

2.H.2 - Food & Beverages Industry

Category Code	Method					AD					EF				
2.H.2	T1					NS					CS				
Key Category	SO ₂	NO _x	NH ₃	NM VOC	CO	BC	Pb	Hg	Cd	Diox	PAH	HCB	TSP	PM ₁₀	PM _{2.5}
2.H.2	-	-	-	-/-	-	-	-	-	-	-	-	-	-/-	-/-	-/-

T = key source by Trend **L** = key source by Level

Methods	
D	Default
RA	Reference Approach
T1	Tier 1 / Simple Methodology *
T2	Tier 2*
T3	Tier 3 / Detailed Methodology *
C	CORINAIR
CS	Country Specific
M	Model

* as described in the EMEP/CORINAIR Emission Inventory Guidebook - 2007, in the group specific chapters.

AD - Data Source for Activity Data	
NS	National Statistics
RS	Regional Statistics
IS	International Statistics
PS	Plant Specific data
AS	Associations, business organisations
Q	specific questionnaires, surveys
EF - Emission Factors	
D	Default (EMEP Guidebook)
C	Confidential
CS	Country Specific
PS	Plant Specific data

Emissions occurring in this sector in Germany derive from the following production processes which are analogous to the IPCC category (Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, Reference Manual (Volume 3)):

Alcoholic beverages

- Wine
- Beer
- Spirits

Bread and other foods

- Meat, fish and poultry
- Sugar
- Margarine as well as hard and hardened fats
- Cake, cookies and breakfast cereals
- Bread
- Animal feedstuffs
- Coffee roasting

Following pollutants are reported:

- volatile organic compounds (NMVOC),
- particulate matter (PM_{2.5}, PM₁₀ and TSP).

Pursuant to the 1993 Classification of Economic Activities (WZ 93), the food and beverage industry is divided into nine groups and a total of 33 classes. Governmental statistical evaluations are oriented to this classification. The German food

industry includes an especially large number of small and medium-sized enterprises (SMEs); nearly 80 percent of its companies have fewer than 100 employees, and only 3 per cent have more than 500 employees (BpB, 2002, p.51).

Energy related emissions from the sugar industry are reported under category 1.A.2.e.

Methodology

The Inventory Database (CSE) lists activity rates (produced amounts) and emission factors for the relevant sectors. The activity rates for the various products / product groups, with the exception of that for feedstuffs, were obtained from the Federal Statistical Office ¹⁾ / ²⁾ / ³⁾

Activity data

The activity data for feedstuffs were obtained from the Federal Ministry of Food, Agriculture and Consumer Protection ⁴⁾. The production amounts are serve as activity data, see following table:

Activities	Unit	2011	2012	2013	2014	2015	2016	2017	2018	2019
Animal fat	t	344,959	351,926	348,924	388,316	428,765	374,107	345,614	320,387	295,231
Animal food	t	21,044,509	21,417,314	22,939,376	23,388,555	24,330,745	25,119,395	25,702,308	26,073,845	26,164,384
Beer	hl	89,447,120	88,502,520	86,504,040	87,231,356	87,213,397	86,775,781	84,806,253	86,568,243	84,603,471
Bread production (craft)	t	915,818	989,580	956,795	965,502	984,536	988,680	990,700	989,440	998,945
Bread production (industrial)	t	3,726,687	4,019,160	3,891,692	3,926,838	4,003,940	4,021,314	4,029,289	4,022,805	4,058,202
Cake & cookies...	t	1,549,301	1,522,044	1,498,048	1,526,029	1,565,246	1,621,125	1,645,863	1,686,357	1,678,133
Coffee	t	539,890	544,745	554,717	531,184	512,557	542,108	550,976	550,896	571,691
Dried fodder	t	242,000	247,000	225,000	198,000	172,000	172,000	234,000	244,000	212,000
Meat	t	1,587,154	1,522,792	1,539,241	1,649,626	1,656,903	1,648,908	1,677,863	1,677,893	1,711,864
Other wine and sparkling	hl	1,353,377	1,404,473	1,319,362	1,148,418	1,539,771	921,975	810,446	841,751	932,728
Red Wine	hl	3,500,761	3,278,551	3,019,266	3,211,437	3,204,384	3,144,761	2,710,139	3,298,572	2,858,432
Smoked Products	t	2,319,108	2,235,273	2,220,686	2,210,356	2,277,438	2,275,074	2,230,685	2,240,797	2,263,469
Spirituos beverages	hl	1,193,796	1,206,592	1,213,041	1,179,724	1,206,941	1,210,178	1,195,702	1,227,011	1,218,995
Sugar	t	4,415,766	4,448,938	3,696,200	3,999,980	3,388,727	3,630,006	4,238,366	4,524,431	4,085,532
White wine	hl	5,022,430	5,116,221	4,748,147	5,453,059	5,028,205	5,305,261	4,352,566	6,432,728	4,787,965

