DIRTY THIRTY

Industrial sector emissions in Germany

In cooperation with:

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Foreword and Policy recommendations

The energy sector has, quite rightly, been at the heart of climate policy for many years now and it is still the largest source of greenhouse gas emissions. However, with the phasing out of coal and the development of renewable energy, the energy sector was the only sector to be able to significantly reduce its emissions: by approximately 36% between 2013 and 2021.[a] In the wake of these developments, the sector with the second-highest emissions in Germany remained at a largely constant level of emissions for much longer than was deemed reasonable from a climate protection perspective: industry.

The industrial sector alone was responsible for a quarter of all German emissions in 2021. Between 2013 and 2021, emissions even increased slightly. One of the reasons for this was the free allocation of CO_2 certificates received by industry within the framework of the EU Emissions Trading System. Industry does not pay for all the CO_2 emissions that it emits. This weakens the CO_2 price signal – and an important incentive to change over to climate-friendly procedures and technologies is lost. Although emissions from the industrial sector fell by 10% in 2022 compared to the previous year, this can be attributed primarily to a decline in production due to high natural gas prices. To date, extensive structural reductions in emissions have not been achieved.

a www.umweltbundesamt.de/daten/klima/treibhausgas-emissionen-in-deutschland

With the anticipated reduction in emissions in the energy sector expected by 2030, there is an increasing focus on the industrial sector – the sector with the second-highest emissions in absolute terms after those in the energy sector – to ensure that Germany is finally on track to meet its climate commitments in terms of overall emissions.

This analysis has set itself the task of documenting the main individual emitters responsible for most of the emissions from industry and the industrial branches in Germany that have the largest emissions. The data reported for industrial installations in the European Emissions Trading System is used to determine this information.

The 30 most heavily polluting industrial installations alone are responsible for around one-third of the emissions in the industrial sector. In particular, a lot of coal is still used in the production of iron and steel and in the manufacture of cement. Effective and efficient measures to reduce the emissions of the 30 largest emitters are therefore very important in attaining the sector target in industry. Individual companies have an enormous influence on whether Germany can reach its climate goals. The most emission-intensive installations are involved in the production of iron and steel. The first 13 places in the list are occupied by installations in the iron and steel industry. In 2022, this industry as a whole was responsible for emissions amounting to 51 million tons of CO_2.

Approximately half of the key industrial installations involved in German basic industries will require reinvestment by 2030.[b] The life span of large industrial plants often amounts to several decades. Investment decisions that are now being made will significantly shape the image of industry in the coming decades. These upcoming, major investment cycles must now be used to achieve climate neutrality by 2045.

The world has the technologies for the decarbonisation of industry. For example, in the steel industry coal-based blast furnaces can now be relegated to the past, as the blast furnace route transitions to green hydrogen for the production of green steel. The cement industry can cut its levels of CO_2 significantly by reducing the proportion of clinker in cement.[c]

It is imperative for German industry to reform in a way that is both competitive and climate friendly. Germany has the opportunity and responsibility to become a trailblazer in the transformation of industry and thus show that it is possible for industry to be both climate friendly and competitive.

b https://www.agora-energiewende.de/fileadmin/Projekte/2018/Dekarbonisierung_Industrie/164_A-EW_Klimaneutrale-Industrie_Studie_WEB.pdf
c https://newclimate.org/sites/default/files/2020/12/SGCCC-EU-Cement-paper-NewClimate_Nov2020.pdf
d https://www.wwf.de/fileadmin/fm-wwf/Publikationen-PDF/Klima/WWF-industrie-entlastungen-hemmnis.pdf

In order get a successful climate policy for industry off the ground in Germany, WWF is calling for the speedy implementation of the following policy measures:

- In the latest reform of the European Emissions Trading System, it was agreed to **end free allowances by 2034.** That is too late. From WWF's perspective, a significantly earlier phasing out would have led faster to an effective price signal, thus incentivising decarbonisation. In order to avoid disincentives for as long as possible, the free allowance must be linked to conditions.

- These conditions should be implemented not only in the context of free allowances, but generally **when granting subsidies and reliefs to industry.**

- In this regard, companies should be required to set scientifically sound climate and environmental targets (Science Based Targets) and submit **medium- to long-term plans for transformation.** Additionally, the money received should be linked to investments made by the companies in energy efficiency, climate-friendly processes and the development of renewable energies.

    - To this end, companies should operate mandatory energy and environment management systems, which must be supplemented by greenhouse gas extension tables. An analysis recently published by WWF also came to this conclusion.[d]

- It is a matter of urgency for climate protection in the industrial sector that a **comprehensive industry strategy** announced in the coalition agreement strategically consolidates the individual measures in the sector. It is necessary, therefore, to urgently specify additional measures beyond the existing regulations or the programmes that have already been decided upon, which would help to close gaps in terms of ambition and delivery and thus contribute to the attainment of climate targets in the industrial sector. Moreover, it is essential to incorporate the necessary infrastructure development. It is only by implementing a comprehensive strategy for the entire sector that the urgently needed planning and investment security can be guaranteed for industry.

