

Greenhouse Gas Emissions in 2020 – Executive Summary –

**Stationary installations and aviation subject to
emissions trading in Germany (2020 VET report)**

Editorial information

Publisher

German Emissions Trading Authority (DEHSt)
at the German Environment Agency
City Campus
Building 3, entrance 3 A
Buchholzweg 8
D-13627 Berlin
Phone: +49 (0) 30 89 03-50 50
Fax: +49 (0) 30 89 03-50 10
emissionstrading@dehst.de
Internet: www.dehst.de/English

As of May 2021

Responsible editor: Section V 3.3

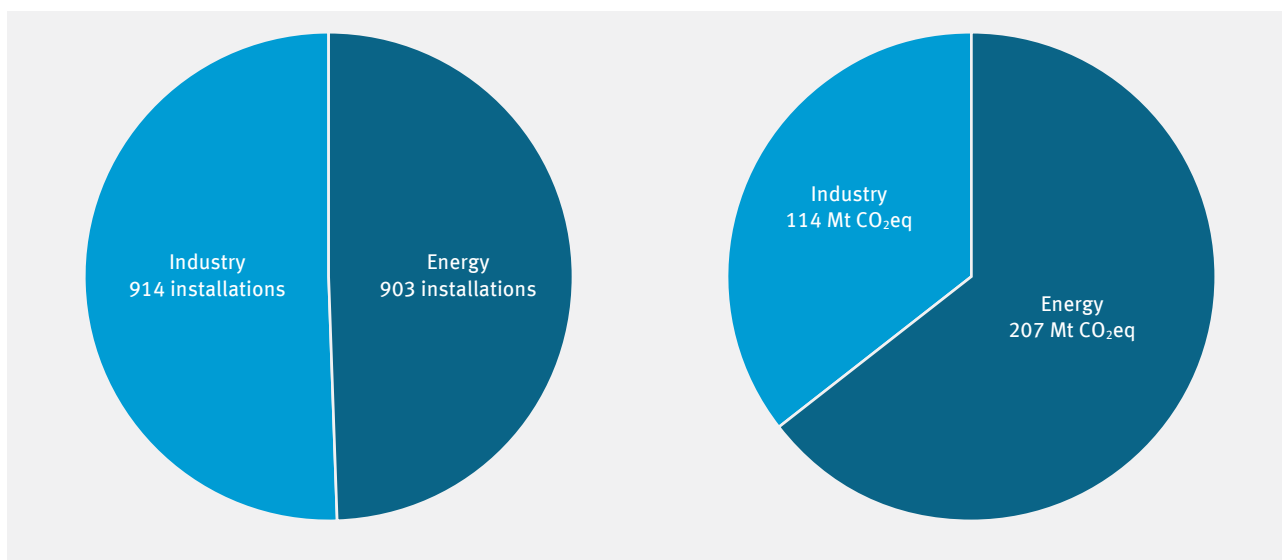
English by Nigel Pye, npservices4u@gmail.com

Executive Summary

Energy and Industry Sector in Germany

2020 is the last year of the third trading period of the European Emissions Trading Scheme (EU ETS). This year, 1,817 stationary installations were covered by the EU ETS in Germany. The installations emitted around 320 million tonnes of carbon dioxide equivalents (CO₂eq), which represents a decrease of 12 percent compared to 2019. At the end of the third trading period, emissions from German installations approached the 300 million tonnes of carbon dioxide equivalents mark for the first time since the start of the EU ETS in 2005. This more or less continues the emissions trend of the previous year. In 2019, the decrease was 14 percent. Emissions from energy installations fell by 15 percent and emissions from industrial installations by five percent compared to the previous year. The economic impact of the COVID 19 pandemic, which began in spring 2020, had a discernible influence on the emissions situation in 2020 presented in this report. However, an exact determination requires further analyses, which cannot be provided within the scope of this report.

Figure 1 provides an overview of the distribution of emissions and installations within the energy and industrial sectors.



