

Scope 3 GHG Inventory Report

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1. Introduction

The calculation of BASF's Scope 3 emissions is based on the Greenhouse Gas Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard and the Guidance for Accounting and Reporting Corporate GHG Emissions in the Chemical Sector Value Chain (WBCSD). The Scope 3 emissions are calculated by category in accordance with the guidelines of the GHG Protocol Standard (at least "minimum boundaries").

2. Descriptive information

Descriptive information	Company response
Company name	BASF
Description of the company	<p>At BASF, we create chemistry for a sustainable future. We combine economic success with environmental protection and social responsibility. More than 117,000 employees in the BASF Group work on contributing to the success of our customers in nearly all sectors and almost every country in the world. Our portfolio is organized into six segments: Chemicals, Materials, Industrial Solutions, Surface Technologies, Nutrition & Care and Agricultural Solutions. BASF generated sales of €59 billion in 2019. BASF shares are traded on the stock exchange in Frankfurt (BAS) and as American Depositary Receipts (BASFY) in the U.S. Further information at www.basf.com.</p>
Chosen consolidation approach (equity share, operational control or financial control)	<p>The emissions of BASF SE subsidiaries that are fully consolidated in the Group financial statements in which BASF holds an interest of less than 100% are included in full. The emissions of proportionally consolidated joint operations are disclosed pro rata according to BASF's interest.</p> <p>Our scope 1, scope 2 and scope 3 emission figures stated in this report do not include the polyamide business acquired from Solvay as of January 31, 2020.</p>
Description of the businesses and operations included in the company's organizational boundary (Description of the inventory boundary, including an outline/description of the organizational (scope 1) boundaries of the reporting company)	<p>BASF reports scope 1 and scope 2 emissions from all production sites of fully consolidated companies and proportionally consolidated joint operations worldwide. We do not report GHG emissions from mobile combustion and from facilities other than production and power plants. GHG emissions from equity-accounted joint ventures and equity-accounted associated companies as well as from subsidiaries and associated companies that are not financially consolidated due to immateriality are not included in BASF's scope 1 or scope 2 emissions. The GHG emissions from equity-accounted joint ventures and equity-accounted associated companies are reported in category 15 of scope 3 emissions.</p> <p>Scope 3 emissions are reported for all BASF Group companies included in the Consolidated Financial Statements on a full or proportional basis, unless stated otherwise. The emissions of joint operations are included pro rata, based on BASF's stake. Relevant scope 3 emissions categories (> 1 million t CO₂ equivalents) that are part of BASF's Scope 3 emissions inventory are:</p> <ul style="list-style-type: none"> • Category 1: Purchased goods & services • Category 2: Capital goods • Category 3: Fuel- and energy-related activities (not incl. in Scope 1 or 2)

	<ul style="list-style-type: none"> • Category 4: Upstream transportation and distribution • Category 5: Waste in Operations • Category 9: Downstream transportation and distribution • Category 11: Use of sold products • Category 12: End-of-life treatment of sold products • Category 15: Investments
The reporting period covered	01/01/2020 -12/31/2020
A list of scope 3 activities included in the inventory	<p>Category 1: Purchased goods & services</p> <p>Category 2: Capital goods</p> <p>Category 3: Fuel- and energy-related activities (not incl. in Scope 1 or 2)</p> <p>Category 4: Upstream transportation and distribution</p> <p>Category 5: Waste generated in operations</p> <p>Category 6: Business travel</p> <p>Category 7: Employee commuting</p> <p>Category 8: Upstream leased assets</p> <p>Category 9: Downstream transportation and distribution</p> <p>Category 11: Use of sold products</p> <p>Category 12: End-of-life treatment of sold products</p> <p>Category 15: Investments</p>
A list of scope 3 activities excluded from the report with justification for their exclusion	<p>Category 10 (Processing of sold products): BASF does not calculate and report GHG emissions from processing of sold products, as these emissions were identified as not being relevant to BASF. This is the result of a thorough analysis of and balancing the different relevance criteria for Scope 3 emissions sources and the five accounting and reporting principles of the GHG Protocol standards by WRI and WBCSD. BASF produces a large variety of intermediate goods. This application diversity cannot be tracked reasonably, and reliable figures on a yearly basis are virtually impossible to obtain. These circumstances strongly compromise the reporting principles completeness, consistency and accuracy (and feasibility), thereby not serving our business goal of reducing GHG emissions along the value chain. In addition, the WBCSD Chemical Sector Standard “Guidance for Accounting & Reporting Corporate GHG Emissions in the Chemical Sector Value Chain” emphasizes that “chemical companies are not required to report Scope 3, category 10 emissions, since reliable figures are difficult to obtain, due to the diverse application and customer structure”.</p> <p>Category 13 (Downstream leased assets): Not relevant (about 5% of Upstream leased assets according to BASF expert judgement).</p> <p>Category 14 (Franchises): Not relevant for BASF as we do not own or operate franchises.</p>

