1 Includes Sigma-Aldrich as of 2016

In 2015, 17% of all subsidiaries (excluding minority holdings, EMD Millipore Corporation, and Merck KGaA, Darmstadt, Germany) were audited for the period between the third quarter of 2013 and the second quarter of 2014, covering approximately 33% of sales.

In 2016, we audited 12% of all legacy Merck subsidiaries (excluding minority holdings, EMD Millipore Corporation, and Merck KGaA, Darmstadt, Germany) for the period between the third quarter of 2014 and the second quarter of 2015, covering approximately 20% of all sales. We also audited 8% of all Sigma-Aldrich sites, a company acquired in 2015.

Reported compliance violations

	2013	2014	2015	2016[1]
Number of reported compliance incidents	22	26	33	36
Number of confirmed cases	9	11	8	12

1 Includes Sigma-Aldrich as of 2016

Compliance training

	2013	2014[1]	2015	2016[2]
Total number of persons trained on anti-corruption guidelines	**24,168**	**7,519[3]**	**20,404[3]**	**29,764[3]**
% of employees trained on anti-corruption	63	14	43	51
by employee category				
Number of employees Global Grade 10 or higher trained on anti-corruption	12,390	3,071	12,747	14,379
% of employees Global Grade 10 or higher trained on anti-corruption	69	17	64	84
% of employees Global Grade 9 or lower trained on anti-corruption	51	12	22	34
by region (%)[4]				
Europe	–	–	–	54
North America	–	–	–	57
Asia-Pacific (APAC)	–	–	–	38
Latin America	–	–	–	52
Middle East and Africa (MEA)	–	–	–	66

1 In Q1 – Q3 2014, Group Compliance performed a thorough analysis and review of its Compliance Training Program. No courses were scheduled for these quarters.
2 Includes Sigma-Aldrich as of 2016
3 Includes contractors, external supervised workers (e.g. temps) and contract partners working on-site who were trained on anti-corruption guidelines (2015: 3,026, 2016: 3,875).
4 As of 2016, we are also reporting the training rate by region. No such data was tracked for the preceding years.

In order to address the special responsibility held by management personnel, as well as by staff with HR responsibility, these employees are increasingly receiving training on anti-corruption guidelines. This applies to all employees rated Global Grade (GG) 10 or higher.

Our compliance and anti-corruption principles are communicated to all our business partners, who undergo a Business Partner Risk Management (BPRM) process.

Legal actions

	2013	2014	2015[1]	2016
Total number[2] of legal actions pending or completed (for anti-competitive behavior, violations of anti-trust or violations of monopoly legislation)	**3**	**2**	**2**	**2**
pending	2	2	2	2
completed	1	0	0	0

1 Includes Sigma-Aldrich as of 2015

2 As published in the annual reports, the herein listed total number of legal actions refers to the significant legal risks as per the company's definition. The significance of legal risks is based on potential negative effects on projected financial objectives as well as on the probability of occurrence.

For further information please see our annual reports:

- Annual Report 2013, pages 132-134 and pages 226-227, no. 48
- Annual Report 2014, pages 130-131 and pages 213-215, no. 48
- Annual Report 2015, pages 128-129 and pages 212-213, no. 27
- Annual Report 2016, pages 135-136 and pages 228-229, no. 26

Indicators: products

Customer privacy[1]

	2013	2014	2015[2]	2016[2]
Total number of substantiated complaints received from outside parties	0	0	0	0
Total number of complaints from regulatory bodies	0	1	0	0
Total number of identified leaks, thefts, or losses of customer data	0	0	0	1

1 This data only reflects incidents classified as significant.
2 The figures exclude Sigma-Aldrich since the integration process is still underway.

Indicators: Employees

We track data on our employees Group-wide. When the legal frameworks are not comparable or no global data is available, the data will then only reflect our employees in Germany (approximately 25% of our workforce).

Employee facts & figures worldwide

Total number of employees

As of Dec. 31	2013	2014	2015[1]	2016
Total number of employees	**38,154**	**39,639**	**49,613**	**50,414**
Men	22,253	23,273	28,997	28,848
Women	15,901	16,366	20,616	21,566

1 Includes Sigma-Aldrich as of 2015

Number of employees by hierarchical level

As of Dec. 31	2013	2014[1]	2015[2]	2016[3]
Total employees	**38,154**	**39,639**	**40,718**	**50,414**
Senior management (Global Grade above 17)	63	63	75	87
Low and middle management (Global Grade 14–17)	1,949	2,108	2,333	2,800
Other employees (Global Grade below 14)	36,142	37,468	38,310	47,527
% of women (total)	**42**	**41**	**41**	**43**
thereof in senior management (Global Grade above 17)	10	10	12	15
thereof in low and middle management (Global Grade 14–17)	498	562	633	817
thereof other employees (Global Grade below 14)	15,393	15,794	16,182	20,734
% of men (total)	**58**	**59**	**59**	**57**
thereof in senior management (Global Grade above 17)	53	53	63	72
thereof in low and middle management (Global Grade 14–17)	1,451	1,546	1,700	1,983
thereof other employees (Global Grade below 14)	20,748	21,673	22,128	26,793
by age group **Up to 29 years old (%)**	**15**	**15**	**15**	**15**
thereof in senior management (Global Grade above 17)	0	0	0	0
thereof in low and middle management (Global Grade 14–17)	5	6	5	8
thereof other employees (Global Grade below 14)	5,901	5,884	5,848	7,411
30 to 49 years old (%)	**64**	**64**	**64**	**62**
thereof in senior management (Global Grade above 17)	27	24	29	35
thereof in low and middle management (Global Grade 14–17)	1,233	1,340	1,469	1,720
thereof other employees (Global Grade below 14)	23,302	24,082	24,680	29,768
50 years or older (%)	**20**	**21**	**21**	**23**
thereof in senior management (Global Grade above 17)	36	39	46	52
thereof in low and middle management (Global Grade 14–17)	711	762	859	1,072
thereof other employees (Global Grade below 14)	6,939	7,502	7,782	10,348

1 Figures do not include the employees of AZ Electronic Materials, a company acquired in July 2014, because our Global Grading System had not yet been implemented for them as of December 31, 2014. These employees are included under "thereof other employees (Global Grade below 14)".