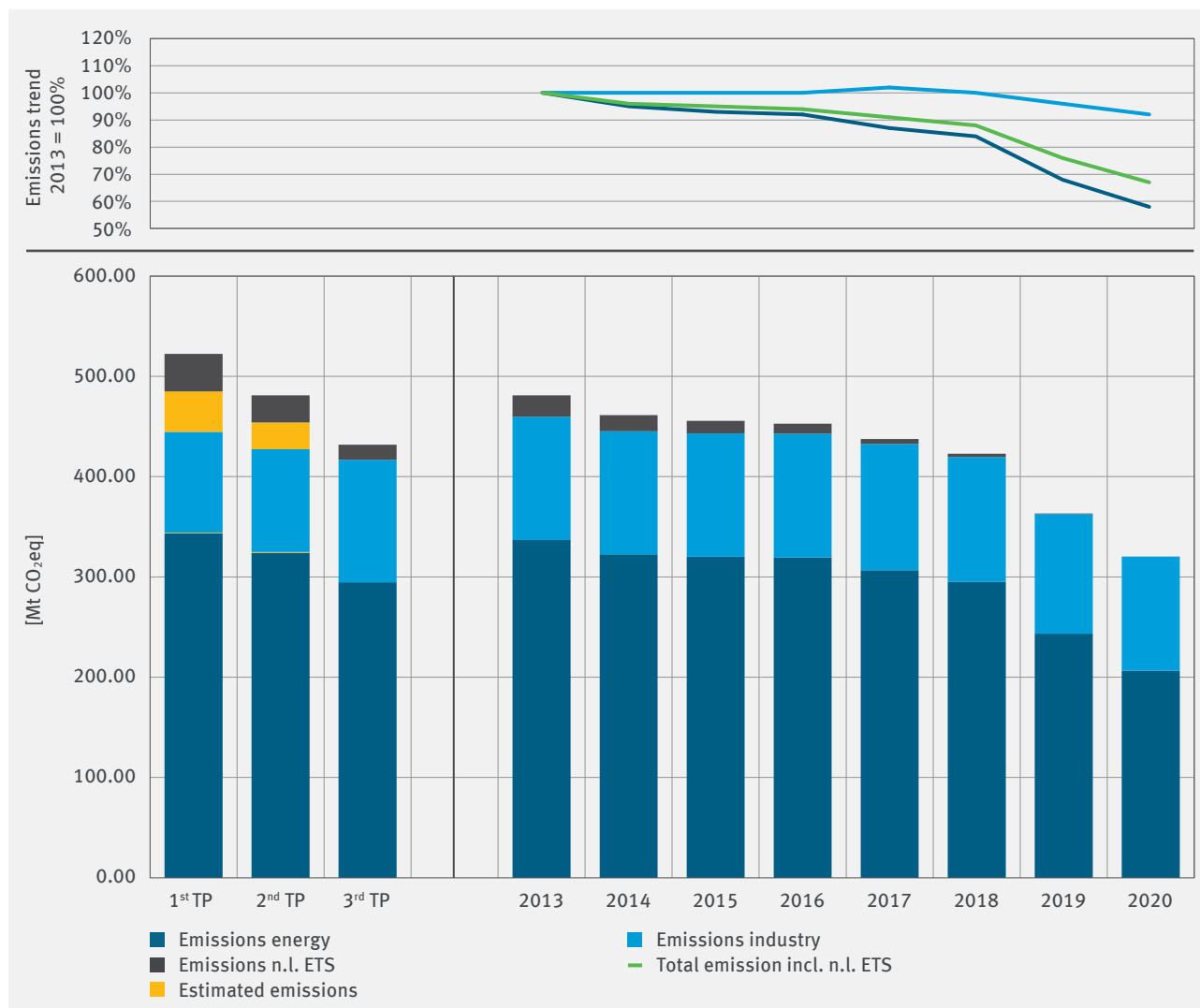
As of 03/05/2021

Figure 1: Distribution of emissions and installations subject to emissions trading in the energy sector (Activities 2 to 6 as per Annex 1 TEHG) and the industrial sector (Activities 1 and 7 to 29 as per Annex 1 TEHG) in Germany in 2020

While the number of installations is divided about half and half between the industrial and the energy sectors, energy installations dominate the field of emissions: nearly two thirds of emissions from Germany's stationary installations subject to emissions trading is generated by energy installations and one third from industrial installations.