- Implementation of **carbon contracts for difference (CCfDs):**

    - CCfDs can give industry the necessary planning and investment security, as long as the price for CO_2 has not reached the required level and there are incentives to switch over to climate-friendly technologies and production processes.

    - CCfDs must not be used for subsidising blue hydrogen, as otherwise lock-in-effects may occur, and a transition to green hydrogen could be delayed.

- The carbon management strategy announced by the German Federal Government is intended to clearly specify **that carbon capture and storage technology (CCS technology)** is used only for unavoidable process-related emissions – which occur primarily in the cement industry – and not for energy-related emissions and other emissions that can be avoided by changing over to more environmentally friendly processes.

- The **circular economy** is still given too little consideration in industrial processes. In particular, measures and technologies that reduce resource consumption and improve material efficiency are required.

  - To do this, binding resource targets, based on the model of climate targets, are to be specified.

  - A financial and tax policy that is geared towards a circular economy, encourages investment in circular business models (circular funding), phases out environmentally harmful subsidies and imposes a fiscal burden on resource-intensive production and consumption practices is urgently required. Above all, this would abolish the distortive benefits for resource-intensive technologies and practices and is therefore a feature of a market-regulating economic policy.

  - Moreover, companies should be offered incentives to promote a shift in values and implement a circular economy within their company.

- A **sustainable reorganisation of public procurement** could have a profound impact on climate protection, the circular economy and the creation of green lead markets. Public procurement in Germany alone entails an annual investment volume of EUR 500 billion.[e] However, contracts are still awarded primarily on the basis of economic efficiency with no consideration for the true environmental costs.

  - This could be comprehensively implemented, for example, through the introduction of climate protection criteria in the awarding of public construction contracts. Consideration could be given to setting greenhouse gas limits and minimum recycling rates as binding quality criteria for materials that are particularly relevant for climate protection and the required use of certificates that focus heavily on climate protection. Such environmental criteria can be either prescribed as a mandatory performance requirement or deemed to be part of the award criteria.[f]

e https://www.bmi.bund.de/SharedDocs/behoerden/DE/bescha.html
f https://www.wwf.de/fileadmin/fm-wwf/Publikationen-PDF/WWF-KSG-Gutachten-3-Klimaschutzmassnahmen-im-Industriesektor.pdf