<p>Once a scope 3 base year has been established, the year chosen as base year and rationale for choosing the base year</p>	<p>No Scope 3 base year was chosen.</p>
<p>Once a base year has been established, scope 3 emissions in the base year</p>	<p>Not applicable.</p>
<p>Once a base year has been established, the chosen base year emissions recalculation policy and context for any significant emissions changes that trigger base year emissions recalculations</p>	<p>Not applicable.</p>

3. Greenhouse gas emissions data

Scopes and categories	Metric tons CO ₂ e	Percentage of scope 3 emissions	Primary ¹	Secondary ²
Scope 1: Direct emissions from owned/controlled operations	18,090,000	-	-	-
Scope 2, market-based ³ : Indirect emissions from the use of purchased electricity, steam, heating, and cooling	3,182,000	-	-	-
Certificates sold to third parties (VCUs)	0	-	-	-
Upstream scope 3 emissions				
Purchased goods and services	47,753,000	52%	83%	17%
Capital goods	1,722,000	2%	92%	8%
Fuel- and energy-related activities (not included in scope 1 or scope 2)	3,119,000	3%	92%	8%
Upstream transportation and distribution	2,462,000	3%	0%	100%
Waste generated in operations	1,343,000	1%	100%	0%
Business travel	34,000	0%	100%	0%
Employee commuting	147,000	0%	15%	85%
Upstream leased assets	169,000	0%	85%	15%
Downstream scope 3 emissions				
Downstream transportation and distribution	1,237,000	1%	100%	0%
Use of sold products	5,951,000	7%	100%	0%
End-of-life treatment of sold products	23,911,000	26%	74%	26%
Investments	3,438,000	4%	100%	0%

¹This column includes emissions data calculated using company-specific data. ²This column is a sum of emissions data calculated using: A) secondary data; B) extrapolated data, and C) proxy data. See Table 7.5 on page 74 of the GHG Protocol Scope 3 Standard for examples of primary and secondary data. ³The location-based Scope 2 emissions amount to 3,362,000 metric tons CO₂e. For further information on the calculation of Scope 2 emissions, please see the GHG Protocol Scope 2 Guidance (WRI, 2015).

Greenhouse gas emissions	CO ₂		CH ₄	
	Metric tons CO ₂	Metric tons CO ₂ e	Metric tons CH ₄	Metric tons CO ₂ e
Scope 1 ¹	17,482,000	17,482,000	843	21,000
Scope 2	3,182,000 ²	3,182,000 ²	-	-

Greenhouse gas emissions	N ₂ O		HFCs	
	Metric tons N ₂ O	Metric tons CO ₂ e	Metric tons HFCs	Metric tons CO ₂ e
Scope 1 ¹	1,868	557,000	23	30,000
Scope 2	-	-	-	-

Greenhouse gas emissions	PFCs		SF ₆	
	Metric tons PFCs	Metric tons CO ₂ e	Metric tons SF	Metric tons CO ₂ e
Scope 1 ¹	0	0	0	0
Scope 2	-	-	-	-

¹Emissions of N₂O, CH₄, HFC and SF₆ have been translated into CO₂ emissions using the Global Warming Potential, or GWP, factor. GWP factors are based on the Intergovernmental Panel on Climate Change (IPCC), 2007. HFC (hydrofluorocarbons) are calculated using the GWP factors of the individual components.