Emissions trends in the third trading period

Figure 2 shows the German EU ETS emissions since 2005, broken down to industrial and energy installations. The figure shows the reported emissions for the individual years from 2013 onwards, but only the average of the first (2005 to 2007) and second (2008 to 2012) trading period for 2005 to 2012. The average for the third trading period (2013 to 2020) is also shown in addition to the figures for the individual years. Emissions from installations that are no longer subject to emissions trading (n.l. ETS)¹ are also taken into account for the years up to the date of their decommissioning. These are predominantly emissions from energy installations, which is why they have not been divided into the energy and industrial sectors. In addition, an estimated correction term (scope estimate) was added to emissions prior to 2013 in order to reflect the scope of emissions trading for previous trading periods at that time. This estimate mainly affects emissions from industrial installations, while the estimated additional emissions from energy installations are as low as to be barely visible in the figure.



As of 03/05/2021

Figure 2: EU ETS emissions from the energy and industry sectors in Germany since 2005²

1 Cf. Explanation for 'Taking into account installations no longer subject to emissions trading (n.l. ETS)' in Chapter 1 Introduction
 2 Estimated emissions from polymerisation plants that have been subject to emissions trading from 2018 onwards, amounting to an average of 75,000 tonnes of carbon dioxide equivalents per year (2005 to 2017), are not shown.

Compared to the previous year, emissions from energy installations in 2020 dropped by around 15 percent to 207 million tonnes of carbon dioxide. This is a continuation of the downward trend of the previous year, albeit slightly weakened (2019: minus 18 percent). The reason is the continued significant decline in lignite and hard coal emissions. Hard coal emissions decreased by 21 percent, lignite emissions by 18 percent in 2020.

The main reasons for the decrease in hard coal emissions were another significant increase in the feed-in of electricity from wind power / photovoltaic installations and a continued displacement by natural gas power stations. Power plant closures, however, played a subordinate role in 2020, unlike in 2019, as the first round of tenders for the closure of hard coal capacities only started in September 2020 and will therefore only have an impact on electricity generation in 2021. The economic efficiency of hard-coal-fired plants deteriorated further compared to the previous year due to relatively low natural gas prices and continued high prices for emission allowances (EUA).

The economic efficiency of lignite-fired power plants also deteriorated further last year due to persistently high CO₂ prices and lower electricity market prices. With regard to lignite power plant closures or transfers of power plant units into security reserve did not play a prominent role in the emission trend in 2020.

Electricity production in Germany fell significantly in 2020 in the wake of the COVID 19 pandemic. Particularly noteworthy is the fact that lignite is no longer the most important energy source in electricity generation for the first time since 2006. With a share of around 18 percent, onshore wind power has moved to the top, lignite shares second place with natural gas (around 16 percent each), nuclear power follows with eleven percent and photovoltaics with nine percent. Hard coal now only has a market share of 7.5 percent.

Natural gas emissions rose by two percent compared to the previous year, but this had only a very minor impact in offsetting the decrease in hard coal and lignite emissions. The rising natural gas emissions are mainly due to the increasing fuel switch from coal to natural gas in power generation as described above.

Since the beginning of the third trading period in 2013, emissions from energy installations have dropped continuously and by around 42 percent. This is due in particular to the decrease in electricity generation from lignite and hard coal. The main reasons for this are the growing importance of electricity from renewable energies, the transfer of electricity generation capacities into security reserve and the decommissioning of power plant units from 2016, and the significantly increased EUA prices from 2018.

