

## Environment

### Total greenhouse gas emissions (Scope 1 and 2 of the GHG Protocol)<sup>1,2</sup>

metric kilotons	2018	2019	2020 <sup>3</sup>	2021 The Group	2021 thereof Merck KGaA, Darmstadt, Germany
<b>Total CO<sub>2</sub>eq<sup>4</sup> emissions</b>	<b>636</b>	<b>621</b>	<b>2,028</b>	<b>1,843</b>	<b>153</b>
Thereof					
direct CO <sub>2</sub> eq emissions (Scope 1)	332	341	1,706	1,522	115
indirect CO <sub>2</sub> eq emissions <sup>5</sup> (Scope 2)	304	280	322	321	38
<b>Biogenic CO<sub>2</sub> emissions</b>	<b>13</b>	<b>13</b>	<b>13</b>	<b>15</b>	<b>0</b>

1 In line with the Greenhouse Gas Protocol, for all previous years greenhouse gas emissions were calculated based on the current corporate structure as of Dec. 31 of the reporting year and retroactively adjusted for acquisitions or divestments of (parts of) companies, or for changes in emission factors (portfolio-adjusted).

2 Baseline for our emission targets is 2020.

3 Includes Versum Materials as of 2020.

4 eq = equivalent

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

Our response to the [CDP Climate change](#) contains a detailed description of our calculation methods.

We have included the following gases in our calculation of direct and indirect CO<sub>2</sub>eq emissions:

Direct CO<sub>2</sub> emissions: CO<sub>2</sub>, HFCs, PFCs, CH<sub>4</sub>, N<sub>2</sub>O, NF<sub>3</sub>, SF<sub>6</sub>.

Indirect CO<sub>2</sub> emissions: CO<sub>2</sub>.

In 2021, we emitted 0.09 kg of CO<sub>2</sub>eq per euro of net sales.

### Other relevant indirect greenhouse gas emissions (Scope 3 of the GHG Protocol)<sup>1</sup>

in metric kilotons of CO <sub>2</sub> eq <sup>2</sup>	2018	2019	2020	2021
<b>Total gross other indirect emissions</b>	<b>348</b>	<b>339</b>	<b>5,030</b>	<b>5,716</b>
Purchased goods & services (category 1) <sup>3</sup>	n/a	n/a	3,040	3,572
Capital goods (Category 2) <sup>3</sup>	n/a	n/a	293	291
Fuel- and energy-related emissions, not included in Scope 1 or 2 (category 3)	131	127	102	143
Upstream transportation & distribution (category 4) <sup>4</sup>	n/a	n/a	264	264 <sup>5</sup>
Waste generated in operations (category 5)	47	50	85	79
Business travel (category 6) <sup>6,7</sup>	104	87	32	26
Employee commuting (category 7)	66	75	90	94
Upstream leased assets (category 8) <sup>8</sup>	0	0	0	0
Downstream transportation & distribution (category 9) <sup>4</sup>	n/a	n/a	8	8 <sup>5</sup>
Processing of sold products (category 10) <sup>9</sup>	0	0	0	0
Use of sold products (category 11) <sup>4</sup>	n/a	n/a	1,091	1,213
End-of-life treatment of sold products (category 12) <sup>4</sup>	n/a	n/a	23	23 <sup>5</sup>
Downstream leased assets (category 13)	0	0	2	2
Franchises (category 14) <sup>10</sup>	0	0	0	0
Investments (category 15)	n/a	n/a	0	1

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2 eq = equivalent

3 The reported figures contain 95-97% of our total spend. The difference stems from smaller sites that are not integrated in our Group-wide purchase volume data. 2020 data are slightly over-reported (approx. 3%) as the currency conversion factor (USD to EUR) from 2021 was used. Non-categorized spends are distributed pro rate to category 1 and 2.

4 Compared to other Scope 3 categories, the screening of the emissions in this category contains more uncertainties. Their impact cannot be estimated more precisely at this time. We are working on improving the accuracy of these data.

5 Due to high efforts for data preparation, we reference 2020 data for 2021.

6 Since 2021, we have applied a new calculation approach for 2021 and 2020. The figure for 2020 was therefore adjusted retrospectively.

7 Air travel, hotel stays, rental car travels, rail travel (German Railway)

8 Already covered under Scope 1 and 2 emissions

9 Our company produces a huge variety of intermediate products for various purposes. Due to their many applications and our customer structure, the associated greenhouse gas emissions cannot be tracked in a reasonable fashion.

10 This category is not relevant for us as we do not operate franchises, i.e. businesses operating under a license to sell or distribute another company's goods or services. Out-licensing in the pharmaceutical sector is not regarded as franchising.

Details on the calculation (methodology, assumptions, uncertainties) of the Scope 3 categories can be found in the [Scope 3 document](#).

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

### Emissions of ozone-depleting substances

metric tons	2018	2019	2020	2021
Total emissions of ozone-depleting substances	1.5	1.0	2.2	1.5
CFC-11eq <sup>1</sup>	0.1	0.1	0.1	0.1

<sup>1</sup> CFC-11eq is a unit of measure used to compare the potential of various substances to deplete the ozone. Reference value 1 indicates the potential of CFC-11 to cause the depletion of the ozone layer.

Substances included: R-12, R-22, R-123, R-141b, R-401a, R-402a, R408a, R-409a, R-502, R-503.

Source for the emission factors: Montreal Protocol.

### Other air emissions

metric kilotons	2018	2019	2020	2021
Volatile organic compounds (VOC)	0.3	0.3	0.3	0.3
Nitrogen oxide	0.3	0.3	0.2	0.3
Sulfur dioxide	0.010	0.010	0.004	0.004
Dust	0.010	0.010	0.010	0.020

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

	2018	2019	2020	2021
% truck	74	70	70	71
% boat	14	19	22	21
% airplane	12	11	8	8

The figures contain the volumes of the biggest global distribution centers of our Life Science, Healthcare and Electronics business sectors. These figures pertain to the total weight of transported products and indicate the primary means of transport.

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<sub>2</sub> emissions.