2 As of Dec. 31 2015, the Global Grading System had not yet been implemented for employees of Sigma-Aldrich, a company acquired in November 2015. These figures therefore exclude Sigma-Aldrich.

3 From 2016 on, these figures include Sigma-Aldrich, but as of Dec. 31 2016 the Global Grading System had not yet been implemented for employees of Sigma-Aldrich legal entities in Germany or for employees of Allergopharma. These employees are included under "thereof other employees (Global Grade below 14)".

Average number of employees by functional area

Average number of employees	2013[1]	2014[1]	2015[2]	2016[2]
Group	**38,282**	**38,930**	**41,511**	**50,439**
Thereof women	**not recorded**	**16,110**	**17,180**	**21,136**
Production	9,985	10,176	11,563	14,829
Thereof women	not recorded	3,202	3,642	4,698
Logistics	1,779	2,207	2,581	3,955
Thereof women	not recorded	774	913	1459
Marketing and Sales	12,214	12,113	12,871	14,887
Thereof women	not recorded	4,814	5,204	6,401
Administration	5,106	6,342	6,763	8,190
Thereof women	not recorded	3,557	3,757	4,421
Research and Development	4,433	4,738	5,097	6,249
Thereof women	not recorded	2,534	2,674	3,274
Infrastructure and Other	4,765	3,354	2,636	2,329
Thereof women	not recorded	1,230	990	883

1 Average headcount (HC) 2014 and 2013 is calculated based on the End HC of the last 5 quarters divided by 5.

2 The average employee headcount for 2015 and 2016 is calculated by adding up all employees at the end of each of the last 13 months, and dividing this total by 13. Employees of Sigma-Aldrich, a company acquired in November 2015, are only included in the employee headcount calculations as of November 2015.

Number of employees by region

As of Dec. 31	2013	2014	2015[1]	2016
Total	**38,154**	**39,639**	**49,613**	**50,414**
Employees in Europe	20,013	20,537	23,429	24,438
thereof women	8,755	8,893	10,316	10,884
Employees in North America	4,911	5,092	9,794	10,037
thereof women	2,246	2,272	4,183	4,308
Employees in Asia-Pacific (APAC)	8,862	9,488	11,096	10,754
thereof women	2,947	3,176	3,706	3,981
Employees in Latin America	3,798	3,883	4,352	4,140
thereof women	1,699	1,745	1,986	1,910
Employees in the Middle East and Africa (MEA)	570	639	942	1,045
thereof women	254	280	425	483

1 Includes Sigma-Aldrich as of 2015

External contractors are currently not logged in our employee data system, nor do we currently have any plans to integrate them.

Employees by business sector

As of Dec. 31	2013	2014	2015[1]	2016
Healthcare employees	**17,278**	**17,757**	**18,566**	**18,837**
Thereof women	7,909	8,130	8,522	9,090
Thereof women (%)	46	46	46	48
Life Science employees	**9,837**	**9,796**	**18,611**	**19,178**
Thereof women	4,124	4,134	7,883	7,928
Thereof women (%)	42	42	42	41
Performance Materials employees	**4,709**	**5,995**	**6,228**	**5,469**
Thereof women	1,210	1,498	1,531	1,427
Thereof women (%)	26	25	25	26

1 Includes Sigma-Aldrich as of 2015

Employees by contract type

As of Dec. 31	2013	2014	2015[1]	2016
Total employees	**38,154**	**39,639**	**49,613**	**50,414**
Number of employees with permanent contracts	36,908	38,410	46,454	46,837
Number of employees with temporary contracts	1,246	1,219	3,159	3,577
% of employees with permanent contracts	97	97	94	93
% of employees with temporary contracts	3	3	6	7
full-time employees	34,911	37,573	47,292	48,056
% full-time	95	98	95	95
thereof women	13,524	14,497	18,557	19,457
thereof women (%)	39	39	39	40
part-time employees	1,994	2,066	2,321	2,358
% part-time	6	5	5	5
thereof women	1,839	1,869	2,059	2,109
thereof women (%)	92	90	89	89

1 Includes Sigma-Aldrich as of 2015

New employees

	2013	2014	2015[1]	2016
Total number of new employee hires	**5,007**	**6,212**	**5,710**	**7,085**
by age group				
Up to 29 years old	2,358	2,305	2,088	2,930
30 to 49 years old	2,397	3,361	3,252	3,736
50 or older	252	546	370	419
by gender				
Women	2,051	2,513	2,450	3,388
Men	2,945	3,689	3,260	3,697
by region				
Europe	1,757	2,312	2,119	2,689
North America	526	826	730	1,348
Asia-Pacific (APAC)	2,060	2,298	1,913	2,201
Latin America	548	619	780	636
Middle East and Africa (MEA)	116	157	168	211
Rate of new employee hires[2] (%)	**13**	**16**	**14**	**14**
by age group[3]				
Up to 29 years old	47	37	37	41
30 to 49 years old	48	54	57	53
50 or older	5	9	6	6
by gender[3]				
Women	41	41	43	48
Men	59	59	57	52
by region[3]				
Europe	35	37	37	38
North America	11	13	13	19
Asia-Pacific (APAC)	41	37	33	31
Latin America	11	10	14	9
Middle East and Africa (MEA)	2	3	3	3

1 These figures exclude the 8,975 Sigma-Aldrich employees, who are not classified as new hires because they joined Merck as part of the Sigma-Aldrich acquisition.