²Market-based approach. The location-based Scope 2 emissions amount to 3,362,000 metric tons CO₂e. For further information on the calculation of Scope 2 emissions, please see the GHG Protocol Scope 2 Guidance (WRI, 2015).

4. Biogenic carbon emissions

24,000 metric tons CO₂e.

5. Description of scope 3 methodologies and data used

Information on methodologies and data used	Description of the types and sources of data used to calculate emissions	Description of the methodologies, allocation methods, and assumptions used to calculate emissions
Upstream scope 3 emissions		
<p>Category 1</p> <p>Purchased goods and services</p>	<p>Activity data (primary data): Quantity and monetary purchasing volume of the goods and services purchased in the reporting year were obtained from BASF internal business data management systems.</p> <p>Emissions factors (secondary data): a) Raw materials and packaging: Cradle-to-gate emissions factors were obtained from commercially and publicly available databases such as GaBi (thinkstep), ecoinvent or PlasticsEurope as well as from BASF's own LCA database, which is based mainly on primary data. b) Technical goods & services: Supply chain emission factors for spending on products and services were obtained from the 2012 Guidelines to DEFRA/DECC's GHG Conversion Factors for Company Reporting, Annex 13 (Indirect emissions from supply chain).</p>	<p>We analyzed the GHG emissions of our procured raw materials and precursor manufacturing at BASF's suppliers' facilities (including merchandise) by calculating the cradle-to-gate emissions, including all direct GHG emissions from raw material extraction, precursor manufacturing and transport, as well as indirect emissions from energy use. To do so, we determined the quantity of each single product purchased, and then applied emission factors for about 80 percent of the purchased products (by weight). If country-specific emission factors were available, we calculated a weighted Product Carbon Footprint to reflect the percentage of the regional distribution of the purchased material. We multiplied the CO₂e emissions per kilogram of each product by the respective quantity of the product purchased to determine cradle-to-gate emissions. Finally, the resulting scope 3 emissions were extrapolated to 100% of the total purchasing volume to account for all procured raw materials and precursors. For calculating the emissions from packaging, we first determined the material compositions of the different packaging groups such as HDPE drums or steel drums. Then, we calculated GHG emissions by multiplying the number of purchased items of packaging by their respective cradle-to-gate emission factors. The GHG emissions from technical goods and services were assessed based on the monetary purchasing volume in the reporting year by multiplying the amount of spending by the GHG conversion factors from the Defra 2012 Guidelines.</p>
<p>Description of the data quality of reported emissions* Percentage of emissions calculated using data obtained from suppliers or other value chain partners</p>		<p>Good 0%</p>
<p>Category 2</p> <p>Capital goods</p>	<p>Activity data (primary data): Monetary purchasing volumes of capital goods purchased in the reporting year were obtained from BASF's internal business data management systems.</p> <p>Emissions factors (secondary data):</p>	<p>The GHG emissions associated with BASF's capital goods were estimated based on the following approach: All sub-segments of BASF's global Technical Procurement related to the sourcing of capital equipment such as machinery and fabricated equipment were analyzed based on their monetary purchasing volume in the reporting</p>

Supply chain emission factors for spending on capital goods were obtained from the 2012 Guidelines to DEFRA/DECC's GHG Conversion Factors for Company Reporting, Annex 13 (Indirect emissions from supply chain)

year. Each sub-segment was assigned a corresponding SIC code because the conversion factors for greenhouse gas emissions are based on the standard classification system (SIC 2003). The amount of spending was then multiplied by the respective GHG conversion factor and subsequently added up to the total GHG emissions from capital goods.

Description of the data quality of reported emissions*
Percentage of emissions calculated using data obtained from suppliers or other value chain partners

Good
0%

Category 3
Fuel- and energy-related activities (not included in scope 1 or scope 2)

Activity data (primary data):
 The quantities of fuel and energy (electricity and steam) purchased in the reporting year were obtained from BASF internal business data management systems.