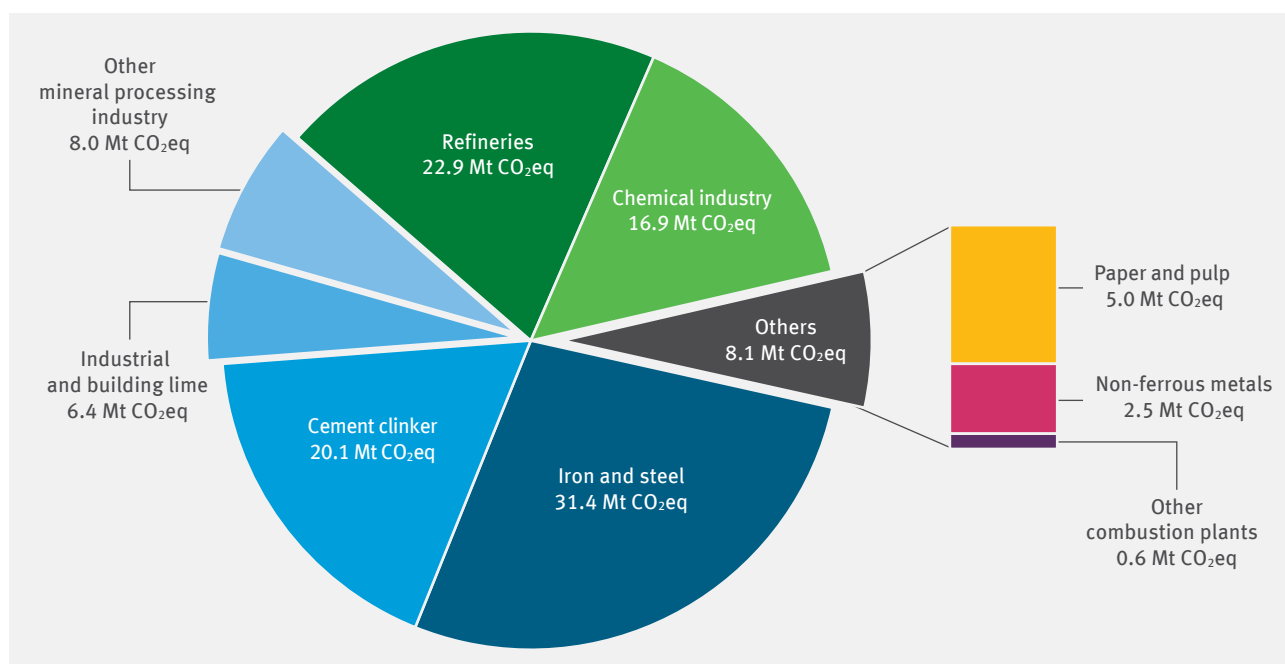
Emissions from the industry with high energy consumption hardly changed from 2013 to 2018 and were between roughly 123 and 126 million tonnes of carbon dioxide equivalents each. Only in 2019 did they fall below the 2013 level for the first time, at 119 million tonnes of carbon dioxide equivalents. In 2020, they then fell further to 113 million tonnes of carbon dioxide equivalents and thus to 92 percent of the 2013 emissions. The decrease in emissions compared to the previous year was five percent (2019: minus four percent). It was mainly due to the economic trend in the wake of the COVID 19 pandemic, whereas it was significantly influenced by the global economic downturn in the previous year, which also affected production trends in Germany.

A 33 percent decrease in total German EU ETS emissions since 2013, i. e. to two-thirds of the 2013 level, is thus predominantly due to the decline in emissions from energy installations. However, a proportional effect by the EUA price in the EU ETS on the emission trend can only be observed in terms of emissions from energy installations from 2019 onwards. In both 2019 and 2020, the economic efficiency of natural gas power plants compared to coal-fired power plants improved, partly due to the increased EUA prices so that they increasingly displaced generation from coal-fired power plants.

Emissions from industrial installations in detail

Figure 3 shows the distribution of the total emissions from individual industrial sectors. The iron and steel industry accounts for the largest share of industrial emissions at around 28 percent, followed by refineries (20 percent), cement clinker production (18 percent) and the chemical industry (15 percent). Due to the emissions trend, the iron and steel industry's share fell slightly compared to the previous year (2019: 30 percent), while the shares of the other three sectors increased slightly (2019: refineries 19 percent, cement clinker production 17 percent, chemical industry 14 percent).