2 Formula for calculating the rate of new employee hires: Total number of new employee hires divided by Number of employees at the end of the fiscal year.

3 Formula for calculating the rate of new employee hires by age/gender/region: New employee hires of the focus group divided by the total number of new employee hires. In consequence of the modified calculation method and the new composition of our regions effective January 1, 2015 corresponding figures for the preceeding years have been retroactively adjusted.

Staff turnover[1]

	2013[2]	2014[2]	2015[3]	2016[3,4]
Total turnover rate	**14.61**	**11.01**	**10.38**	**12.07**
Turnover rate by gender				
Men	13.98	10.75	10.13	12.87
Women	15.00	11.38	10.73	10.96
Turnover rate by age group				
Up to 29 years old	21.55	18.71	17.49	19.20
30 to 49 years old	13.44	9.72	9.69	11.37
50 or older	13.01	9.49	8.08	9.19
Turnover rate by region				
Europe	14.61	7.05	6.22	6.23
North America	10.51	12.45	12.72	11.50
Asia-Pacific (APAC)[5]	not recorded	17.55	15.95	22.37
Latin America[5]	not recorded	13.67	15.29	18.85
Middle East and Africa (MEA)[5]	not recorded	13.62	12.00	10.80
Total number of leavers	**5,573**	**4,364**	**4,168**	**6,087**
by gender				
Men	3,110	2,502	2,386	3,771
Women	2,385	1,862	1,782	2,316
by age group				
Up to 29 years old	1,273	1,102	943	1,464
30 to 49 years old	3,300	2,474	2,505	3,589
50 or older	1,000	788	720	1,034
by region				
Europe	2,367	1,447	1,290	1,490
North America	516	634	638	1,132
Asia-Pacific (APAC)[5]	not recorded	1,665	1,540	2,543
Latin America[5]	not recorded	531	618	814
Middle East and Africa (MEA)[5]	not recorded	87	82	108

1 The table contains unadjusted turnover rates. The rate excludes employees who depart due to parental leave or a long-term illness, as well as employees who are transitioning to the non-working phase of partial retirement.

2 Employee turnover for fiscal 2013 and 2014 is calculated as follows: Total number of leavers of the past 12 months multiplied by 100 divided by the employee headcount as of December 31.

3 Employee headcount for fiscal 2015 and 2016 is calculated as follows: Total number of leavers from the past 12 months divided by the average employee headcount (see table "average number of employees by functional area") multiplied by 100. These figures exclude Sigma-Aldrich, which is still undergoing integration. In consequence of the modified calculation method for turnover rate, it is only possible to make a limited statement concerning interannual trends.

4 Includes Sigma-Aldrich as of 2016

5 We have no 2013 data for the Asia-Pacific (APAC), Latin America, and Middle East and Africa (MEA) regions, which were realigned in 2015.

Core labor standards of the International Labour Organization (ILO)

As of Dec. 31	2013	2014	2015	2016[1]
% of full-time employees (standard contract, excluding exempts) with contractually stipulated working hours of maximally 48 hours/week[2]	99	99	100	100
% of full-time employees (standard contract) with at least 15 vacation days/year[3]	98	95	97	95
% of female employees with access to maternity leave programs[4]	100	100	100	100
% of employees with the right to collective bargaining[5]	97	97	98	92
% of employees working at companies where collective agreements apply	68	66	71	54
% of sites that rule out complicity in child labor as described in ILO Convention 138	100	100	100	100
Age of youngest employees, excluding apprentices	16	17	17	17

1 Includes Sigma-Aldrich as of 2016
2 ILO: Hours of Work (Commerce and Offices) Convention, 1930 (No. 30)
3 ILO: Holidays with Pay Convention (Revised), 1970 (No. 132)
4 ILO: Maternity Protection Convention (Revised), 1952 (No. 103)
5 ILO: Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87)

Local minimum wage

As of Dec. 31	2013	2014	2015	2016[1]
% of sites that guarantee a salary above the local minimum wage[2]	100	100	100	100

1 Includes Sigma-Aldrich as of 2016
2 Minimum wage as stipulated by law, or derived from other provisions such as collective agreements.

The Global Rewards Policy applies across all our subsidiaries worldwide and guarantees a systematic compensation structure. Base pay is oriented on the median base pay, and short-term variable compensation is based on the third quartile of the relevant reference market. All employees within the lowest Grades are paid within this salary band, which corresponds at least to the local minimum wage.

Work-related accidents[1]

	2013	2014	2015[2]	2016
Lost Time Injury Rate (LTIR=workplace accidents resulting in missed days of work per one million man-hours)	**2.2**	**1.8**	**1.4**	**1.3**
by region				
Europe	3.7	2.9	2.6	2.1
North America	0.9	1.0	0.9	1.1
Asia-Pacific (APAC)	0.3	0.5	0.3	0.4
Latin America	2.1	1.3	0.7	0.4
Middle East and Africa (MEA)	1.8	0.9	0.5	1.6
Number of deaths	**0**	**2**	**2**	**0**
by region				
Europe	0	0	1	0
North America	0	0	1	0
Asia-Pacific (APAC)	0	1	0	0
Latin America	0	1	0	0
Middle East and Africa (MEA)	0	0	0	0
by gender				
Women	0	1	1	0
Men	0	1	1	0

1 Including supervised workers
2 Includes Sigma-Aldrich as of 2015

Despite our efforts to prevent accidents, we had two fatal workplace accidents in 2015; one employee died in a car accident in the United States, and in Germany one employee suffered a fatal accident involving a forklift.

