

Scope 3 GHG Inventory Report

Inhalt

1. Introduction.....	1
2. Descriptive information.....	2
3. Greenhouse gas emissions data.....	5
4. Biogenic carbon emissions.....	6
5. Description of scope 3 methodologies and data used	7

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. The approximately 115,000 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 about €60 billion in 2017. BASF shares are traded on the stock exchanges in Frankfurt (BAS), London (BFA) and Zurich (BAS). Further information at www.basf.com.</p>
Chosen consolidation approach (equity share, operational control or financial control)	<p>Production sites of fully consolidated companies and proportionally consolidated joint operations worldwide. The emissions are included pro rata, based on BASF's stake.</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. However, the GHG emissions from these 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) • Category 4: Upstream transportation and distribution • Category 9: Downstream transportation and distribution • Category 11: Use of sold products • Category 12: End-of-life treatment of sold products

	<ul style="list-style-type: none"> Category 15: Investments
The reporting period covered	01/01/2018 -12/31/2018
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>
Once a scope 3 base year has been established, the year chosen as base year and rationale for choosing the base year	No Scope 3 base year was chosen.
Once a base year has been established, scope 3 emissions in the base year	Not applicable.

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

Not applicable.

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	18,418,000	-	-	-
Scope 2, location-based ³ : Indirect emissions from the use of purchased electricity, steam, heating, and cooling	3,361,000	-	-	-
Certificates sold to third parties (VCUs)	0	-	-	-
Upstream scope 3 emissions				
Purchased goods and services	48,550,000	41%	90%	10%
Capital goods	1,900,000	2%	92%	8%
Fuel- and energy-related activities (not included in scope 1 or scope 2)	2,906,000	2%	90%	10%
Upstream transportation and distribution	1,937,000	2%	0%	100%
Waste generated in operations	717,000	1%	100%	0%
Business travel	211,000	0%	100%	0%
Employee commuting	236,000	0%	13%	87%
Upstream leased assets	270,000	0%	86%	14%
Downstream scope 3 emissions				
Downstream transportation and distribution	1,817,000	2%	100%	0%
Use of sold products	41,509,000	35%	100%	0%
End-of-life treatment of sold products	15,954,000	13%	92%	8%
Investments	1,858,000	2%	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 market-based Scope 2 emissions amount to 3,657,000 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	17,523,000	17,523,000	2,534	64,000
Scope 2	3,361,000 ²	3,361,000 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	2,484	740,000	72	91,000
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.

²Location-based approach. The market-based Scope 2 emissions amount to 3,657,000 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

Not applicable to BASF.

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):</p> <p>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.</p> <p>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 90 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*</p> <p>Percentage of emissions calculated using data obtained from suppliers or other value chain partners</p>		<p>Good</p> <p>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 that are 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 turn-key projects, machinery and fabricated equipment were analyzed based on their monetary purchasing volume in the reporting</p>

	<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)</p>	<p>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.</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 3 Fuel- and energy-related activities (not included in scope 1 or scope 2)</p>	<p>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.</p> <p>Emissions factors (secondary data): The cradle-to-gate emissions factors were obtained from the GaBi database.</p> <p>The grid related loss factor was taken from the German Federal Statistical Office.</p>	<p>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 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 (91,5% 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, 2018). 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 of 7 percent for Germany. 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.</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 4</p>	<p>Activity data (primary data): Quantities, types of goods procured and regional split of purchase in the reporting year</p>	<p>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>

<p>Upstream transportation and distribution</p>	<p>were obtained from BASF internal business data management 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.</p> <p>The current modal split of chemical transport in Europe was derived from the above-mentioned McKinnon Report.</p>	<p>(i) raw materials, (ii) technical & capital goods and (iii) packaging. (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. (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. (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>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 the in-house Reporting EHS Application database. The data collection method differentiates between on-site and off-site disposal as well as between different disposal</p>	<p>The GHG emissions from on-site waste incineration are accounted for in our Scope 1 emissions. The GHG emissions from off-site waste incineration and on- and off-site landfill were calculated as follows: 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 and assuming that all of</p>

methods (waste incineration with and without energy recovery, landfill, waste water treatment and others).

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

the carbon is converted into CO₂ during combustion results in the CO₂ emissions from waste incineration. The GHG emissions from landfill were calculated by multiplying the amount of landfilled waste with the GHG emission factor for landfilled plastic waste. Plastic waste was chosen because it is a common inert chemical product showing average decomposition behavior for a carbon containing chemical in terms of greenhouse gases.

The GHG emissions of BASF-operated wastewater plants are accounted for in our Scope 1 or Scope 2 emissions, respectively. The CO₂e emissions from non-BASF operated wastewater 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 biotreatable TOC is converted into biosludge 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*

Good

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

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.