For the purpose of international comparability, the inventory team aggregates all products to the common unit of kilotons. These totals can be find in CRF tables and NFR tables as activity data, but this approximately converted figure is not statistically published. The procedure for the uniform reporting of the activity rate shows a high degree of uncertainty due to the very different products of official statistics.

Emission factors

For emissions calculations, country-specific emission factors were used where available. EF were evaluated and updated by a national research study ⁵⁾. Otherwise, the emission factors recommended by IPCC and CORINAIR were used.

All NMVOC emission factors except for beer were perpetuated during the complete time series. The emission factor for beer changed in 2000.

Product	Unit	NM VOC-EF	Source
Animal Fat	kg/t	1	Expert judgement
Animal Feed	kg/t	0,1	Expert judgement
Beer	kg/hl	0,002	Expert judgement
Bread (artisanry)	kg/t	3	Guidebook 2019 (Bouscaren, 1992)
Bread (industry)	kg/t	0,3	Expert judgement
Cakes & Cookies	kg/t	0,1	Expert judgement
Coffee	kg/t	0,06885	Expert judgement
Meat	kg/t	0,03	Guidebook 2019 (Bouscaren, 1992)
Other Wine/ sparkling Wine	kg/hl	0,058	Expert judgement
Red Wine	kg/hl	0,08	IPCC GB 1996
Smoked Meat & Fish	kg/t	0,0023	Expert judgement
Spirits	kg/hl	2,93	Expert judgement
Sugar	kg/t	0,898368	Expert judgement
White Wine	kg/hl	0,035	IPCC GB 1996

In the following table the EF of TSP, PM10 and PM2.5 are presented.

Product	Unit	Value	Source
Sugar (TSP)	kg/t	0,19	Expert judgement
Sugar (PM 10)	kg/t	0,10526	Expert judgement
Sugar (PM 2,5)	kg/t	0,0589	Expert judgement
Coffee (TSP)	kg/t	0,00905	Expert judgement
Coffee (PM 10)	kg/t	0,00318	Expert judgement
Coffee (PM 2,5)	kg/t	0,0009055	Expert judgement
Dried fodder (TSP)	kg/t	0,85	Expert judgement

Trends in emissions

Emissions of the food and drink industry are reported, in summary form, in the inventory in of the sectoral report for industrial processes. Emissions in detail for the resp. products are presented following tables:

NM VOC Emissions	Unit	2011	2012	2013	2014	2015	2016	2017	2018	2019
Animal fat	t	344.96	351.93	348.92	388.32	428.77	374.11	345.61	320.39	295.23
Animal food	t	2104.45	2141.73	2293.94	2338.86	2433.07	2511.94	2570.23	2607.38	2616.44
Beer	t	178.89	177.01	173.01	174.46	174.43	173.55	169.61	173.14	169.21
Bread production (total)	t	3865.46	4174.49	4037.89	4074.56	4154.79	4172.44	4180.89	4175.16	4214.30
Cake & cookies...	t	158.72	152.28	153.92	164.96	165.69	164.89	167.79	167.79	171.19
Coffee	t	37.20	37.53	38.22	36.60	35.32	37.35	37.96	37.96	39.39
Meat, fish	t	51.81	50.80	50.05	50.86	52.20	53.87	54.51	55.74	55.55
Spirituos beverages	t	3497.82	3535.31	3554.21	3456.59	3536.34	3545.82	3503.41	3595.14	3571.66
Sugar	t	3974.19	4004.04	3326.58	3599.98	3049.85	3267.01	3814.53	4071.99	3676.98
Wine (total)	t	534.34	522.81	484.25	514.38	521.64	490.74	416.16	537.85	450.35
Total	t	14747.84	15147.94	14460.99	14799.57	14552.10	14791.71	15260.69	15742.54	15260.28