Both Merck employees as well as contractors have been included in the calculation of these indicators.

Through the LTIR, we record work-related accidents that involve at least one day of missed work. A work-related accident is an injury that results from the type of work, in the course of doing said work, and that has no internal cause. Work-related accidents are considered relevant if they occur on the premises, on business trips, during goods transport, as a result of external influences (e.g. natural disasters), or due to criminal acts involving personal injury. Commuting accidents and accidents during company sporting activities are not included. First-aid incidents are generally not included in the LTIR since these usually do not result in more than one day of missed work.

By 2020, we intend to sustainably lower the LTIR to 1.5. The aim is to permanently stabilize or outperform this challenging number, which we achieved for the first time in 2015.

We have defined the LTIR as a key indicator for the Merck Group. Therefore, we do not publish any other indicators such as workplace accidents, lost days or days of absence. The LTIR is not broken down by gender as this differentiation is not relevant to our strategic planning.

For the Merck KGaA sites in Darmstadt and Gernsheim (about 19% of the employees of the Merck Group), we only report work-related illnesses if these have been diagnosed and verified by a physician. In the 2015-2016 period, no cases of work-induced illness were recorded.

Spending on advanced training for employees

€	2013	2014	2015	2016[1]
Average continuing education spending per employee	679	718	775	736

1 Includes Sigma-Aldrich as of 2016

We record and report the costs of vocational training and continuing education for our employees. We are not currently tracking the average number of continuing education hours consolidated at Group level, but we are working on a technical solution.

Employees who regularly receive a performance and development evaluation

	2013[1]	2014[2]	2015[3]	2016[4]
% of employees who receive a performance and development evaluation	**72**	**79**	**88**	**97**
by gender				
Women	75	84	90	97
Men	71	77	87	97
by employee category				
Senior management (Global Grade above 17)	100	97[5]	100	100
Low and middle management (Global Grade 14–17)	100	96[5]	100	100
Other employees (Global Grade below 14)	72	78[5]	88	97

1 The 2013 data is based on a reporting date of March 12, 2014.
2 The 2014 data is based on a reporting date of March 2, 2015.
3 The 2015 data is based on a reporting date of February 29, 2016.
4 From 2016 on, figures include Sigma-Aldrich, but as of Dec. 31 2016, the Global Grading System had not yet been implemented for employees of Sigma-Aldrich legal entities in Germany and of Allergopharma.
5 The fluctuations in participant numbers by employee category can be explained by the process of Merck's acquisition of AZ Electronic Materials.

Regular feedback and employee performance evaluations are essential to fairly ranking individual performance and to helping all employees follow their own career path at Merck. Our globally uniform Performance and Talent Management Process requires annual feedback meetings and performance assessments for all employees rated Global Grade 10 and up in the position ranking system that was used in 2016. Apart from evaluating employee performance, this helps us to identify individual development opportunities.

When it comes to applying this process, our individual subsidiaries can decide for themselves whether to include employees rated below Global Grade 10. In Germany, all permanent employees have been participating in the Performance and Talent Management Process since 2013. In 2016, a total of 49,000 employees worldwide were involved in the process. The Performance and Talent Management Process is coordinated via our HR Suite IT system.

Internationality of employees

As of Dec. 31	2013	2014[1]	2015[2]	2016[3]
Number of nationalities	114	122	122	129
Number of nationalities in management positions (Global Grade 14 or above)	64	67	64	70
% of non-Germans in management positions (Global Grade 14 or above)	60	60	61	65

1 These figures do not include the employees of AZ Electronic Materials, a company that was acquired in July 2014. As of December 31, 2014, the Global Grading System had not yet been implemented there.
2 These figures do not include the employees of Sigma-Aldrich, a company that was acquired in November 2015. As of December 31, 2015, the Global Grading System had not yet been implemented there.
3 From 2016 on, figures include Sigma-Aldrich. However, as of Dec. 31 2016, the Global Grading System had not yet been implemented for employees of Sigma-Aldrich legal entities in Germany or for employees of Allergopharma.

Employee age by region

As of Dec. 31

Number of employees	Worldwide	North America	Europe (including Germany)	Germany	Asia-Pacific (APAC)	Latin America	Middle East and Africa (MEA)
2015[1]							
Up to 29 years old	7,565	1,314	2,912	1,624	2,496	666	177
thereof women	3,233	522	1,378	649	898	367	68
30 to 49 years old	31,047	5,117	14,589	6,775	7,651	3,092	598
thereof women	13,242	2,285	6,673	2,674	2,576	1,434	274
50 or older	11,001	3,363	5,928	3,539	949	594	167
thereof women	4,141	1,376	2,265	1,241	232	185	83
Average age	**41.2**	**44.2**	**42.4**	**43.0**	**36.7**	**39.5**	**39.5**
Total employees	**49,613**	**9,794**	**23,429**	**11,938**	**11,096**	**4,352**	**942**
2016							
Up to 29 years old	7,419	1,319	3,087	1,757	2,260	562	191
thereof women	3,331	548	1,470	695	922	312	79
30 to 49 years old	31,523	5,224	15,023	6,938	7,625	2,972	679
thereof women	13,849	2,327	6,985	2,780	2,817	1,405	315
50 or older	11,472	3,494	6,328	3,755	869	606	175
thereof women	4,386	1,433	2,429	1,333	242	193	89
Average age	**41.3**	**44.3**	**42.4**	**42.9**	**36.7**	**39.9**	**39.3**
Total employees	**50,414**	**10,037**	**24,438**	**12,450**	**10,754**	**4,140**	**1,045**