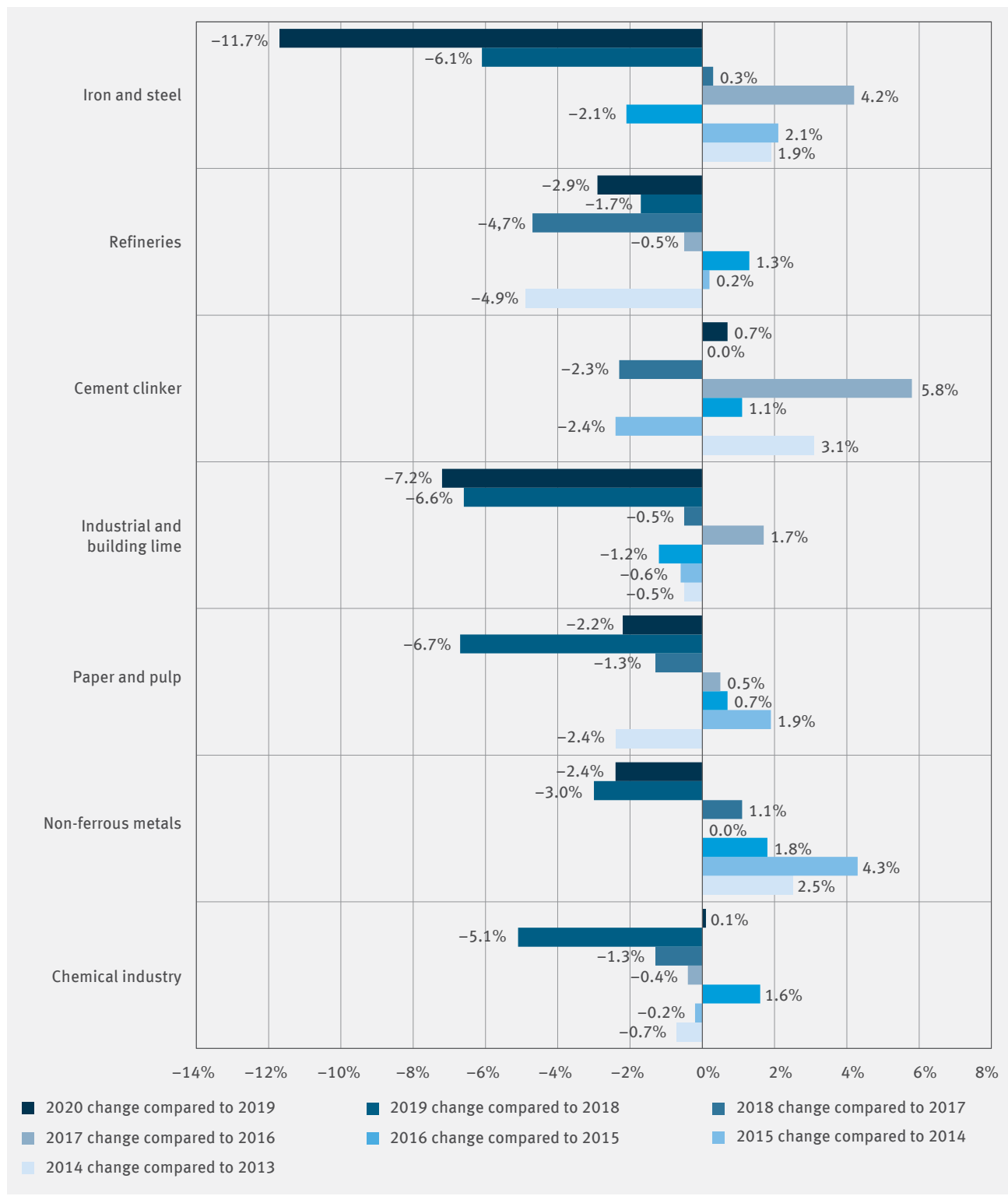
The remaining industrial emissions are distributed across four other sectors and sub-sectors: other mineral processing industries (seven percent), which includes glass and ceramics production, industrial and building lime (six percent), the paper and pulp industry (four percent) and non-ferrous metals industry (two percent). Other combustion plants that cannot be assigned to any of the aforementioned sectors generate only about half a percent of the total industrial emissions.



As of 03/05/2021

Figure 3: Distribution of emissions among individual industrial sectors in 2020

Figure 4 summarises the different trends of emissions in selected industrial sectors compared to the previous year. In addition, the relative annual changes since 2013 are also shown.



As of 03/05/2021

Figure 4: Annual emission changes in the industrial sectors since 2013

In 2020, emissions fell in almost all sectors, sometimes considerably, compared to the previous year, they only remained roughly unchanged year-on-year in the cement clinker industry and the chemical industry. This also reflects the production trend in the individual sectors, with the cement clinker industry recording slight increases in production as the construction sector was not affected by the COVID 19 pandemic.