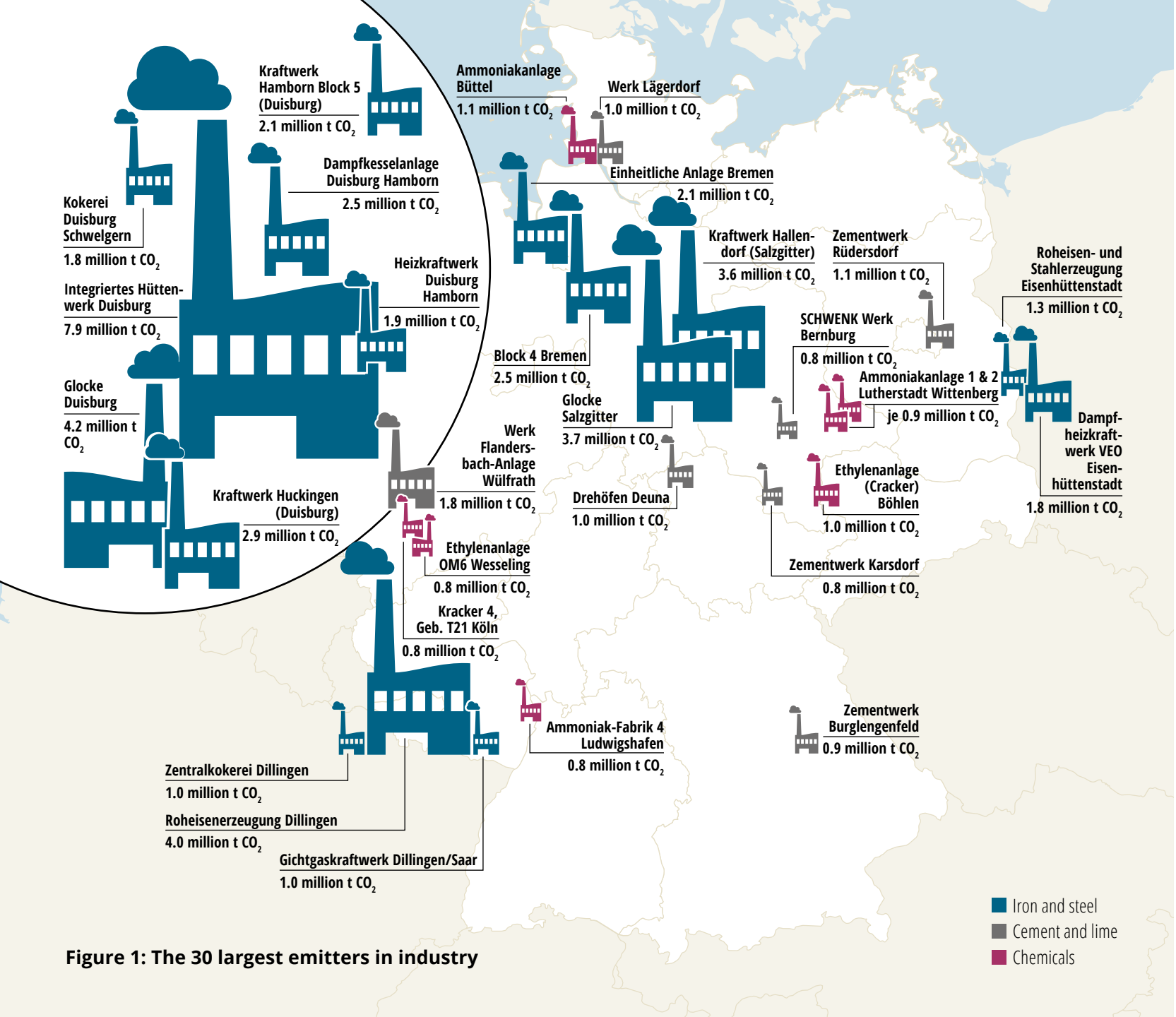


Figure 1: The 30 largest emitters in industry

Summary

In this brief analysis, the Öko-Institut (Institute for Applied Ecology) has analysed those emissions from industrial installations that are covered by the EU Emissions Trading System (EU ETS). Table 1 shows the 30 industrial installations (excluding refineries) that emitted the most CO_2 in 2022. These installations emitted a total of 58 million tons of CO_2 in 2022. This corresponds to almost one-third of industrial emissions as defined in the German Climate Change Act (Klimaschutzgesetz, KSG) (177 million tons of CO_2 equivalents) or 8% of Germany's total greenhouse gas emissions in 2022.

In terms of emissions, the top 13 installations are involved in the production of iron and steel. In 14th place is a lime manufacturing installation.

In 2022, high natural gas prices and the associated decline in production led to a reduction of 10% in emissions from the industrial sector as a whole.

Table 1: The 30 largest emitters in industry

	EUTL ID	Company	Installation	City	Activity	Emissions (million t CO_2)		
						2021	2022	2022 vs. 2021
1	DE 69	thyssenkrupp Steel Europe	Integriertes Hüttenwerk Duisburg	Duisburg	24	7.8	7.9	1%
2	DE 53	Hüttenwerke Krupp Mannesmann	Glocke Duisburg	Duisburg	24	4.9	4.2	–14%
3	DE 52	ROGESA Roheisengesellschaft Saar	Roheisenerzeugung Dillingen	Dillingen/Saar	24	4.3	4.0	–7%
4	DE 43	Salzgitter Flachstahl	Glocke Salzgitter	Salzgitter	24	3.7	3.7	–2%
5	DE 1132	Salzgitter Flachstahl	Kraftwerk Hallendorf	Salzgitter	20	3.6	3.6	–2%
6	DE 1486	Hüttenwerke Krupp Mannesmann	Kraftwerk Huckingen	Duisburg	20	3.2	2.9	–10%
7	DE 1228	ArcelorMittal Bremen	Block 4 Bremen	Bremen	20	2.5	2.5	–2%
8	DE 1415	thyssenkrupp Steel Europe	Dampfkesselanlage Duisburg Hamborn	Duisburg	20	3.1	2.5	–20%
9	DE 60	ArcelorMittal Bremen	Einheitliche Anlage Bremen	Bremen	24	2.3	2.1	–7%
10	DE 1850	thyssenkrupp Steel Europe	Kraftwerk Hamborn Block 5	Duisburg	20	2.4	2.1	–14%
11	DE 1411	thyssenkrupp Steel Europe	Heizkraftwerk Duisburg Hamborn	Duisburg	20	1.5	1.9	26%
12	DE 65	thyssenkrupp Steel Europe	Kokerei Duisburg Schwelgern	Duisburg	22	1.9	1.8	–3%
13	DE 1386	Vulkan Energiewirtschaft Oderbrücke	Dampfheizkraftwerk VEO	Eisenhüttenstadt	20	1.7	1.8	4%
14	DE 147	Rheinkalk	Werk Flandersbach-Anlage	Wülfrath	30	1.7	1.8	4%
15	DE 70	ArcelorMittal Eisenhüttenstadt	Roheisen- und Stahlerzeugung	Eisenhüttenstadt	24	1.7	1.3	–25%
16	DE 81	CEMEX Zement	Zementwerk Rüdersdorf	Rüdersdorf	29	1.3	1.1	–9%

