

# **Greenhouse Gas Emissions in 2019**

## **– Executive Summary –**

**Stationary installations and aviation subject  
to emissions trading in Germany (2019 VET report)**

## Editorial information

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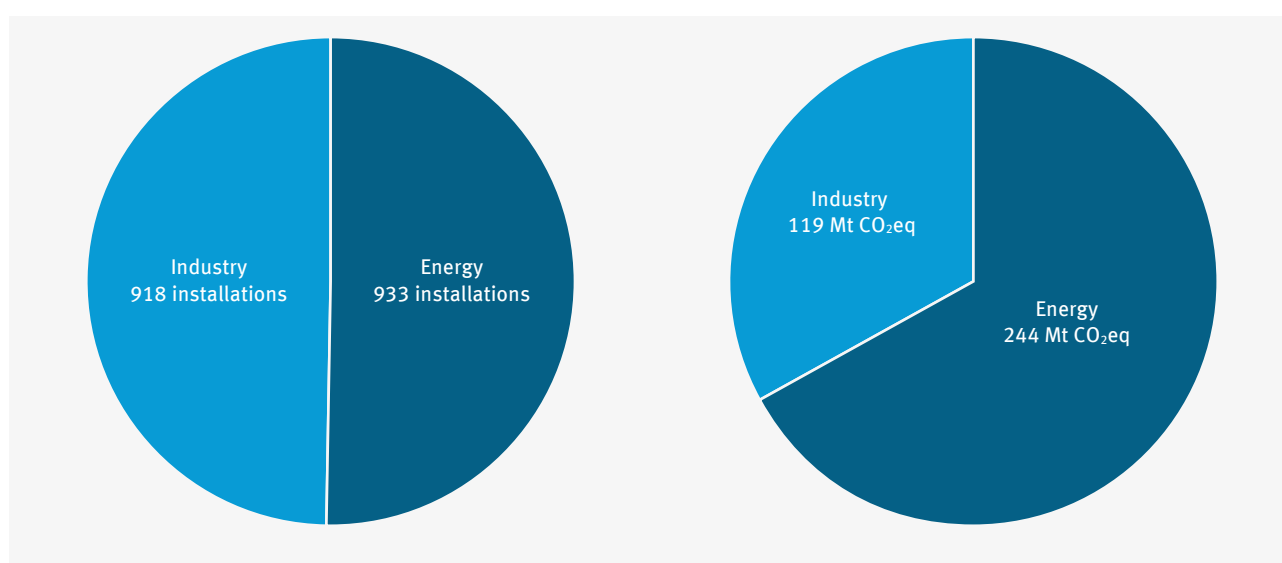
## Executive summary

### Energy and industrial sectors in Germany

In 2019, the European Emissions Trading Scheme (EU ETS) covered 1,851 stationary installations in Germany. These installations emitted around 363 million tonnes of carbon dioxide equivalent (CO<sub>2</sub>eq), which represents a 14.2 percent decrease compared to 2018 and for the first time since the beginning of the EU ETS in 2005, emissions from German installations dropped below 400 million tonnes CO<sub>2</sub>eq. In 2018, the decrease was 3.5 percent.

The economic impact of the Covid 19 pandemic, which began in spring 2020, did not affect the emissions situation in 2019 as presented in this report.