Emissions factors (secondary data):
 The cradle-to-gate emissions factors were obtained from the GaBi database. The grid related loss factor was taken from the International Energy Agency's (IEA) Monthly OECD Electricity Statistics Statistics (Sept. 2020 for 2019).

The GHG emissions from the extraction, production and transportation of fossil fuels used for power and steam generation in our own (power) plants were determined by multiplying the amount of purchased fuels by their respective, region-specific cradle-to-gate CO₂e emission factors. The GHG emissions from the extraction, production and transportation of fuels consumed in the generation of electricity and steam purchased by BASF in the reporting year were calculated as follows:

The amount of primary energy was determined based on the amount of purchased electricity and steam and the respective fuel efficiencies (83% for steam generation; 37% for electricity generation). The share of the different fuel types of the total amount of primary energy was then calculated based on the fuel shares of electricity generation (IEA, Key World Energy Statistics, 2020). The fuel shares were then multiplied by the respective CO₂e emission factors to result in the overall GHG emissions. Generation of electricity, steam, heating and cooling that is consumed in a T&D system: GHG emissions associated with losses of purchased electricity and steam were estimated based on our Scope 2 emissions in the reporting year and a grid-related loss factor. Losses associated with our own T&D system due to our own generation of electricity and steam are already accounted for in our Scope 1 emissions which are based on fuel input. Generation of electricity and steam that is purchased by the reporting company and sold to end users is not applicable to BASF.

Description of the data quality of reported emissions*
Percentage of emissions calculated using data obtained from suppliers or other value chain partners

Good
0%

Category 4

Activity data (primary data):
 Quantities, types of goods procured and regional split of purchase in the reporting year were obtained from

For the calculation of the GHG emissions associated with the transportation of all procured products to BASF sites, three different categories of procured products were defined:

<p>Upstream transportation and distribution</p>	<p>BASF internal business data management systems. For assessing BASF's internal transports additional information such as origin and destination points, mode of transport and load factors was retrieved from the business data systems.</p> <p>Emissions factors (secondary data): The CO₂ emission factors used were taken from the McKinnon Report: "Measuring and Managing CO₂ Emissions from the Transport of Chemicals in Europe". For trucks in Asia, a higher CO₂ emission factor of 90 g CO₂ per t*km was assumed. The current modal split of chemical transport in Europe was derived from this report as well.</p> <p>For quantification of the GHG emissions from BASF's internal transports the emission factors incorporated in the IT solution EcoTransIT World were used (http://www.ecotransit.org/).</p>	<p>(i) raw materials, (ii) technical & capital goods and (iii) packaging.</p> <p>(i) The raw materials category was further divided into a) raw materials, naphtha & industrial gases (bulk), b) industrial gases (pipeline) and c) natural gas. The GHG emissions associated with the transportation of raw materials, naphtha and industrial gases (bulk) were calculated by multiplying the quantities of products procured by a transportation distance and by an emissions factor for the mode of transport. For all procured products in Europe, the modal split included road, ocean-going vessel, barge, rail and air. In all other regions, solely transportation by truck was assumed. The transportation distance in each region was estimated by logistics experts. Emissions from the transportation of industrial gases (pipeline) and natural gas were calculated by multiplying the quantity of the product purchased by an emission factor for pipeline and a transportation distance. The distance for the transportation of industrial gases was assumed to be 0.5 km since most of the gases are produced on-site. The distance for the transportation of natural gas was assumed to be 1,000 km.</p> <p>(ii) The GHG emissions that are associated with transportation of BASF's technical & capital goods purchased in the reporting year were estimated by assuming that the technical goods are 100% material and made from carbon steel whereas the capital goods have a material content of 50% and are made from 60% stainless steel and 40% carbon steel.</p> <p>(iii) The weight of the purchased packaging was calculated based on material composition. Only truck transportation and an average transportation distance of 500 km (1,000 km in USA) were assumed. The corresponding GHG emissions were calculated by multiplying quantity by an emission factor for truck and a transportation distance.</p> <p>The GHG emissions from BASF internal transports were calculated based on detailed transportation data using the IT solution EcoTransIT World.</p>
<p>Description of the data quality of reported emissions*</p> <p>Percentage of emissions calculated using data obtained from suppliers or other value chain partners</p>		<p>Fair</p> <p>0%</p>
<p>Category 5</p> <p>Waste generated in operations</p>	<p>Activity data (primary data): The quantities of solid waste and waste water generated during production at BASF production sites were obtained from an in-house EHS database. The</p>	<p>The GHG emissions from on-site waste incineration are accounted for in our Scope 1 emissions.</p>