1 Figures include Sigma-Aldrich as of 2015

Global voluntary insurance benefits (voluntarily introduced and (co-) financed)

As of Dec. 31	2013[1]	2014[1]	2015[1]	2016
% of employees with healthcare benefits[2]	–	–	–	90
% of employees with Group accident insurance[3]	–	–	–	39
% of employees with life insurance[4]	–	–	–	57
% of employees with disability insurance (short-term and long-term)[5]	–	–	–	32

1 Since 2016, we've been reporting global voluntary insurance benefits that we offer our employees. No such data was tracked for the preceding years.

2 Any spend on voluntarily introduced and (co-) financed healthcare benefits for employees and possibly their dependents. Not taking into consideration any mandatory social security cover (Mostly covered by an insurance policy).

3 Any spend on voluntarily introduced and (co-) financed accident insurance that pays a defined amount in case of death or disability caused by a work-related accident (not taking into consideration any mandatory social security cover, e.g. workman's compensation).

4 Any spend on voluntarily introduced and (co-) financed life insurance cover that pays a defined amount of money in case of natural death (not accidental).

5 Any spend on voluntarily introduced and (co-) financed insurance cover that disability pays for salary continuation in case of inability to work caused by an insured incident.

All our employees are covered by either statutory or voluntary accident and health insurance.

We offer a company pension in numerous countries along with various programs for supplemental company pensions and survivor's benefits.

The global benefits listed in the table above are designed to provide additional security to our workforce and their families and to improve their quality of life. Benefits represent voluntarily employer-initiated as well as employer-financed assistance to our workforce in addition to the regular compensation package.

Our benefits offer meaningful choices, where possible, to support a diverse workforce and are sensitive to the needs and customs of the employees who use them, regardless of country, age, family status, interests, or values.

Long-term pension obligations and post-employment benefits

€ million	2013	2014	2015[1]	2016
Present value of all defined benefit obligations as of Dec. 31	2,737	3,813	4,153	4,698
Pension expenses	147	157	210	226

1 Includes Sigma-Aldrich as of 2015

Depending on the legal, economic and fiscal circumstances prevailing in each country, different retirement benefit systems are provided for the employees of the Merck Group. Generally, these systems are based on the years of service and salaries of the employees. Pension obligations of the Merck Group include both defined benefit and defined contribution plans and comprise both obligations from current pensions and accrued benefits for pensions payable in the future. In the Merck Group, defined benefit plans are funded and unfunded (see our Annual Report 2016, Note on Provisions for pensions and other post-employment benefits).

Flexible working hours

As of Dec. 31	2013	2014	2015	2016[1]
% of employees with the option of working flexible hours	75	74	80	78

1 Includes Sigma-Aldrich as of 2016

Employee facts and figures, Germany

Parental leave in Germany[1]

As of Dec. 31	2013	2014	2015	2016
Number of employees with a right to parental leave	254	331	317	359
thereof women (recorded via maternity leave in the respective year)	120	165	149	191
thereof men (recorded via special paternity leave in the respective year)	134	166	168	168
Number of employees who took parental leave[2]	433	507	485	480
thereof women	292	349	301	303
thereof men	141	158	184	177
Number of employees on parental leave who worked part time during their leave	81	99	102	102
thereof women	77	94	99	95
thereof men	4	5	3	7
Number of employees who returned from parental leave	151	187	183	174
thereof women	60	83	51	62
thereof men	91	104	132	112
Return to work rate (%)	34.9	36.9	37.7	36.3
thereof women	20.6	23.8	16.9	20.5
thereof men	64.5	65.8	71.7	63.3
Number of employees still working for Merck one year after their return from parental leave	152	137	184	–[3]
thereof women	57	35	55	–[3]
thereof men	95	102	129	–[3]
Retention rate (%)	93.8	90.7	96.8	–[3]
thereof women	91.9	58.3	98.2	–[3]
thereof men	95.0	112.1	96.3	–[3]

1 Figures only pertain to the Darmstadt and Gernsheim sites in Germany (which accounted for around 20.9% of Merck Group employees in 2016). Figures are calculated on the basis of the data from one entire year, which also includes those employees who took parental leave during the calendar year, but who had not returned by Dec. 31.

2 Since parental leave can be taken for a period ranging from one month to three years, it is possible for employees to be recorded across a period of up to four calendar years. This explains why the number of employees on parental leave exceeds the number of employees who have a right to it.

3 Figure will be available on Dec. 31, 2017.

Employees with disabilities[1] (%)

As of Dec. 31	2013	2014	2015	2016
Employees with disabilities[1]	5.0	4.7	4.7	4.5

1 Only pertains to Merck KGaA (which accounted for around 20% of Merck Group employees in 2016, calculations based on the German Social Code IX - SGB IX).

Apprentices

As of Dec. 31	2013	2014[1]	2015[2]	2016[3]
Number of apprentices	516	498	506	576
% of apprentices	5.6	5.4	5.3	4.6

1 Only pertains to Merck KGaA sites in Darmstadt, Gernsheim and Grafing, Germany (which accounted for roughly 24% of the Merck Group's employees in 2014).
2 Only pertains to Merck KGaA (roughly 19% of the Merck Group's total employee headcount in 2015).
3 Reflects only those Merck sites in Germany (approximately 25% of the Group's total workforce in 2016).