	EUTL ID	Company	Installation	City	Activity	Emissions (million t CO_2)		
						2021	2022	2022 vs. 2021
17	DE 205626	Yara Brunsbüttel	Ammoniakanlage	Büttel	43	1.1	1.1	2%
18	DE 116	Dyckerhoff	Drehöfen Deuna	Deuna	29	1.1	1.0	–3%
19	DE 4137	Dillinger Hüttenwerke und ROGESA	Gichtgaskraftwerk Dillingen/Saar	Dillingen/Saar	20	1.2	1.0	–11%
20	DE 49	Zentralkokerei Saar	Zentralkokerei Dillingen	Dillingen/Saar	22	1.1	1.0	–4%
21	DE 3596	Dow Olefinverbund	Ethylenanlage (Cracker) Böhlen	Böhlen	42	1.1	1.0	–15%
22	DE 74	Holcim	Werk Lägerdorf	Lägerdorf	29	1.1	1.0	–9%
23	DE 202455	SKW Stickstoffwerke Piesteritz	Ammoniakanlage 2	Lutherstadt Wittenberg	41	1.3	0.9	–32%
24	DE 202457	SKW Stickstoffwerke Piesteritz	Ammoniakanlage 1	Lutherstadt Wittenberg	41	1.2	0.9	–30%
25	DE 109	HeidelbergCement	Zementwerk Burglengenfeld	Burglengenfeld	29	1.0	0.9	–16%
26	DE 83	OPTERRA Zement	Zementwerk Karsdorf	Karsdorf	29	1.0	0.8	–12%
27	DE 2196	Basell Polyolefine	Ethylenanlage OM6 Wesseling	Wesseling	42	0.9	0.8	–9%
28	DE 201960	BASF	Ammoniak-Fabrik 4	Ludwigshafen	41	0.9	0.8	–12%
29	DE 100	SCHWENK Zement	SCHWENK Werk Bernburg	Bernburg	29	0.8	0.8	0%
30	DE 2294	INEOS Manufacturing Deutschland	Kracker 4, Geb. T21 Köln	Köln	42	0.8	0.8	–5%
	Total					**62.1**	**57.8**	**–7%**
	Percentage of total emissions in Germany accounted for by the "Dirty Thirty"						8%	

Source: EUTL

1 Introduction

While the phasing out of coal has meant that the energy sector has been responsible for significantly fewer emissions in recent years, emissions in the industrial sector remained virtually constant up until 2021. It is now time to take a closer look at this sector in order to ensure that it too meets its emission reduction goals. After all, this is the sector with the second-highest emissions in absolute terms after those of the energy sector. This analysis has set itself the task of documenting the major individual emitters responsible for most of the emissions from industry and the industrial branches in Germany that have the largest emissions.

The analysis consists of the following chapters:

- Chapter 2 presents the industry sector targets as defined by the German Climate Change Act (KSG) and explains the sectoral delimitation.
- Chapter 3 analyses which industrial sub-sector dominate the ETS emissions.
- Chapter 4 presents the 30 largest installations in the individual sub-sectors.
- Chapter 5 rounds off this study with a detailed analysis of the iron and steel sub-sector taking into account blast furnace gas flows between installations of integrated steelworks.

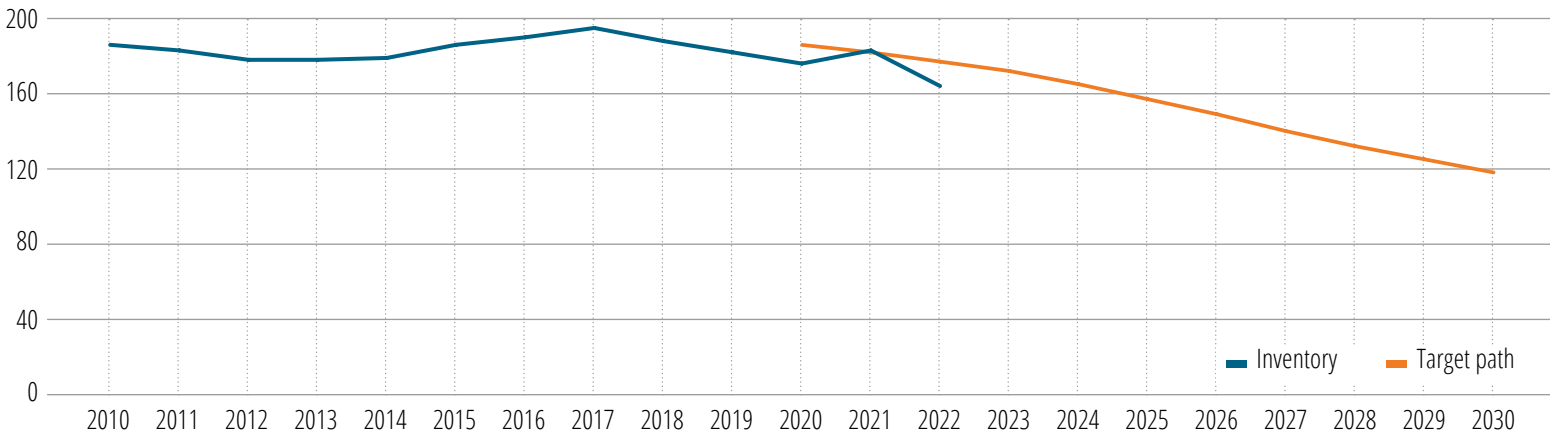
2 Sector targets for 2030 and sectoral developments to date