Particle Emissions	Product	Unit	2011	2012	2013	2014	2015	2016	2017	2018	2019
PM 10	Coffee	t	1.73	1.74	1.78	1.70	1.64	1.73	1.76	1.76	1.83
PM 10	Sugar	t	464.80	468.30	389.06	421.04	356.70	382.09	446.13	476.24	430.04
PM 10 (total)			466.53	470.04	390.84	422.74	358.34	383.83	447.89	478.00	431.87
PM 2.5	Coffee	t	0.49	0.49	0.50	0.48	0.46	0.49	0.50	0.50	0.51
PM 2.5	Sugar	t	260.09	262.04	217.71	235.60	199.60	213.81	249.64	266.49	240.64
PM 2.5 (total)			260.57	262.53	218.21	236.08	200.06	214.30	250.14	266.98	241.15
TSP	Coffee	t	4.91	4.96	5.05	4.83	4.66	4.93	5.01	5.01	5.20
TSP	Dried fodder	t	205.70	209.95	191.25	168.30	146.20	146.20	198.90	207.40	180.20
TSP	Sugar	t	839.00	845.30	702.28	760.00	643.86	689.70	805.29	859.64	776.25
TSP (Total)			1049.61	1060.21	898.58	933.13	794.72	840.83	1009.20	1072.06	961.65

Recalculations

Only one recalculation has been carried out compared to last year's Submission: NMVOC emissions for 2018 due to a correction of AD of spirituous beverages.



For pollutant-specific information on recalculated emission estimates for Base Year and 2018, please see the pollutant specific recalculation tables following [chapter 8.1 - Recalculations](#).

Planned improvements

For purposes of updating the EF project has started in 2020, but results are planned not before 2021 for the 2022 submission ⁶⁾.

¹⁾ Statistisches Bundesamt (FS 4, R 3.1): Fachserie 4, Reihe 3.1: Produzierendes Gewerbe, Produktion im Produzierenden Gewerbe ("manufacturing industry; production in the manufacturing industry"; URL:

https://www.destatis.de/DE/Themen/Branchen-Unternehmen/Industrie-Verarbeitendes-Gewerbe/_inhalt.html

²⁾ Statistisches Bundesamt (FS 3, R 3.2.1): Fachserie 3, Reihe 3.2.1: Land- und Forstwirtschaft, Fischerei, Wachstum und Ernte – Feldfrüchte (div. Jgg.). URL:

https://www.destatis.de/DE/Themen/Branchen-Unternehmen/Landwirtschaft-Forstwirtschaft-Fischerei/Flaechennutzung/_inhalt.html

³⁾ Statistisches Bundesamt (FS 3, R 3.2.2): Land- und Forstwirtschaft, Fischerei, Wirtschaftsdünger tierischer Herkunft in landwirtschaftlichen Betrieben - Erhebung zur Wirtschaftsdüngerausbringung (div. Jgg.)

⁴⁾ BMELV, 2020: Federal Ministry of Food, Agriculture and Consumer Protection (BMELV): Statistisches Jahrbuch über Ernährung, Landwirtschaft und Forsten 2019;

URL: <https://www.ble-medien-service.de/0127/statistisches-jahrbuch-ueber-ernaehrung-landwirtschaft-und-forsten-2019>

⁵⁾ J. Theloke, S. Wagner, D. Jepsen, U. Hackmack, 2008: "Emissionen aus der Nahrungsmittelindustrie", FKZ 206 42 101/01

⁶⁾ ReFoPlan FKZ – 3720533040: „Aktualisierung der Datengrundlagen zu Emissionen aus der Nahrungsmittelindustrie“