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

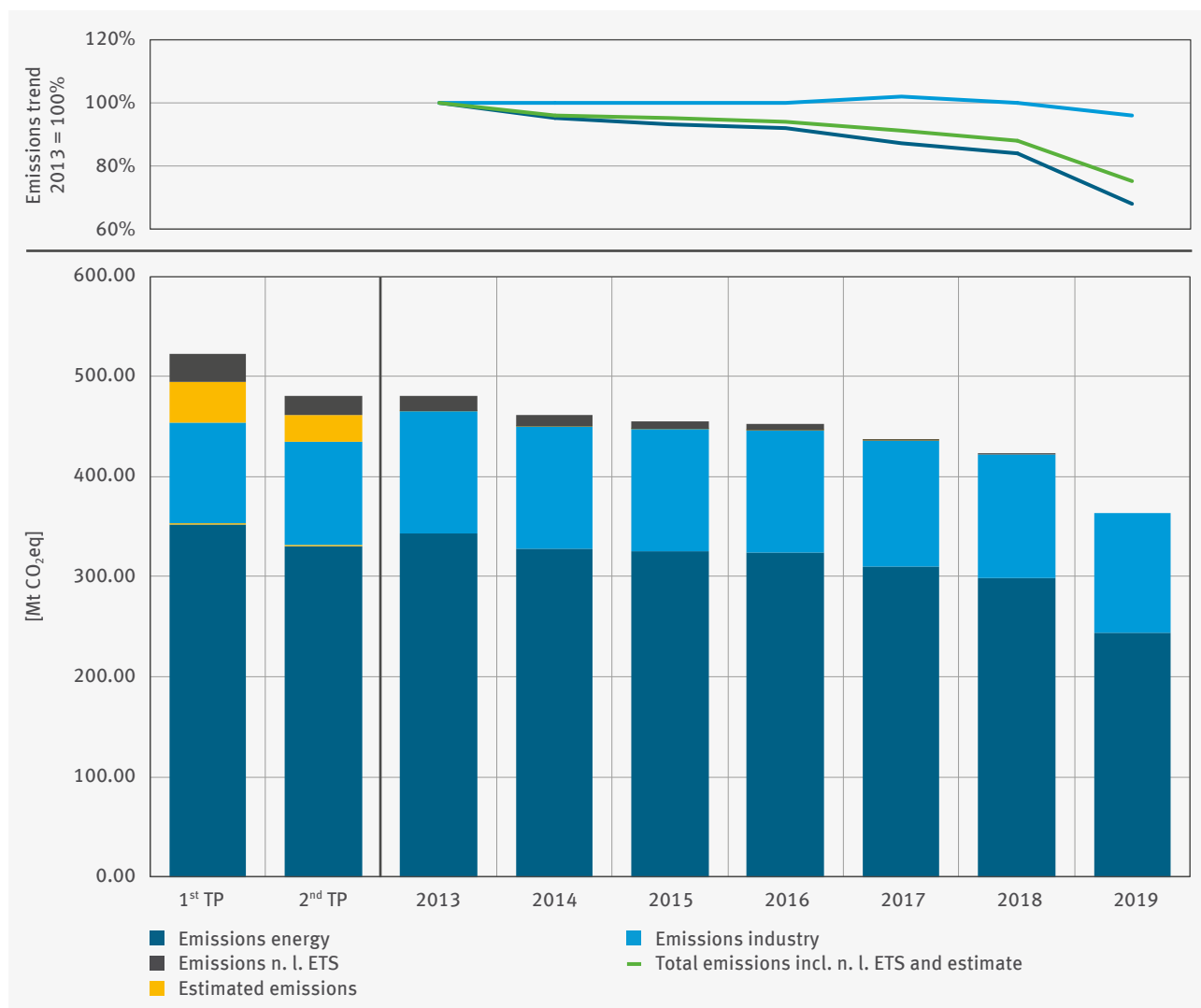


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**Figure 1:** Distribution of emissions and installations subject to emissions trading in the energy sector (Activities 2 to 6 as per Annex 1 TEHG) and the industrial sector (Activities 1 and 7 to 29 as per Annex 1 TEHG) in Germany in 2019

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: about 70 percent of emissions from Germany's stationary installations subject to emissions trading is generated by energy installations and 30 percent from industrial installations.

Figure 2 shows the German 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. Emissions from installations that are no longer subject to emissions trading (n.l. ETS) are also taken into account. 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 current scope of emissions trading for previous trading periods. This estimate mainly affects emissions from industrial installations, while the estimated emissions from energy installations are as low as to be barely visible in the figure.