Figure 2.1 shows the historic emissions from the industrial sector based on the definition in the German Climate Change Act (KSG). On 28 March 2023, Germany's coalition committee decided to modify the Climate Change Act. "In future, compliance with the climate targets is to be monitored using a cross-sector and multi-year account. (...) The Federal Government will continue to present the annual monitoring report on emission trends. In this, the reduction achieved will be stated transparently for each sector."[1]

The exact mode of implementation has yet to be decided. It is likely, however, that the sector target for industry will remain unchanged but that ministerial responsibility for compliance with the target will be more widely distributed.

In 2021, emissions from the industrial sector amounted to 183 million tons of CO_2 equivalents. This was a slight increase on the 2013 figures: back then, the emissions amounted to 178 million tons of CO_2 equivalents. Industry has a sector target of 118 million tons of CO_2 equivalents for 2030. To achieve this, an annual emissions reduction of somewhat less than 10 million tons of CO_2 equivalents will be necessary. Compared with the previous year, an emissions reduction of 19 million tons of CO_2 equivalents was achieved in 2022, representing a reduction of 10%. This is mainly the result of crisis-related declines in production; however, there have been no reductions in structural emissions. Emissions are expected to rise again next year.

Figure 2.1: Sectoral trends in emissions and target path in millions of tons of CO_2 equivalents



Source: Annex 2 KSG, UBA trend tables "Target path graphic"

The sector target for industry is defined in the KSG using the greenhouse gas inventories.[2] Table 2.1 lists the main emission sources in industry and their development over time. In addition to CO2, other greenhouse gases are reported in the industrial sector as it is defined by the KSG. In addition to large industrial installations that are subject to the ETS, such as steel and cement works, the industrial sector also includes many other activities other than those covered by the EU ETS. For example, the industrial sector includes emissions from mobile machinery in the construction industry. All emissions of fluorinated greenhouse gases (F-gases), for example from mobile and stationary air-conditioning units, are reported in the industrial sector; these also cover the large number of cooling systems in the food industry (reported under "Other process emissions" in Table 2.1).

1 https://www.wiwo.de/downloads/29065906/3/ergebnis-koalitionsausschuss-28-marz-2023_230328_200642.pdf

2 The German Environment Agency (Umweltbundesamt, UBA) reports each year on Germany's greenhouse gas emissions in the greenhouse gas inventories. In the energy sector, the inventories are based on fuel sales taken from the energy balance (top-down approach). For further information, see: https://www.umweltbundesamt.de/themen/klima-energie/klimaschutz-energiepolitik-in-deutschland/treibhausgas-emissionen/wie-funktioniert-die-berichterstattung

Table 2.1: Emission sources in the KSG industrial sector

Emission source	1990	2013	2014	2015	2016	2017	2018	2019	2020
	Million t CO_2 equivalents								
Combustion-related emissions	**186.8**	**118.7**	**118.6**	**127.3**	**129.6**	**131.6**	**126.4**	**123.5**	**116.4**
Iron and steel incl. blast furnace gas power plants	35.5	33.3	33.8	40.2	37.6	37.4	37.3	36.6	32.7
Minerals industry	18.8	12.8	13.4	13.3	13.2	13.5	13.2	13.0	12.7
Industrial power plants excl. blast furnace gas power plants	56.2	32.2	30.8	32.9	32.7	38.7	44.5	44.6	43.8
Miscellaneous stationary equipment	72.6	37.3	37.4	37.4	42.5	38.2	28.0	25.8	23.6
Construction industry	3.7	3.1	3.2	3.5	3.7	3.8	3.5	3.5	3.6
Process emissions	**96.9**	**61.3**	**61.2**	**60.2**	**63.7**	**65.9**	**63.0**	**59.8**	**55.5**
Iron and steel	28.2	15.9	17.3	16.9	20.3	21.8	20.1	18.2	15.8
Minerals industry	23.5	19.0	19.6	19.2	19.2	19.8	19.7	19.4	19.0
Chemicals industry	35.5	9.6	7.6	6.9	7.0	6.9	6.7	6.5	6.5
Other process emissions	9.7	16.8	16.8	17.2	17.3	17.4	16.4	15.7	14.2
KSG industry as a whole	**283.7**	**180.1**	**179.8**	**187.5**	**193.4**	**197.5**	**189.4**	**183.3**	**171.9**