data collection method differentiates between on-site and off-site disposal as well as between different disposal methods (waste incineration with and without energy recovery, landfill, physical recovery, waste water treatment and others).

Emissions factors (secondary data):
The emission factors were obtained from the GaBi database.

The off-site physical recovery (recycling) of waste is assigned zero emissions in line with the cut-off approach of life cycle assessment. The GHG emissions from off-site waste incineration with energy recovery were calculated by multiplying the amount of waste in this category with a suitable emission factor. The GHG emissions from off-site waste incineration without energy recovery as well as from landfill disposal were calculated based on a carbon balance. It was assumed that all carbon contained in the waste is converted to CO₂ during incineration or landfilling. From a survey of a variety of different chemical products, the average carbon content of a chemical product was determined. Multiplying the amount of waste with this factor yields the waste's total carbon content which is then converted to the amount of emitted CO₂. The GHG emissions from other solid waste disposal methods (on and off site) were calculated by multiplying the amount of waste with a landfill emission factor for inert plastic waste. The GHG emissions of BASF-operated waste water plants are accounted for in our Scope 1 or Scope 2 emissions, respectively. The CO₂e emissions from non-BASF operated waste water treatment plants were calculated as follows based on a TOC (Total Organic Carbon) material balance. It is assumed that 30% of the influent organic carbon load is insoluble and inert, as well as the non-biodegradable TOC in the effluent. It is also assumed that 25% of the remaining bio-treatable TOC is converted into bio-sludge during biotreatment. The residual TOC, which is about 50% of the total influent TOC, is converted into CO₂. The CO₂ emissions were calculated from the residual TOC with a conversion factor of CO₂/TOC=3.67.

Description of the data quality of reported emissions*

Percentage of emissions calculated using data obtained from suppliers or other value chain partners

Good

0%

**Category 6
Business travel**

Activity data (primary data):
Miles and kilometers per means of transportation travelled by BASF employees in the reporting year were collected by external partners such as travel agencies and provided to BASF's Travel Management. For some travel activities the travel providers directly reported the amount of emitted greenhouse gases for the reporting

The GHG emissions associated with the transportation of all BASF Group employees for business-related activities were calculated as follows:
a) GHG emissions from business travel by air: Miles, which are collected through external partners such as travel agencies and monitored by BASF's Travel Management, were converted to CO₂ equivalents using conversion factors for the average passenger in short-haul, medium-haul and long-haul flights.

<p>year (applies to rail travel in Germany and most trips by rental car).</p> <p>Emissions factors (secondary data): CO₂e conversion factors for short-haul, medium-haul and long-haul flights including radiative forcing and fuel pre-chain emissions (well-to-tank) were taken from DEFRA's GHG Conversion Factors for Company Reporting (2020).</p> <p>CO₂e conversion factors for travel by train (per country) were taken from: SNCF, 2020 for France; Thalys Network, 2017 for Belgium; Ferrovie dello stato italiane, 2019 for Italy; ÖBB, 2019/2020 for Austria; DEFRA, 2020 for UK; EPA, 2020 for the US; Via Rail, 2019 for Canada; IEA Railway Handbook, 2017 and the India GHG Program, 2015 for Asia Pacific.</p>	<p>b) GHG emissions from business travel by train: Rail miles that are collected through external partners such as travel agencies and monitored by our Travel Management were converted into CO₂e emissions, using country-specific and/or railway-specific CO₂e conversion factor for travel by train; for rail travel in Germany the external partner Deutsche Bahn directly reports the resulting GHG emissions (zero emissions due to 100% green power).</p> <p>c) GHG emissions from business travel by car: For most trips the external partners (car rental companies) provided a summary of kilometers driven and the resulting GHG emissions for the reporting year. One provider supplied data solely on kilometers driven. These were converted into GHG emissions by multiplying with an average car travel emission factor.</p>
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Description of the data quality of reported emissions

Good

Percentage of emissions calculated using data obtained from suppliers or other value chain partners

100%

**Category 7
Employee commuting**

Activity data (primary data):
Number of employees per region as well as distance and mode of transportation for a selected group of employees in Germany, who participated in a poll in 2017.