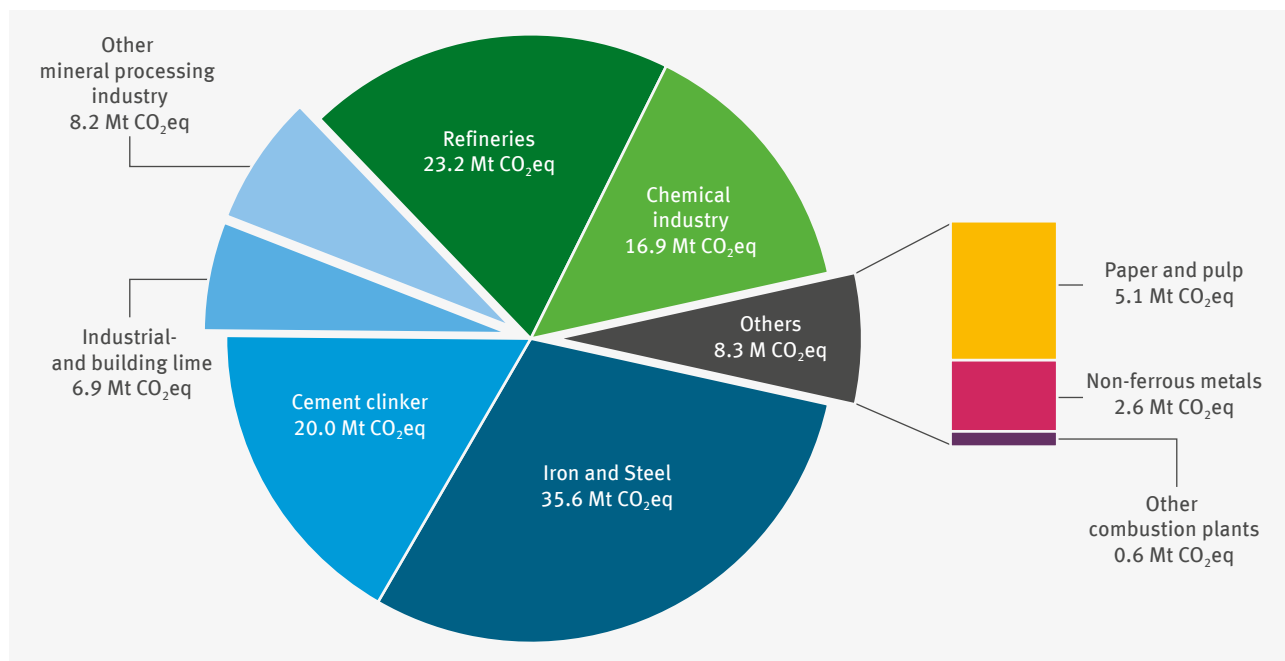


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**Figure 2: ETS emissions from the energy and industry sectors in Germany since 2005**

Compared to the previous year, emissions from energy installations in 2019 dropped by around 18 percent to 244 million tonnes of carbon dioxide. This strongly reinforces the downward trend of the previous year (2018 was minus 4.5 percent), which is due to a major reduction in lignite and hard coal emissions. In 2019, hard coal emissions decreased by 30 percent and lignite emissions by 22 percent. The main reasons for the decrease in hard coal emissions were a significant increase in wind power feed-in and an increasing displacement by natural gas power stations. In addition, several hard coal-fired units with a capacity of around one gigawatt were shut down. The economic efficiency of hard coal-fired plants deteriorated compared to the previous year due to relatively low natural gas prices on the one hand and a significant increase in the price of emission allowances on the other. The economic efficiency of lignite-fired power plants also deteriorated last year due to higher CO<sub>2</sub> prices. In October 2019, one unit each of the Neurath power plant (308 megawatts, MW) and the Jänschwalde power plant (500 MW) were also transferred into security reserve. Natural gas emissions rose by five 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. Since the beginning of the third trading period in 2013, emissions from energy installations have dropped by around 32 percent.

Emissions from the industry with high energy consumption hardly changed at all from 2013 to 2018 and were each between around 123 and 126 million tonnes of carbon dioxide equivalents. It was not until 2019 that at 119 million tonnes of carbon dioxide equivalents dropped for the first time below the 2013 level, with emissions falling by four percent compared to both 2013 and the previous year. The 25 percent decline in total German ETS emissions since 2013 is thus mainly due to the reduction in emissions from energy installations.