Source: Database of emissions (Zentrales System Emissionen) operated by the German Environment Agency and Common Reporting Format (CRF) tables, as of Submission 2022

The sectoral delimitation in the KSG is different from that in the EU ETS. This is because the German Emissions Trading Authority (Deutsche Emissionshandelsstelle, DEHSt) and the European Environment Agency (EEA) use industrial sector delimitations in their publications that are guided by the numbers in the German Greenhouse Gas Emissions Trading Act (Treibhausgas-Emissionshandelsgesetz, TEHG) or more specifically the activity numbers. These delimitations do not correspond with the methodology used for the greenhouse gas inventory and thus the sectoral delimitation in the KSG. Emissions data from the EU ETS reports therefore cannot be readily transferred to the KSG structure.[3] For example, the DEHSt and the EEA classify refineries in the category of industrial plants, whereas they are allocated to the energy sector in the greenhouse gas inventory – and therefore also in the KSG. While all power plants are reported jointly as part of the activity "Combustion installations" in emissions trading, a distinction is made in the inventory between public power plants (energy sector) and industrial power plants (industrial sector).

In the following chapters, the analysis focuses on the emissions reported in EU ETS emissions trading on a installation basis. The focus is therefore on industrial activities. Industrial power plants other than blast furnace power plants and combustion installations serving industrial plants are not considered.

3 In particular, see Section 3.3 of the Öko-Institut report (2021): Datenkonzepte im EU-Emissionshandel, https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/2022-06-03_cc_75-2021_ets-handbuch_datenkonzepte.pdf

3 Industrial ETS emissions

Most of the emissions from the industrial sector (as defined by the KSG) are covered by the EU ETS Emissions Trading System. In the EU ETS emissions trading, a distinction is made between combustion installations with activity 20 and refineries with activity 21, as well as other industrial activities. For this analysis, eight blast furnace gas power plants with total emissions of roughly 20 million tons of CO_2 (these are also taken into consideration among the 30 largest emitters) were identified from the group of combustion installations. The emissions from these blast furnace gas power plants are allocated to the iron and steel sub-sector in Table 4.1. In EU emissions trading, industrial power plants and combustion installations serving industrial plants (activity 20). In the KSG delimitation, these emissions are also allocated to the industrial sector. However, they were not identified in this analysis and are therefore not considered.

Table 3.1 shows the trend in emissions since 2013. In 2013, the scope of the ETS was expanded (additional plants and additional emissions were included), with the result that a consistent comparison of emissions, without correction calculations, has only been possible since 2013. It is clear that emissions from combustion installations fell by 36% between 2013 and 2021. During the same period, emissions arising from industrial activities only fell by 2%. Compared with 2022 and 2021, the trend was reversed. In 2022, emissions from combustion installations (activity 20) increased by 3% compared to the previous year, while emissions arising from industrial activities declined by 8%.

The following three industrial sub-sectors with the highest emissions were identified for a more in-depth analysis.

- With 51 million tons of CO_2, emissions from the production of iron and steel proved to be the largest sub-sector (47% of industrial ETS activities).
- In second place are emissions from the production of cement and lime, which caused 27 million tons of CO_2 emissions in 2022 (25% of industrial ETS activities).
- In third place is the chemicals industry, which was responsible for 14 million tons of CO_2 in 2022 (15% of industrial ETS activities).

In total, 87% of emissions from industrial ETS activities can be attributed to these three sub-sectors. Table 4.4 also shows the emissions from refineries, which are classified as belonging to the energy sector in the KSG.

Overall, the emissions arising from industrial ETS activities in 2022 fell by 9 million tons compared to the previous year. This corresponds to a reduction of 8%. The decline was below average in a number of activities – iron and steel, cement and lime, and glass, brick and ceramics – while it was above average in chemicals, paper and non-ferrous metals.