Indicators: Environment

Spending on environmental protection, safety and health

€ million	2013	2014	2015	2016[1]
Spending	142	145	148	189

1 Includes Sigma-Aldrich as of 2016

These figures include both investments in as well as internal and external spending on waste and wastewater management, water, occupational safety, fire protection, noise reduction, air pollution prevention, decontamination, preservation of nature and the landscape, climate impact mitigation, and energy efficiency. We do not further break down our spending on environmental protection by type.

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

metric kilotons	2006[2]	2013	2014	2015	2016
Total CO_2eq[3] emissions	**790**	**784**	**736**	**729**	**715**
Thereof					
direct CO_2eq emissions	378	417	390	393	386
indirect CO_2eq emissions	412	367	346	336	329
Biogenic CO_2 emissions	**6**	**6**	**11**	**54**	**56**

1 In line with the Greenhouse Gas Protocol, for all previous years (up to the 2006 baseline) the greenhouse gas emissions have been calculated based on the current corporate structure of the reporting year and retroactively adjusted for acquisitions (e.g. Sigma-Aldrich in 2015) or divestments of (parts of) companies, or for changes in emission factors (portfolio-adjusted).
2 Baseline for our emission targets is 2006.
3 eq = equivalent

The increase in biogenic carbon emissions was caused by the biomass power plants that were commissioned in Goa, India and Jaffrey, New Hampshire (USA) at the end of 2014.

Our response to the Carbon Disclosure Project contains a detailed description of our calculation methods.

We have included the following gases in our calculation of direct and indirect CO_2eq emissions:

- Direct CO_2 emissions: CO_2, HFCs, PFCs; CH_4/N_2O negligible; SF_6/NF_3 not available.
- Indirect CO_2 emissions: CO_2.

In 2016, we emitted 0.048 kg of CO_2eq per euro of net sales.

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

	2013	2014	2015	2016[2]
Total gross other indirect emissions (metric kilotons CO_2eq[1])	**64**	**319**	**349**	**426**
Fuel- and energy-related emissions, not included in Scope 1 or 2 (category 3)	not recorded	97	95	127
Waste generated in operations (category 5)	not recorded	96	123	127
Business travel - air travel (category 6)	63	74	79	103[3]
Business travel - rail travel (category 6)	0.05	0.02	0.02	0.02
Business travel - rental car travel (category 6)	1.3	1.2	1.1	0.6
Employee commuting (category 7)	not recorded	51	51	68
Upstream leased assets (category 8)	not recorded	0[4]	0[4]	0[4]
Processing of sold products (category 10)	not recorded	0[5]	0[5]	0[5]
Downstream leased assets (category 13)	not recorded	0	0	0
Franchises (category 14)	not recorded	0	0	0

1 eq = equivalent
2 Includes Sigma-Aldrich as of 2016
3 This figure covers roughly 80% - 85% of the employees of the Merck Group because the data for the employees of Sigma-Aldrich, acquired in November 2015, are only partially available.
4 Already covered under Scope 1/2 emissions
5 Merck produces a huge variety of intermediate products for various purposes. Due to their many applications and our customer structure, the associated GHG emissions cannot be tracked in a reasonable fashion.

No data is available for Scope 3 categories not listed above. Their relevance to Merck is assessed in the Scope 3 document.

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

Emissions of ozone-depleting substances

metric tons	2013[1]	2014	2015	2016
Total emissions of ozone-depleting substances	2.5	2.0	2.5	2.2
CFC-11eq[2]	0.1	0.1	0.1	0.1

1 Includes Sigma-Aldrich from 2013 onwards
2 CFC-11eq is a unit of measure used to compare the potential of various substances to deplete the ozone. Reference figure 1 indicates the potential of CFC-11 to cause the depletion of the ozone layer.

Substances included: R-12, R-22, R-141b, R-402a, R-409a, R-401a.

Source for the emission factors: Montreal Protocol.

Other air emissions

metric kilotons	2013	2014	2015	2016[1]
Volatile organic compounds (VOC)	0.2	0.3	0.3	0.3
Nitrogen oxide	0.2	0.2	0.3[2]	0.2
Sulfur dioxide	0.02	0.02	0.05	0.05
Dust	0.01	0.02	0.06	0.02

1 Includes Sigma-Aldrich as of 2016
2 Figure retroactively adjusted.

The VOC, nitrogen oxide, sulfur dioxide, and dust emissions reported here are attributable to production activities as well as energy generation. These figures do not include emissions from vehicles. Emissions are determined partially based on measurements and partially based on calculations or estimates. Only some sites are required to measure individual parameters.

Transport of finished goods, by means of transportation

	2013[1]	2014[1]	2015[1]	2016[2]
% Truck	56	56	53	71
% Boat	37	38	41	18
% Airplane	7	6	6	11

1 The figures for 2013 through 2015 pertain to goods shipped by our Darmstadt, Gernsheim and Hohenbrunn sites in Germany (excluding Sigma-Aldrich).

2 From 2016 on, the figures contain the volumes of the biggest global distribution centers of our Healthcare, Life Science and Performance Materials business sectors. These figures pertain to the total weight of transported products and indicate the primary means of transport (including Sigma-Aldrich).

In shipping finished goods from our production sites to the local warehouses of our subsidiaries, we have been working to reduce the use of air shipping in favor of sea freight. This change aims to both reduce costs as well as lower transport-related CO_2 emissions.