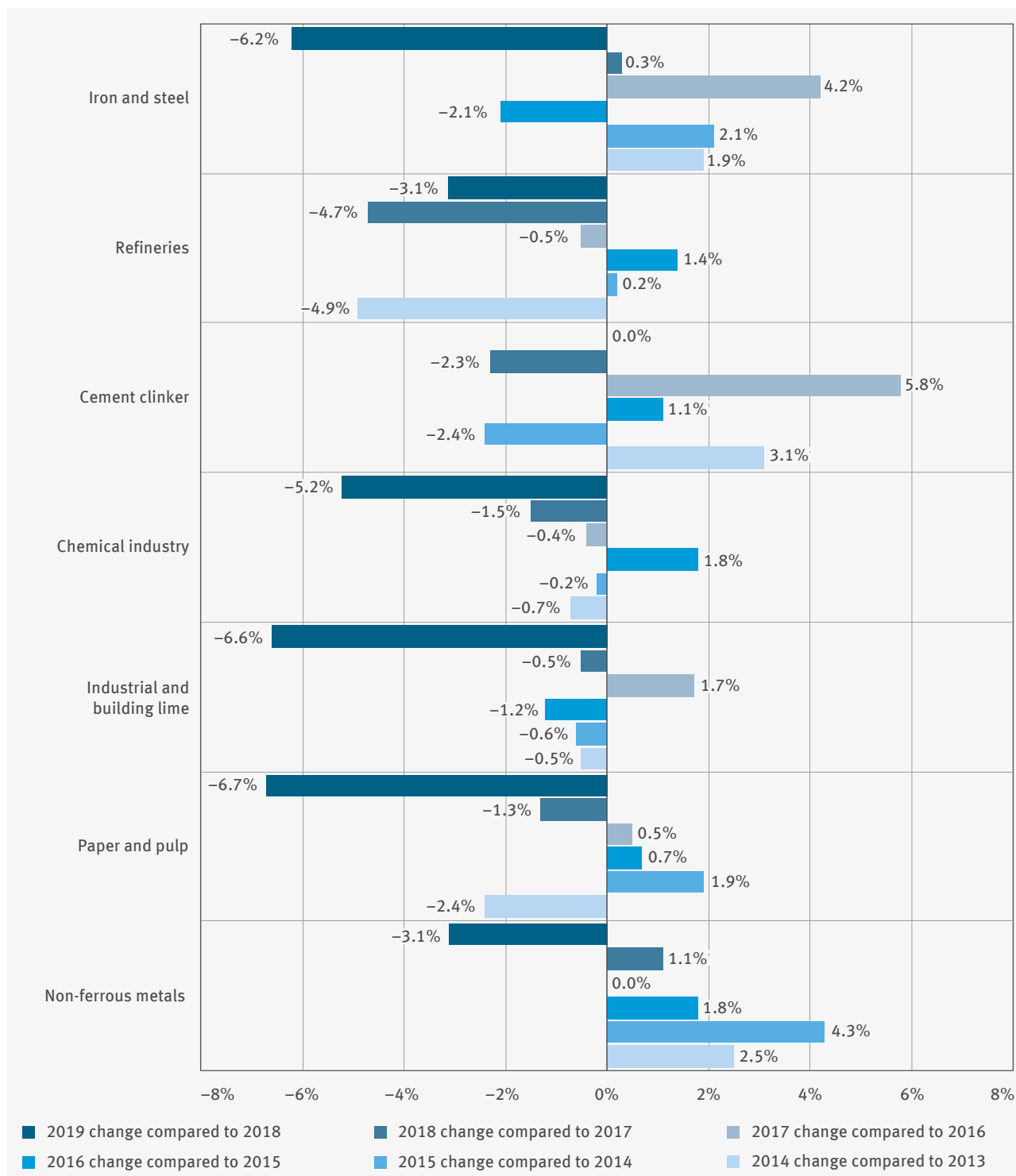


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**Figure 3: Distribution of emissions among individual industrial sectors in 2019**

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 30 percent, followed by refineries (19 percent), cement clinker production (17 percent) and the chemical industry (14 percent). The remaining industrial emissions can be attributed to four further 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.

Figure 4 summarises the different development of emissions in selected industrial sectors compared to the previous year. In addition, the relative annual changes since 2013 are also shown. In 2019, emissions fell in almost all sectors compared to the previous year, they only remained roughly unchanged year-on-year in the cement industry. This also reflects the production trend in the individual sectors, with the cement industry recording slight increases in production.



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Figure 4: Changes in the industrial sector's annual emissions since 2013

## The largest installations 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 with somewhat less than 124 million tonnes of carbon dioxide equivalents cause about one third (34 percent) of the emissions subject to emissions trading in the stationary sector and about half (51 percent) of the emissions from energy installations. These ten power plants thus emit a total of even more carbon dioxide equivalents than all 918 German industrial plants combined.