Table 3.1: Aggregated trends in ETS emissions by activity in million t CO_2

Activity	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2021 vs. 2013	2022 vs. 2021	Share of industrial activities
Total	**481**	**461**	**456**	**453**	**438**	**423**	**363**	**320**	**355**	**353**	**−26%**	**−1%**	
Combustion installations	338	318	313	310	293	280	226	191	218	225	−35%	3%	
Refineries	25	23	24	24	24	23	22	21	21	22	−13%	4%	
Industrial activities	**118**	**120**	**119**	**119**	**121**	**120**	**115**	**108**	**115**	**106**	**−2%**	**−8%**	**100%**
Iron and steel	56	58	58	58	59	58	55	48	54	51	−3%	−6%	47%
Cement and lime	28	29	28	28	30	29	29	28	29	27	3%	−6%	25%
Chemicals	18	18	18	18	18	18	17	17	17	14	−7%	−17%	15%
Glass, brick, ceramics	6	6	6	6	6	7	6	6	6	6	−3%	−3%	5%
Paper	6	6	6	6	6	6	5	5	5	5	−7%	−12%	5%
Non-ferrous metals (incl. aluminium)	3	3	3	3	3	3	3	3	3	2	3%	−21%	3%

Note: Combustion installations exclude blast furnace gas power plants; iron and steel include blast furnace gas power plants; the share of industrial activities relates to 2021

Source: EUTL[4]

4 https://climate.ec.europa.eu/document/download/8f79885d-c567-4db2-9711-71ee8a29a037_en?filename=policy_ets_registry_verified_emissions_2022_en_1.xlsx

Table 3.2 presents details of the activities that make up the individual sub-sectors.

Table 3.2: Trend in ETS emissions by activity in million t CO_2

Activity		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
20–99	**Total**	**481.0**	**461.2**	**455.6**	**452.8**	**437.6**	**422.8**	**363.3**	**320.3**	**355.1**	**353.3**
20	Combustion excl. blast furnace gases	338.4	318.3	312.5	309.8	292.5	280.3	226.3	191.2	218.3	225.2
21	Refineries	24.5	23.4	23.7	23.9	23.6	22.6	22.2	21.5	21.4	22.3
22–99	**Industrial activities**	**118.1**	**119.5**	**119.4**	**119.1**	**121.4**	**120.0**	**114.8**	**107.6**	**115.4**	**105.8**
22	Coking plants	3.7	3.8	3.8	3.9	4.0	3.9	3.7	3.3	3.7	3.8
23	Metal ores	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
24	Pig iron and steel	28.2	28.6	29.5	28.6	29.9	30.1	28.3	25.1	28.3	26.4
20	Blast furnace gas power plants	20.6	21.2	21.3	21.3	20.8	19.9	19.1	16.6	19.2	18.1
25	Ferrous metals	3.9	3.8	3.7	3.8	3.8	3.8	3.3	2.9	3.2	2.8
26	Primary aluminium	1.4	1.4	1.4	1.4	1.4	1.4	1.3	1.4	1.3	1.0
27	Secondary aluminium	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.5	0.6	0.5
28	Non-ferrous metals	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.8
29	Cement clinker	19.0	19.6	19.1	19.3	20.5	20.0	20.0	20.1	20.5	18.8
30	Lime	9.3	9.3	9.2	9.1	9.3	9.4	8.8	8.2	8.8	8.7
31	Glass	3.7	3.8	3.8	3.8	3.7	3.8	3.7	3.6	3.7	3.7
32	Ceramics	2.1	2.1	2.0	2.0	2.0	2.1	2.0	1.9	1.9	1.7

Activity		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
33	Mineral fibres	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4
34	Gypsum	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
35	Wood pulp	0.4	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.3	0.4
36	Paper	5.4	5.3	5.3	5.3	5.3	5.2	5.0	4.8	5.0	4.4
37	Carbon black	0.6	0.7	0.7	0.7	0.6	0.6	0.6	0.5	0.6	0.6
38	Nitric acid	0.8	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.4	0.3
39	Adipic acid	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
40	Glyoxal and glyoxylic acid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41	Ammonia	4.7	4.3	4.5	4.5	4.5	4.6	4.4	4.5	4.6	3.1
42	Basic chemicals	8.0	8.4	8.0	8.3	8.3	8.0	7.6	7.9	8.0	6.9
43	Hydrogen and synthesis gas	3.4	3.2	3.0	3.2	3.2	3.1	3.1	3.0	2.8	2.6
44	Soda	0.5	0.6	0.6	0.5	0.6	0.5	0.6	0.5	0.5	0.5

Note: Combustion installations exclude blast furnace gas power plants; industrial activity includes blast furnace gas power plants
Source: EUTL

4 The sub-sectors in detail

Sub-sector 1 – Iron and steel

Emissions from the production of iron and steel are concentrated in the six integrated steelplants furnace sites in Germany (see Chapter 5). The individual sites consist of various ETS installations. These generally include coking plants, blast furnaces, blast furnace gas power plants, and processing plants. The installation with the highest emissions is in Duisburg: it emits 8 million tons of CO_2 and is operated by thyssenkrupp (Table 4.1).