Energy consumption[1]

In GWh	2013	2014	2015	2016
Total energy consumption	**2,108**	**2,158**	**2,256**	**2,253**
Direct energy consumption	**1,286**	**1,354**	**1,451**	**1,443**
Natural gas	1,157	1,212	1,212	1,272
Liquid fossil fuels[2]	114	115	104	30
Biomass and self-generated renewable energy	15	27	135	141
Indirect energy consumption	**822**	**804**	**805**	**810**
Electricity	743	707	709	715
Steam, heat, cold	79	97	96	95
Total energy sold	**0.4**	**0.6**	**0.5**	**0.5**
Electricity	0.4	0.6	0.5	0.5
Steam, heat, cold	0	0	0	0

In TJ	2013	2014	2015	2016
Total energy consumption	**7,589**	**7,769**	**8,122**	**8,111**
Direct energy consumption	**4,630**	**4,874**	**5,224**	**5,195**
Natural gas	4,165	4,363	4,363	4,579
Liquid fossil fuels[2]	410	414	374	108
Biomass and self-generated renewable energy	54	97	486	508
Indirect energy consumption	**2,959**	**2,894**	**2,898**	**2,916**
Electricity	2,675	2,545	2,552	2,574
Steam, heat, cold	284	349	346	342
Total energy sold	**1**	**2**	**2**	**2**
Electricity	1	2	2	2
Steam, heat, cold	0	0	0	0

1 In line with the Greenhouse Gas Protocol, for all previous years (up to the 2006 baseline) the energy consumption has been calculated based on the current corporate structure of the reporting year and retroactively adjusted for acquisitions or divestments of (parts of) companies, or for changes in emission factors (portfolio-adjusted).

2 Light and heavy fuel oil, liquefied petroleum gas (LPG), diesel and gasoline

At our sites in Billerica (MA, USA), Bedford (MA, USA), Molsheim (France), Tel Aviv (Israel), Rome (Italy), Guatemala City (Guatemala), Shizuoka-ken (Japan), and Shanghai (China), we use photovoltaics to produce power. Since 2015, the increase in biomass and self-generated renewable energy consumption has been attributable to the biomass power plants that were commissioned in Goa, India, and Jaffrey (NH, USA) in 2014.

The reduction in liquid fossil fuel consumption primarily stems from a project at our Onahama site in Japan that switched energy generation from kerosene to natural gas.

Merck currently only records purchased secondary energy – this is primarily electricity and, to a lesser extent, heat/steam/cold. Details on the local energy mix, including the respective percentage of primary energy, renewable energy, etc. are not available. Data on local energy efficiency in electricity or heat generation are not available either. Our production sites are located in countries with a widely varying energy mix.

Our Darmstadt and Gernsheim sites in Germany consume the most energy, representing 29% of our Group-wide total. At these sites, fossil energy (coal, gas, etc.) accounts for approx. 53%, nuclear energy approx. 15% and renewable energies approx. 32% of the energy mix. Renewable energies account for a higher share of electricity generation at production sites in Switzerland, with nuclear energy taking the lead in France. Based on an estimated global energy efficiency of 37% for the conversion and distribution of generated electricity, this results in a primary energy consumption of 1,931 GWh for 2016. Based on an estimated global energy efficiency of 85% for heat/steam/cold, this results in a primary energy consumption of 112 GWh for 2016. This yields a total primary energy consumption of 2,043 GWh for 2016. The calculation is based on factors stated in the "Manual for energy management in practice - Systematically reducing energy costs" published by DENA, 12/2012.

In 2016, Merck's energy intensity relative to net sales totaled 0.150 kWh/€ compared to 0.134 kWh/€ in 2015.

Water consumption

millions of m^3	2013	2014	2015[1]	2016
Total water consumption	**9.6**	**11.1**	**13.6**	**13.7**
Surface water (rivers, lakes)	0.8[2]	1.2[2]	1.2[2]	1.2
Groundwater	5.4	6.3	7.0[2]	7.2
Drinking water (from local suppliers)	3.4[2]	3.6[2]	5.4[2]	5.3
Rain water and other sources	0.01	0.01[2]	0.01[2]	0.01

1 Includes Sigma-Aldrich as of 2015
2 Figure retroactively adjusted.

These figures do not include the ground water that we use for safety measures at our Gernsheim site in Germany. Here, the water is fed back directly into natural circulation.

Water reused

millions of m^3	2013	2014	2015[1]	2016
Water reused	16.6	16.0	23.0	22.7

1 Includes Sigma-Aldrich as of 2015

The increase in reused water in 2015 is attributable to the recirculating cooling system that went online at our facility in Darmstadt, Germany. This system provides recirculating cooling water to both our new co-generation unit as well as our new cold and compressed air generator. The recirculating cooling system largely accounts for the amount of reused water as it allows the water to be re-utilized multiple times. The volume of reused water is thus greater than the total volume of consumed water.

Wastewater volume and quality

	2013	2014	2015[1]	2016
Total wastewater volume (millions of m^3)	**8.6**	**10.1**	**11.8**	**12.1**
Chemical oxygen demand (metric tons of O_2)	756	1,319	1,933	1,535
Phosphorous (metric tons)	7	10	10	12
Nitrogen (metric tons)	77	81	330	303
Zinc (kg)	406[2]	410[2]	498[2]	451
Chromium (kg)	23	36	42	34
Copper (kg)	36	34	84	53
Nickel (kg)	110	128	128	124
Lead (kg)	42	55	54	56
Cadmium (kg)	10	10	13	11
Mercury (kg)	1	1	2	2
Arsenic (kg)	4	4	5	4

1 Includes Sigma-Aldrich as of 2015
2 Figures retroactively adjusted.

The wastewater volume includes indirect discharge into both public and Merck-owned wastewater treatment plants, as well as direct discharge (such as rainwater and cooling water).