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

| Installation (operator)   | 2019 VET<br>[kt CO <sub>2</sub> eq] | Change<br>against 2018 |             |
|---|-------------------------------------|------------------------|-------------|
| Neurath Power Plant (RWE Power AG)  | 22,597                              | ▼                      | –30%        |
| Boxberg III and IV Power Plant (Lausitz Energie Kraftwerke AG)            | 18,656                              | ▼                      | –2%         |
| Niederaußem Power Plant (RWE Power AG)                                    | 18,425                              | ▼                      | –29%        |
| Jänschwalde Power Plant (Lausitz Energie Kraftwerke AG)                   | 17,614                              | ▼                      | –23%        |
| Weisweiler Power Plant (RWE Power AG)                                     | 13,297                              | ▼                      | –21%        |
| Schwarze Pumpe Power Plant (Lausitz Energie Kraftwerke AG)                | 10,479                              | ▼                      | –15%        |
| Lippendorf Power Plant (Lausitz Energie Kraftwerke AG)*                   | 8,944                               | ▼                      | –24%        |
| Mannheim Large Power Plant (GKM)<br>(Grosskraftwerk Mannheim AG)**        | 4,922                               | ▼                      | –27%        |
| Moorburg Heat and Power Plant<br>(Vattenfall Heizkraftwerk Moorburg GmbH) | 4,740                               | ▼                      | –24%        |
| Scholven Power Plant (Uniper Kraftwerke GmbH)                             | 4,064                               | ▼                      | –5%         |
| <b>Total</b>  | <b>123,738</b>                      | <b>▼</b>               | <b>–22%</b> |

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\* 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%).

At around 36 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 around 30 percent of emissions from industrial installations.

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

| Installation (operator)   | VET 2019<br>[kt CO <sub>2</sub> eq] | Change<br>against 2018 |            |
|---|-------------------------------------|------------------------|------------|
| Integrated Iron and Steel Works in Duisburg (thyssenkrupp Steel Europe AG)                            | 7,818                               | ▼                      | –6%        |
| Duisburg-Huckingen Plant, Glocke<br>(HKM Hüttenwerke Krupp Mannesmann GmbH)                           | 5,108                               | ▲                      | 4%         |
| Dillingen Plant, amalgamated installation<br>(ROGESA Roheisengesellschaft Saar mbH)                   | 4,207                               | ▼                      | –10%       |
| Salzgitter Plant, Glocke (Salzgitter Flachstahl GmbH)   | 4,116                               | ▼                      | –6%        |
| PCK Raffinerie, Glocke (PCK Raffinerie GmbH)  | 3,419                               | ▼                      | –10%       |
| Ruhr Oel GmbH – Scholven Plant (Ruhr Oel GmbH)  | 3,008                               | ▲                      | 5%         |
| Oberrhein Mineral Oil Refinery, Plant 1 and Plant 2,<br>(Mineralölraffinerie Oberrhein GmbH & Co. KG) | 2,660                               | ▼                      | –1%        |
| Bremen Plant, amalgamated installation (ArcelorMittal Bremen GmbH)                                    | 2,177                               | ▼                      | –17%       |
| Wesseling Refinery Plants including Power Plant, Rhineland Refinery<br>(Shell Deutschland Oil GmbH)   | 1,982                               | ▼                      | –8%        |
| <i>Duisburg-Schwelgern Coking Plant (thyssenkrupp Steel Europe AG)</i>                                | <i>1,947</i>                        | <i>▼</i>               | <i>–8%</i> |
| <b>Total</b>  | <b>36,443</b>                       | <b>▼</b>               | <b>–5%</b> |