Since the beginning of the third trading period, the sectors have also developed quite differently, but depending on their economic situation.

Emissions from the iron and steel industry increased slightly from 2013 to 2018, with the exception of 2016, but fell back to almost the 2013 level in 2019 and significantly below it in the 2020 reporting year due to the economic situation. The emissions trend was also influenced by the fact that coke imports were increasingly replaced by domestic production. Other factors for emission fluctuations in the iron and steel industry can be further changes in the fuel mix, for example the mutual substitution of natural gas and more emission-intensive hard coal. Another reason could be changes in the quality of raw materials (ores used).

Emissions from refineries fell overall between 2013, the start of the third trading period, and 2020. Since 2017, emissions have decreased continuously compared to the respective previous year. Potential causes for this trend were several extraordinary events in 2018 and 2019 and the pandemic-related adjustment of production in refinery installations in the reporting year. For example, demand for aircraft fuel fell sharply in 2020. In contrast, the demand for heating oil rose considerably due to the significantly lower price level, which somewhat mitigated the production decline at the German refineries.

Since the beginning of the third trading period in 2013 and especially between 2015 and 2017, emissions from the cement clinker industry increased significantly, reaching their highest level since 2008 in 2017. Since 2018, emissions have remained relatively constant and they are primarily determined by the production trend. The cement industry was less affected by the pandemic containment restrictions than other industries. Construction sites continued to operate and construction investments, a key sales market for the cement industry, even increased.

From 2013 to 2018, emissions from the production of industrial and building lime did not change. Production and emissions from industrial and building lime installations are primarily determined by the economic situation of the steel and construction industries. In line with the decline in production in the iron and steel sector since 2018, emissions from industrial and building lime plants have also fallen.

Overall, emissions from the paper and pulp industry remained relatively constant since the beginning of the third trading period. However, in the last two years of the third trading period there was a significant decrease in emissions. Reasons for the trend since 2013 were, in addition to an increasing energy efficiency in production, essentially also the production trend: the COVID 19 pandemic intensified the trend towards the decrease in production of graphic paper and the increase in the production of packaging products in 2020.

In the first years of the third trading period, emissions from the non-ferrous metals industry rose steadily, but decreased again in 2019 and 2020 due to the economic situation and in 2020 in particular, due to reduced demand from the automobile industry.

Total emissions from the chemical industry remained at about the same level in the first years of the third trading period, only dropping significantly from 2018 onwards. Emissions in 2020 did not change compared to 2019. There were different pandemic-related developments in the chemical industry (decrease in demand for polymers from the automobile industry, higher demand for cleaning agents and disinfectants, etc.), which were not directly reflected in the emissions trend, as their production is associated with low direct emissions.

The largest emitters in the energy and industrial sectors

Table 1 shows the largest emitters among the energy installations. The Boxberg III and Boxberg IV installations are combined into one power plant in Table 1. In total, these ten power plants or eleven installations at 100 million tonnes of carbon dioxide equivalents cause just under a third (31 percent) of the emissions subject to emissions trading in the stationary sector and about just under half (48 percent) of the emissions from energy installations. While the ten largest power plants had actually emitted more carbon dioxide equivalents in total in 2019 than all German industrial installations combined, they were about twelve percent below the emissions of industrial installations in 2020.

Table 1: The ten largest power plants (Activities 2 to 6) by emissions

Installation (operator)	2020 VET [kt CO ₂ eq]	Change against 2019
Neurath Power Plant (RWE Power AG)	18,671	▼ -17%
Boxberg III and IV Power Plant (Lausitz Energie Kraftwerke AG)	15,385	▼ -18%
Jänschwalde Power Plant (Lausitz Energie Kraftwerke AG)	13,650	▼ -23%
Niederaußem Power Plant (RWE Power AG)	11,878	▼ -36%
Weisweiler Power Plant (RWE Power AG)	11,474	▼ -14%
Schwarze Pumpe Power Plant (Lausitz Energie Kraftwerke AG)	10,286	▼ -2%
Lippendorf Power Plant (Lausitz Energie Kraftwerke AG)*	8,273	▼ -8%
Mannheim Large Power Plant (GKM) (Grosskraftwerk Mannheim AG)**	4,179	▼ -15%
Scholven Power Plant (Uniper Kraftwerke GmbH)	3,448	▼ -15%
<i>Hallendorf Power Plant (Salzgitter Flachstahl GmbH)</i>	3,124	▼ -10%
Total	100,368	▼ -18%