The wastewater treatment plant at our Gernsheim, Germany site also treats wastewater from the neighboring municipality of Biebesheim. The communal wastewater from Biebesheim is included in the wastewater volume as well as in the emissions stated in the table.

Emissions are determined partially based on measurements and partially based on calculations or estimates. Only some sites are required to measure individual parameters.

Hazardous and non-hazardous waste

metric kilotons	2013	2014	2015[1]	2016
Total waste	**161**	**228**	**317**	**254**
Hazardous waste disposed[2]	37	53	55	50
Non-hazardous waste disposed[2]	31	55	35	44
Hazardous waste recycled[3]	50	49	73	75
Non-hazardous waste recycled[3]	43	71	154	85

1 Includes Sigma-Aldrich as of 2015
2 Disposed = incineration (without energy recovery) and landfill
3 Recycled = incineration (without energy recovery) and material recycling

The increase in "non-hazardous waste recycled" in 2015 can be attributed to the sharp rise in construction, excavation and demolition waste. Construction, excavation and demolition waste accounted for 49% of our waste in 2015 and 30% in 2016.

Exported/Imported hazardous waste

metric kilotons	2013	2014	2015[1]	2016
Exported[2]	7.1	9.6	5.1	4.6
Imported[3]	0.01	0.003	0.01	0.01

1 Includes Sigma-Aldrich as of 2015
2 Disposal within the EU and the United States.
3 As part of the return system for our cell tests, these kits are brought to our Gernsheim site in Germany for proper disposal.

Waste by disposal method

	2013	2014	2015[1]	2016
Total waste (metric kilotons)	**161**	**228**	**317**	**254**
Disposed waste (metric kilotons)	**67**	**108**	**90**	**94**
Landfilled waste (metric kilotons)	13	37	16	15
Incinerated waste (metric kilotons)	54	71	74	79
Recycled waste (metric kilotons)	**94**	**120**	**227**	**160**
Material recycling (metric kilotons)	69	93	195	128
Waste-to-energy (metric kilotons)	25	27	32	32
Recycling rate (%)	**58**	**53**	**72**	**63**

1 Includes Sigma-Aldrich as of 2015

As in previous years, the total waste generated continues to be heavily influenced by the waste from construction and remodeling activities. Construction, excavation and demolition waste accounted for 49% of our waste in 2015 and 30% in 2016. In 2015, around 124 metric kilotons of construction, excavation and demolition waste was recycled, with roughly 53 metric kilotons recycled in 2016.

Significant spills

	2013	2014	2015[1]	2016
Total number of significant spills	0	0	0	0

1 Includes Sigma-Aldrich as of 2015

Indicators: community

Spending on community involvement

€ million	2013	2014	2015	2016[1,2]
Total spending	46.2	50.8	100.0	43.0

1 Includes Sigma-Aldrich as of 2016
2 From 2016 on, we are separating spending on patient support programs such as our Erbitux® China Patients Assistance Program from our community involvement figures.

We calculate the value of pharmaceutical product donations according to the WHO Guidelines for Medicine Donations; for other product donations, we apply their fair value.

Community involvement spending by region[1]

	Europe	North America	Asia-Pacific (APAC)	Latin America	Middle East and Africa (MEA)
2016					
€ million	10.1	2.3	4.4	1.1	25.1
%	24	5	10	3	58

1 This table presents the regions across the globe in which we support initiatives. For projects that benefit multiple regions, we have calculated the amount per region by dividing the project spending evenly per country.

Focus of our local community involvement[1]

%	2013	2014	2015	2016[2,3,4]
Health	23	33	33	35
Culture and education	42	38	33	36
Environment	10	10	7	5
Disaster relief	6	4	6	2
Other	19	15	21	22

1 Based on number of projects
2 Includes Sigma-Aldrich as of 2016
3 Since 2016, we have integrated our global projects into our community outreach figures, specifically the Global Pharma Health Fund, the Merck Praziquantel Donation Program and the Deutsche Philharmonie Merck. This change in approach was due to the increasingly international nature of our efforts. We are spearheading a rising number of global projects that account for a growing percentage of our project portfolio. To ensure maximal accuracy, we are therefore including all international initiatives in our figures as of 2016.
4 From 2016 on, we are separating spending on patient support programs such as our Erbitux® China Patients Assistance Program from our charitable spending figures.

Motivations for our community involvement[1]

%	2013	2014	2015	2016[2,3,4]
Charitable activities	20	9	3	4
Community investment	59	59	92	87
Commercial initiatives in the community	21	32	5	9

1 Based on total spending on all projects
2 Including Sigma-Aldrich as of 2016
3 Since 2016, we have been integrating our global projects into our community outreach figures, specifically the Global Pharma Health Fund, the Merck Praziquantel Donation Program and the Deutsche Philharmonie Merck. This change in approach was due to the increasingly international nature of our efforts. We are spearheading a rising number of global projects that account for a growing percentage of our project portfolio. To ensure maximal accuracy, we are therefore including all international initiatives in our figures as of 2016.
4 As of 2016, we are separating patient support programs such as our Erbitux® China Patients Assistance Program from our charitable spending.

We categorize the motivations for our activities based on the London Benchmarking Group model as well as the guidelines of the Bertelsmann Foundation for corporate social responsibility. Projects that primarily aim to make improvements within the community are classified as community investment.

Initiatives that are predominantly aimed at company-relevant factors such as image or personnel recruitment are classified as commercial initiatives in the community. Charitable activities cover any other projects that benefit a charitable organization, but cannot be listed under either of the other two motivation categories due to missing data or their narrow scope.