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## Allocation status

In the seventh, i.e. the last but one year of the current third trading period, verified emissions of 363 million tonnes of carbon dioxide equivalents from all installations in Germany subject to emissions trading significantly exceeded the free allocation amount for that year. In 2019, around 141 million emission allowances were allocated free of charge to operators of 1,617 of Germany's 1,851 installations. The average allocation coverage was above the previous year (34.3 percent) and thus has increased for the first time since 2013 due to the significant reduction in emissions. The allocation coverage changes proportionally between the sectors taking 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, the level of allocation coverage in the industrial sectors decreased from 100.8 to 87 percent in 2019, while allocation coverage in the energy sector increased from 8.6 to 15.3 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 <sup>rd</sup> TP       | No of installations | 2019 allocation amount [1000 EUA] | 2019 VET [kt CO <sub>2</sub> eq] | 2019 allocation deviation from 2019 VET [kt CO <sub>2</sub> eq] | 2019 allocation coverage* | Adjusted 2019 allocation amount** [1000 EUA] | Adjusted 2019 allocation coverage* |
|--------------|-----------------------------------|---------------------|-----------------------------------|----------------------------------|---|---------------------------|--|------------------------------------|
| Energy       | Energy installations              | 933                 | 20,894                            | 243,912                          | -223,018  | 8.6 %                     | 37,331                                       | 15.3 %                             |
|              |                                   | <b>933</b>          | <b>20,894</b>                     | <b>243,912</b>                   | <b>-223,018</b>   | <b>8.6 %</b>              | <b>37,331</b>                                | <b>15.3 %</b>                      |
| Industry     | Refineries                        | 24                  | 17,860                            | 23,208                           | -5,349  | 77.0 %                    | 17,860                                       | 77.0 %                             |
|              | Iron and steel                    | 125                 | 46,223                            | 35,577                           | 10,646  | 129.9 %                   | 32,867                                       | 92.4 %                             |
|              | Non-ferrous metals                | 39                  | 2,300                             | 2,580                            | -280  | 89.1 %                    | 2,300  | 89.1 %                             |
|              | Industrial and building lime      | 39                  | 6,064                             | 6,874                            | -810  | 88.2 %                    | 6,064  | 88.2 %                             |
|              | Cement clinker                    | 36                  | 16,828                            | 19,990                           | -3,162  | 84.2 %                    | 16,828                                       | 84.2 %                             |
|              | Other mineral processing industry | 247                 | 6,279                             | 8,238                            | -1,958  | 76.2 %                    | 6,279  | 76.2 %                             |
|              | Paper and pulp                    | 144                 | 5,878                             | 5,112                            | 767   | 115.0 %                   | 4,257  | 83.3 %                             |
|              | Chemical industry                 | 227                 | 18,092                            | 16,899                           | 1,194   | 107.1 %                   | 16,633                                       | 98.4 %                             |
|              | Other combustion plants           | 37                  | 421                               | 566                              | -145  | 74.5 %                    | 421  | 74.4 %                             |
|              |                                   | <b>918</b>          | <b>119,946</b>                    | <b>119,043</b>                   | <b>902</b>  | <b>100.8 %</b>            | <b>103,509</b>                               | <b>87.0 %</b>                      |
| <b>Total</b> |                                   | <b>1,851</b>        | <b>140,840</b>                    | <b>362,955</b>                   | <b>-222,116</b>   | <b>38.8 %</b>             | <b>140,840</b>                               | <b>38.8 %</b>                      |

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\* Without considering possible adjustments for transfers of waste gases and heat imports

\*\* Considering possible adjustments for transfers of waste gases and heat imports

## Germany and Europe

The emissions from all installations participating in the EU ETS in 2019 (28 EU Member States and Iceland, Liechtenstein, Norway) also decreased but to a lesser extent than in Germany. According to European Commission data, emissions fell by nine percent in 2019 and amounted to 1.53 billion tonnes of carbon dioxide equivalents. As in Germany, the main reason for this trend was a decline in emissions from electricity generation (15 percent reduction), while the emissions from industrial installations showed a two percent decrease.

However, over a longer period of time, ETS emissions in Europe have fallen more than in Germany: while emissions from installations in Germany have fallen by around 30 percent since the beginning of emissions trading in 2005, ETS emissions in Europe have fallen by around 36 percent below the 2005 baseline. The decline in emissions in the period from 2013 to 2019 has slowed down Europe-wide: in 2019 emissions were around 20 percent below the 2013 baseline. The decline in emissions in Germany was 25 percent greater compared to 2013 over the same period.

As in all years since the beginning of the third trading period, emissions from stationary installations in the EU ETS in 2019 were around 1.53 billion tonnes of carbon dioxide equivalents, thus significantly lower than the maximum available quantity of emission allowances (nominal cap) of 1.86 billion allowances over the same period. The reduction in emissions compared to the previous year of around 155 million carbon dioxide equivalents was thus almost four times as large as the annual reduction in the cap (minus 38 million emission allowances).

In 2019, the actual supply of allowances made available was significantly below the nominal cap, in particular due to reductions in the auction volume through the Market Stability Reserve (MSR). The provisional emissions from the ETS installations exceeded this offer of emission allowances made available by free allocation, auctioning and exchange quotas for project credits. The volume of surplus emission allowances, which has been accumulating in the stationary sector since 2008, thus declined and, according to the European Commission, amounted to around 1.39 billion at the end of 2019. However, the surplus remains above the upper MSR threshold (833 million emission allowances). This value is decisive for the auction volume reduction by the MSR from 01/09/2020 to 31/08/2021. During this period, around 333 million emission allowances will not be auctioned as planned but will be moved to the MSR. The European Commission will determine the market surplus and publish it as TNAC or Total Number of Allowances in Circulation.

## Aviation

For 2019, 66 aircraft operators subject to emissions trading administered by Germany reported emissions of 9 million tonnes of carbon dioxide. This means that emissions have decreased by around four percent compared to the previous year. The average allocation coverage in 2019 was around 40 percent, slightly above the 2018 figure of 38 percent. This is due to the reduced emissions.