Emissions factors (secondary data):
The CO₂e emissions factors used for car, motorbike, and public transportation were taken from DEFRA's GHG Conversion Factors for Company Reporting (2020) and EPA's Emission Factors for Greenhouse Gas Inventories (2020).

GHG emissions from employee commuting in Europe were calculated based on the results of a representative poll conducted among BASF SE employees in 2017 (19,560 out of 35,809 employees). Employees were asked about the distance travelled between their homes and workplaces and their means of transportation. GHG emissions were calculated by multiplying the travelled distance (220 days per year, back and forth) with the respective CO₂e emissions factor accounting for the different means of transportation. The resulting GHG emissions were subsequently extrapolated to all BASF Group employees in Europe.

For North America, the calculations were based on Bureau of Transportation Statistics on principal means of transportation to work. It was assumed that employees travel 236 days per year and 30 kilometers one-way.

For Asia and South America, it was assumed that all employees travel 30 km by car (one-way) and 230 or 222 days per year, respectively.

The corresponding emissions were calculated by multiplying the distance with the number of employees, number of working days and the emission factor for cars per km from DEFRA for Asia and the emission factor from EPA for North and South America.

		<p>Due to the corona pandemic mobile working was established in all BASF regions. In 2020 36% of all employees worked from home for a period of 9 months and hence did not commute to work. This fact was considered in the calculations of GHG emissions from employee commuting.</p>
<p>Description of the data quality of reported emissions*</p>		<p>Fair</p>
<p>Percentage of emissions calculated using data obtained from suppliers or other value chain partners</p>		<p>0%</p>
<p>Category 8 Upstream leased assets</p>	<p>Activity data (primary data) <i>Leased cars:</i> Vehicle miles as defined in the leasing contracts for BASF SE employees in the reporting year. <i>Leased office and storage space:</i> Leased office and storage space for the reporting year was obtained from BASF internal business data management systems. <i>Leased equipment:</i> The monetary purchasing volume for leased equipment in the reporting year was derived from BASF internal business data management systems.</p> <p>Emissions factors (secondary data): The CO₂ emission factors for leased cars were provided by the car manufacturers. They differentiate between fuel type (diesel/gasoline) as well as cubic capacity. For electric cars the electricity consumption of the models was taken from the manufacturer's specification. The energy consumption (electricity and heat energy) per square meter of office space and warehouses in Europe was taken from a study of the German Federal Ministry for Economic Affairs and Energy (BMWi, 2015). For North America and South America, it was taken from the Commercial Buildings Energy Consumption Survey (EIA, 2012). For Asia, it was taken from a study by Ding et al., 2017. Region-specific CO₂ emissions factors per MWh of electricity were obtained from IEA, 2020. CO₂ emissions factors per MWh of heat energy from natural gas and light fuel oil were taken from the GaBi database. For assessing the GHG emissions from leased equipment the emission factors</p>	<p>GHG emissions from leased assets were calculated for three different categories. 1) Leased cars: GHG emissions from Diesel, Otto and hybrid cars leased by BASF SE were calculated by multiplying the vehicle miles travelled, which were derived from the respective leasing contracts, by the relevant CO₂ emission factors. Since only the leasing contracts of BASF SE were evaluated, the resulting GHG emissions were subsequently extrapolated based on the number of employees to account for the entire BASF Group. Emissions from electric cars leased by the BASF Group were similarly extrapolated from BASF SE leasing data. First the total electricity consumption of all electric cars leased by BASF SE was determined by multiplying the vehicle miles travelled with the respective vehicle model's electricity consumption. From there the total electricity consumption was extrapolated for the BASF Group. This extrapolated global electricity consumption was then distributed among the four regions (Europe, Asia, North America, South America) based on the share of employees. For each region the electricity consumption was multiplied with a region-specific electricity emission factor. The resulting GHG emissions per region were then added up to yield the total GHG emissions from leased electric vehicles. 2) Leased offices and storage space: The GHG emissions from leased offices and storage space were assessed based on the leased space (in square meters) and the annual energy consumption per square meter of office and storage space, respectively. Only for Asia no distinction was made between office and storage space. 3) Leased Equipment: The GHG emissions from leased equipment such as hardware (i.e. computers or printers) were assessed based on the monetary purchasing volume in the</p>