As of 03/05/2021

* Lippendorf Power Plant is a joint power plant owned by LEAG (Lausitz Energy Power Plants AG) and EnBW (Energy Baden-Württemberg AG), each of which owns a unit.
 ** Mannheim Large Power Plant is a joint power plant of the following companies: RWE Generation SE (40%), EnBW (32%) and MVV RHE GmbH (28%).
 Italics = new installation / power plant in the TOP 10

At around 33 million tonnes of carbon dioxide equivalents, the ten largest emitters among the industrial installations emit significantly less than the ten largest power plants and come exclusively from the iron and steel industry or are refineries. Their share of emissions subject to emissions trading in the stationary sector is around ten percent, while they account for 29 percent of emissions from industrial installations.

Table 2: The ten largest industrial installations (Activities 1 and 7 to 29) by emissions

Installation (operator)	2020 VET [kt CO ₂ eq]	Changes against to 2019	
Duisburg Integrated Steelworks (thyssenkrupp Steel Europe AG)	6,835	▼	-13%
Duisburg-Huckingen Plant, Glocke (HKM Hüttenwerke Krupp Mannesmann GmbH)	3,952	▼	-23%
Salzgitter Plant, Glocke (Salzgitter Flachstahl GmbH)	3,736	▼	-9%
Dillingen Plant, Amalgamated Installation (ROGESA Roheisengesellschaft Saar mbH)	3,601	▼	-14%
PCK Refinery, Glocke (PCK Raffinerie GmbH)	3,516	▲	3%
Ruhr Oel GmbH –Scholven Plant (Ruhr Oel GmbH)	2,789	▼	-7%
Oberrhein Mineral Oil Refinery, Plant 1 and Plant 2 (Mineralölraffinerie Oberrhein GmbH & Co. KG)	2,629	▼	-1%
Bremen Plant, Amalgamated Installation (ArcelorMittal Bremen GmbH)	2,349	▲	8%
Duisburg-Schwegern Coking Plant (thyssenkrupp Steel Europe AG)	2,015	▲	3%
<i>Leuna Mineral Oil Refinery (TOTAL Raffinerie Mitteldeutschland GmbH)</i>	1,943	▼	-5%
Total	33,365	▼	-9%

As of 03/05/2021

Italics = new installation / power plant in the TOP 10

Allocation status

In the last year of the third trading period, verified emissions of 320 million tonnes of carbon dioxide equivalents from all installations in Germany subject to emissions trading again significantly exceeded the free allocation amount for that year. In 2020, about 136 million emission allowances were allocated free of charge to operators of 1,601 of Germany's 1,817 installations. The average allocation coverage was thus 42.6 percent being above the level of the previous year (2019: 38.8 percent). This means that it increased for the second time in a row due to the renewed significant decrease in emissions. The allocation coverage changes proportionally between the sectors and takes into account transfers of waste gases from iron, steel and coke production and heat imports in the allocation amounts. As a result of this adjustment, allocation coverage in the industrial sectors decreased from 103.0 to 90.5 percent in 2020, while allocation coverage in the energy sector increased from 9.2 to 16.2 percent, as shown in Table 3.

Table 3: Adjusted allocation coverage (taking into account waste gases from iron, steel and coke production and heat imports)

Sector	Activity 3 rd TP	No. of installations	2020 allocation amount [1000 EUA]	2020 VET [kt CO ₂ -eq]	2020 allocation deviation from 2019 VET [kt CO ₂ eq]	2020 allocation coverage*	Adjusted 2020 allocation amount** [1000 EUA]	2020 adjusted allocation coverage**
Energy	Energy installations	903	19,091	206,549	-187,458	9.2%	33,382	16.2%
		903	19,091	206,549	-187,458	9.2%	33,382	16.2%
Industry	Refineries	23	17,767	22,876	-5,108	77.7%	17,767	77.7%
	Iron and Steel	123	45,167	31,401	13,766	143.8%	33,898	108.0%
	Non-ferrous metals	38	2,267	2,513	-246	90.2%	2,267	90.2%
	Industrial- and building lime	39	5,947	6,378	-431	93.2%	5,947	93.2%
	Cement clinker	36	16,190	20,133	-3,943	80.4%	16,190	80.4%
	Other mineral processing industry	246	6,085	7,951	-1,866	76.5%	6,085	76.5%
	Paper and pulp	146	5,711	5,001	710	114.2%	4,116	82.3%
	Chemical industry	226	17,657	16,922	735	104.3%	16,230	95.9%
	Other combustion plants	37	398	551	-154	72.1%	398	72.2%
		914	117,190	113,726	3,464	103.0%	102,898	90.5%
Total		1,817	136,281	320,275	-183,994	42.6%	136,280	42.6%