Emissions factors (secondary data): CO₂e conversion factors for short-haul, medium-haul and long-haul flights were taken from DEFRA's GHG Conversion Factors for Company Reporting (2018). CO₂e conversion factors for travel by train, per country were taken from: SNCF, 2014-2015 for France; UBA, 2017 for Germany; Thalys Network, 2017 for Belgium; Ferrovie dello stato italiane, 2017 for Italy; ÖBB, 2016 for Austria; DEFRA, 2018 for UK; EPA, 2018 for the US; Via Rail, 2017 for Canada; the average of India GHG Program, 2015 and

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; b) GHG emissions from business travel by train: Rail miles that are collected through external partners such as Deutsche Bahn or 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; and (c) GHG emissions from business travel by car: Driven kilometers that are collected by car rental companies and monitored by BASF's Travel Management were converted into CO₂e emissions using an

	<p>Japan's Eco-Mo Foundation, 2018 for Asia Pacific; and the average of the European emission factors for Spain. CO₂e conversion factors for business travel by rental car were taken from DEFRA's GHG Conversion Factors for Company Reporting (2018) and EPA's Emission Factors for Greenhouse Gas Inventories (2018).</p>	<p>average passenger car CO₂e conversion factor taken from DEFRA (2018) and EPA (2018).</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>Good</p> <p>100%</p>
<p>Category 7</p> <p>Employee commuting</p>	<p>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.</p> <p>Emission 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 (2018) and EPA's Emission Factors for Greenhouse Gas Inventories (2018).</p>	<p>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 a distance of 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 South America.</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 8</p> <p>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.</p>	<p>GHG emissions from leased assets were calculated for three different categories. 1) Leased cars: GHG emissions from 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</p>

Leased equipment: The monetary purchasing volume for leased equipment in the reporting year was derived from BASF internal business data management systems.

Emissions factors (secondary data):
 The CO₂ emission factors for the leased cars were provided by the car manufacturers. They differentiate between fuel type (diesel/gasoline) as well as cubic capacity.
 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.
 CO₂ emissions factors per MWh of electricity were obtained from IEA, 2018 based on data of the year 2016.
 CO₂ emissions factors per MWh of heat energy from natural gas and light fuel oil were obtained from the GaBi database.
 For assessing the GHG emissions from leased equipment the emission factors were taken from the 2012 Guidelines to DEFRA/DECC's GHG Conversion Factors for Company Reporting, Annex 13 (Indirect emissions from supply chain).

employees to account for the entire BASF Group. 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 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	<p>Activity data (primary data): Quantities and types of products sold in the reporting year as well as their means of transportation were obtained from BASF internal business data management systems.</p> <p>Emissions factors (secondary data):</p>	<p>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 taking into account regional differences. The transport distances from each Verbund site and in the different regions Europe, North America, South America and</p>

The CO₂ emission factors used (except pipeline transport) are specific factors calculated for BASF's outbound transport activities; for pipeline transport the CO₂ emission factor was taken from the McKinnon Report "Measuring and Managing CO₂ Emissions from the Transport of Chemicals in Europe". For trucks in Asia, a CO₂ emission factor of 90 g per t*km was assumed.

Asia were determined by internal experts. The GHG emissions associated with the transport of BASF's sold products were calculated by multiplying product quantity by the relevant transport distance and by the respective CO₂ emissions factor.

**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): The CO₂ emission factor for crude oil was taken from IPCC. The CO₂ emission factor for natural gas was calculated on the basis that natural gas is solely methane that is entirely converted into CO₂.

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 emissions that occur from the use of fuels and feedstock, and GHGs and products that contain or form GHGs that are emitted during use.

1) Oil & Gas: It was assumed that 100% of the oil and gas are combusted for heating purposes. The volume of sold crude oil and natural gas, respectively, was multiplied by the CO₂ emission factor for crude oil and natural gas, respectively, to calculate the GHG emissions associated with the thermal conversion of these products.

2) 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 2018, 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) was calculated based on the sold product quantity and the contained CO₂ amount.

3) 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

		<p>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 (35 % for spray foam and 100% for integral foam).</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 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 versus landfill) in each country/region was derived from data on municipal waste treatment provided by Eurostat (2014), the United Nations Statistics Division (2012), and the Inter-American Development Bank (2010).</p> <p>Emission factors (secondary data): The emissions factor for landfill was obtained from the GaBi database.</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 are disposed of at the end of their lives either by landfilling or by incineration. It was assumed that the products would be used and disposed of in the countries to which BASF sold them. Therefore, the ratio of incineration to landfilling in each region was investigated. In Europe, the percentage of incinerated waste adds up to 49% and therefrom 94% are with energy recovery while the share of landfilled waste amounts to 51%. In North America, the ratio of incineration to landfilling is 16% to 84%; in Asia, 42% and therefrom 50% with energy recovery to 58%. For South America, 100% of the waste is taken to landfills.</p> <p>The amount of GHG emissions was calculated separately for incineration and landfill for each region (corresponding to BASF's sales in Europe, Asia, North and South America), considering the region-specific proportions of the different disposal methods. As the pre-products purchased are known from their amount and C-content, the same range of chemicals as in Category 1 was considered for end-of-life options. The amount of CO₂ a compound emits when incinerated can be determined by its C-content. Following this approach, the CO₂ emissions for all products incinerated in the different regions were calculated by multiplying CO₂ emissions per kg by the amount of pre-product.</p> <p>Incineration with energy recovery was considered proportionately in Europe and Asia. Thus, a proportion of the 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</p>

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%). For the fraction of C-containing products disposed of in landfills, an average CO₂/CH₄-release was assumed, related to 1 kg plastic waste landfilled. Again, this factor was multiplied by the landfill fraction of the amount of product procured to obtain the CO_{2e} emissions of products landfilled.

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 subsidiaries, 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 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. However, the GHG emissions from these companies are determined 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).