were taken from the 2012 Guidelines to DEFRA/DECC's GHG Conversion Factors for Company Reporting, Annex 13 (Indirect emissions from supply chain).

reporting year and the corresponding GHG conversion factors.

Description of the data quality of reported emissions*
Percentage of emissions calculated using data obtained from suppliers or other value chain partners

Fair
0%

Information on methodologies and data used

Description of the types and sources of data used to calculate emissions

Description of the methodologies, allocation methods, and assumptions used to calculate emissions

Downstream scope 3 emissions

Category 9
Downstream transportation and distribution

Activity data (primary data):
 Quantities of product, origin and destination points, mode of transport and load factors were obtained from BASF internal business data management systems.

Emissions factors (secondary data):
 The emission factors incorporated in the IT solution EcoTransIT World were used (<http://www.ecotransit.org/>).

For the calculation of the GHG emissions associated with the transport of BASF products sold in the reporting year, the respective shipments from BASF sites to BASF customers were evaluated using the IT solution EcoTransIT World.

Description of the data quality of reported emissions*
Percentage of emissions calculated using data obtained from suppliers or other value chain partners

Good
0%

Category 11
Use of sold products

Activity data (primary data):
 Quantities and types of products sold in the reporting year were obtained from BASF internal business data management systems.

Emissions factors (secondary data):
 GWPs were taken from the Fifth Assessment Report, IPCC, 2013. In the case of some fluorinated hydrocarbons, GWPs are based on manufacturers' information.

Chemical products vary strongly in their GHG emissions during their use phase. Most chemical products do neither cause nor prevent GHG emissions, e.g. food and feed additives like vitamins or pigments for paints and dyes. For the calculation of the GHG emissions associated with the use of sold BASF products we only considered the direct use-phase emissions of sold products over their expected lifetime, i.e. the GHGs and products that contain or form GHGs that are emitted during use.

1) GHG emissions from products sold in the reporting year that form greenhouse gases: Nitrogenous fertilizers release nitrous oxide (N₂O) to the atmosphere because of microbial action in the soil. The associated GHG emissions were calculated based on the amount of N-containing fertilizers sold in the reporting year, the nitrogen content and on the fact that about 1% (in the presence of a nitrification inhibitor only 0.5%) of the nitrogen contained in the fertilizer is converted into N₂O-N. CO₂ from the use of urea (as fertilizer and solution for diesel truck engines) and from