As of 03/05/2021

* Without considering potential adjustments for transfers of waste gases and heat imports.
 ** Considering potential adjustments for transfers of waste gases and heat imports.

Germany and Europe

The emissions from all installations participating in the EU ETS in 2020 (27 EU Member States and Great Britain, Iceland, Liechtenstein, Norway) also decreased to a similar extent as Germany. According to European Commission data, emissions fell by 11.2 percent in 2020 and amounted to 1.33 billion tonnes of carbon dioxide equivalents. As in Germany, the main reason for this trend was a decline in emissions from electricity generation (about 15 percent reduction), even though the emissions from industrial installations also showed a pandemic related seven percent decrease.

Emissions in Germany decreased less sharply in the first and second half of the third trading period than in the other EU ETS Member States. The emissions trend in German installations then followed the Europe-wide trend for the following years: since the beginning of the third trading period, emissions in Germany have actually fallen somewhat more sharply (minus 33 percent) than in the EU ETS Member States as a whole (minus 29 percent). This is mainly due to the significant emission reductions of German energy installations in 2019 and 2020.

The large surplus of unused emission allowances from the second and beginning of the third trading periods were in part reduced in recent years. This was primarily achieved through reductions in the auction volumes: in 2014 – 2016 due to backloading, and from 2019 through the Market Stability Reserve (MSR). The European Commission determines an official value of the amount in circulation each year called TNAC (Total Number of Allowances in Circulation) as an indicator of the surplus. At the end of 2020, the TNAC amounted to almost 1.6 billion emission allowances, according to the European Commission, and thus increased significantly year-on-year for the first time since 2015 (plus 14 percent compared to the end of the previous year). The value also remains well above the upper MSR threshold at which auction volume cuts take place. Since emissions fell relatively sharply in 2020 as a result of the COVID 19 crisis and more was auctioned than in the previous year due to various special effects, the MSR mechanism could not prevent the surplus from rising again. The current value of the TNAC decides the size of the auction volume cut by the MSR in the period from 01/09/2021 to 31/08/2022. In this period, a total of around 379 million fewer emission allowances than planned will be auctioned and transferred to the MSR.

Aviation

For 2020, 48 aircraft operators subject to emissions trading administered by Germany reported emissions of 4 million tonnes of carbon dioxide. This means that emissions have decreased by around 58 percent compared to the previous year. This large decrease is due to the COVID 19 pandemic. The average allocation coverage in 2020 was around 92 percent, considerably above the 2019 figure of 39 percent and is due to the reduced emissions.

Outlook

2020 was the last year of the third trading period of the EU ETS. It was significantly influenced by the COVID 19 pandemic so that emissions in the EU ETS again fell noticeably. However, this drop in emissions is not expected to be sustainable, especially among industrial installations, even though the pandemic will presumably continue to influence the overall economic situation beyond 2020. Other significant changes in perspective are the start of the fourth trading period in 2021 with a changed allocation regime and a more strongly declining cap, and the introduction of national fuel emissions trading in 2021. In summer 2021, the European Commission will also present a broad legislative package as part of the European Green Deal, which is to implement the increase of the 2030 EU greenhouse gas reduction target to at least 55 percent compared to 1990.

This package called “Fit for 55” will also include proposals to adjust the EU ETS and thus set new framework conditions for the fourth trading period that started this year.

**German Emissions Trading Authority (DEHSt) at the German Environment Agency
City Campus
Building 3, entrance 3A
Buchholzweg 8
D-13627 Berlin**

www.dehst.de/English | emissionstrading@dehst.de