		<p>carbonates was calculated based on the sold product quantity and the contained CO₂ amount.</p> <p>2) GHG emissions from products sold in the reporting year that contain greenhouse gases such as dry ice, CO₂ as gas for the beverage industry and HFCs as foaming agents to produce polyurethane foams: GHG emissions from dry ice and CO₂ liquid sold to the beverage industry were considered based on the sold quantity. GHG emissions from HFCs were calculated based on the procured HFC-quantities and the loss rate of HFCs in the polyurethane foams during their use phase (100% over the entire life cycle).</p>
<p>Description of the data quality of reported emissions* Percentage of emissions calculated using data obtained from suppliers or other value chain partners</p>		<p>Good</p> <p>0%</p>
<p>Category 12 End-of-life treatment of sold products</p>	<p>Activity data (primary data): Quantity of the products (raw materials, pre-products as well as packaging) purchased in the reporting year and percentage of BASF's sales in Europe and in the other regions was obtained from BASF internal business data management systems.</p> <p>The ratio of the different waste disposal methods (incineration, landfill, recycling) in each country/region was derived from data on municipal waste treatment provided by Eurostat (2018), OECD statistics (2012, 2015) and the Chinese National Bureau of Statistics (2018). The following shares of waste disposal methods were used for the different regions:</p> <p>Europe: 35% incineration (97% with energy recovery), 28% landfilling, 37% recycling; North America: 11% incineration with energy recovery, 65% landfilling, 24% recycling; Asia: 44% incineration (97% with energy recovery), 46% landfilling, 10% recycling; South America: over 99% landfilling and less than 1% incineration without energy recovery.</p>	<p>GHG emissions from the disposal of all BASF products (except the products that are already disposed of during their use phase and therefore accounted for in Category 11) manufactured in the reporting year were calculated presuming that these products at the end of their lives are either disposed of by landfilling or incineration or recycled. It was assumed that the products would be used and disposed of in the countries to which BASF sold them.</p> <p>The amount of GHG emissions was calculated separately for each region and end-of-life method. Recycling was assigned zero emissions in line with the cut-off approach of life cycle assessment. The emissions from landfilling and incineration were calculated based on a carbon balance. It was assumed that all carbon contained in the products is converted to CO₂ after disposal. For this end-of-life calculation, the same range of materials as in Category 1 (purchased materials) was considered since their amounts and C-contents are known. The total amount of disposed carbon going into landfilling was determined by multiplying the region's landfilling share with the materials' carbon content, which is calculated for each material by multiplying the amount of a material with its carbon percentage. This amount of disposed carbon was then converted into the amount of emitted CO₂ from landfilling. The same method was applied to determine the emissions from incineration.</p> <p>Incineration with energy recovery was considered proportionately in Europe, North America and Asia. Thus, a proportion of the</p>

calculated emissions from waste incineration in these two regions were allocated to energy generation. For the calculation of these emissions allocated to energy generation, the heating value methodology was used by assessing the energy content of the products of Category 1 that are incinerated at the end of their lives. Under the assumption that the efficiency of steam generation is 75% and the incineration plant requires 25% of the steam for its own power requirements, the produced net steam was determined. In accordance with the Guidance for Accounting & Reporting Corporate GHG Emissions in the Chemical Sector Value Chain, the total emissions from incineration with energy recovery was then allocated to the waste treatment and the energy generation with a zero emission factor by using an economic allocation approach based on the proportions of total costs of waste treatment (i.e. costs per tons of waste multiplied by the amount of waste; allocation share is 47%) and total revenues from the sale of generated steam (i.e. costs per tons of steam multiplied by the net amount of steam; allocation share is 53%).

Since this carbon balance calculation was done based on purchased materials, some corrections were necessary to avoid double counting of carbon that does not enter the end-of-life treatment stage. Therefore, process emissions, emissions occurring in the use phase and emissions from treatment of waste in operations were subtracted from the total amount of emissions from end-of-life treatment.

Description of the data quality of reported emissions*

Good

Percentage of emissions calculated using data obtained from suppliers or other value chain partners

0%

**Category 15
Investments**

Activity data (primary data): Scope 1 and scope 2 emissions of BASF's equity-accounted associated companies and joint ventures were obtained from the respective companies upon inquiry.

GHG emissions from equity-accounted joint ventures and equity-accounted associated companies are not included in BASF's scope 1 or scope 2 emissions. The GHG emissions from these companies are evaluated on a regular basis by inquiring these data from the respective companies. GHG emissions were calculated based on BASF's equity share in these companies, but only from non-consolidated companies of which BASF holds a minimum interest of 20%.

Description of the data quality of reported emissions*

Good

Percentage of emissions calculated using data obtained from suppliers or other value chain partners

100%

* Subjective evaluation of the data quality of the direct emissions data, activity data, and emission factors. The type of evaluation according to the criteria (Technology, Time, Geography, Completeness, and Reliability) is based on the GHG Protocol Scope 3 standard (page 77).