Table 4.1: Iron and steel – 30 largest emitters

	EUTL ID	Company	Installation	Town/city	Activity	Emissions (million t CO_2)		
						2021	2022	2022 vs. 2021
1	DE 69	thyssenkrupp Steel Europe	Integriertes Hüttenwerk Duisburg	Duisburg	24	7.8	7.9	1%
2	DE 53	Hüttenwerke Krupp Mannesmann	Glocke Duisburg	Duisburg	24	4.9	4.2	−14%
3	DE 52	ROGESA Roheisengesellschaft Saar	Roheisenerzeugung Dillingen	Dillingen/Saar	24	4.3	4.0	−7%
4	DE 43	Salzgitter Flachstahl	Glocke Salzgitter	Salzgitter	24	3.7	3.7	−2%
5	DE 1132	Salzgitter Flachstahl	Kraftwerk Hallendorf	Salzgitter	20	3.6	3.6	−2%
6	DE 1486	Hüttenwerke Krupp Mannesmann	Kraftwerk Huckingen	Duisburg	20	3.2	2.9	−10%
7	DE 1228	ArcelorMittal Bremen	Block 4 Bremen	Bremen	20	2.5	2.5	−2%
8	DE 1415	thyssenkrupp Steel Europe	Dampfkesselanlage Duisburg Hamborn	Duisburg	20	3.1	2.5	−20%
9	DE 60	ArcelorMittal Bremen	Einheitliche Anlage Bremen	Bremen	24	2.3	2.1	−7%
10	DE 1850	thyssenkrupp Steel Europe	Kraftwerk Hamborn Block 5	Duisburg	20	2.4	2.1	−14%
11	DE 1411	thyssenkrupp Steel Europe	Heizkraftwerk Duisburg Hamborn	Duisburg	20	1.5	1.9	26%
12	DE 65	thyssenkrupp Steel Europe	Kokerei Duisburg Schwelgern	Duisburg	22	1.9	1.8	−3%
13	DE 1386	Vulkan Energiewirtschaft Oderbrücke	Dampfheizkraftwerk VEO	Eisenhüttenstadt	20	1.7	1.8	4%
14	DE 70	ArcelorMittal Eisenhüttenstadt	Roheisen- und Stahlerzeugung	Eisenhüttenstadt	24	1.7	1.3	−25%
15	DE 4137	Dillinger Hüttenwerke und ROGESA	Gichtgaskraftwerk Dillingen/Saar	Dillingen/Saar	20	1.2	1.0	−11%
16	DE 49	Zentralkokerei Saar	Zentralkokerei Dillingen	Dillingen/Saar	22	1.1	1.0	−4%

	EUTL ID	Company	Installation	Town/city	Activity	Emissions (million t CO_2)		
						2021	2022	2022 vs. 2021
17	DE 45	ArcelorMittal Bremen	Kokerei Prosper (Ohne Kesselhaus)	Bottrop	22	0.3	0.5	63%
18	DE 4151	BRE.M.A Warmwalz	Warmwalzwerk	Bremen	24	0.5	0.5	−8%
19	DE 56	Dillinger Hüttenwerke	Stahlwerk Dillinger Hütte	Dillingen/Saar	24	0.4	0.4	3%
20	DE 4100	RWE Power	Herdofenanlage Fortuna-Nord	Bergheim	22	0.4	0.4	−8%
21	DE 3902	Dillinger Hüttenwerke	Grobblechwalzwerk 2	Dillingen/Saar	24	0.3	0.3	3%
22	DE 2495	Salzgitter Flachstahl	Wärmöfen Warmbreitband-Walzwerk	Salzgitter	25	0.3	0.3	−10%
23	DE 59	Saarstahl Aktiengesellschaft	Stahlwerk Saarstahl	Völklingen	24	0.3	0.2	−22%
24	DE 44	ArcelorMittal Hochfeld	Stahlwerk Duisburg	Duisburg	24	0.2	0.2	−4%
25	DE 203770	Fritz Winter Eisengießerei	Fritz Winter Eisengießerei Gmbh & Co. Kg	Stadtallendorf	25	0.2	0.2	−9%
26	DE 206009	DK Recycling und Roheisen	Hochofenanlage	Duisburg	24	0.2	0.2	−26%
27	DE 2496	Saarstahl Aktiengesellschaft	Walzwerk Nauweiler	Völklingen	24	0.1	0.1	−5%
28	DE 41	Lech-Stahlwerke	Lech-Stahlwerke	Meitingen	24	0.2	0.1	−19%
29	DE 40	Peiner Träger	Elektrostahlwerk – Einheitliche Anlage	Peine	24	0.1	0.1	−20%
30	DE 202991	thyssenkrupp Steel Europe	Warmbandwerk 3	Bochum	24	0.2	0.1	−31%
	Total					**50.6**	**47.8**	**−6%**
	Proportion of "Dirty Thirty" in the sector as a whole						93%	

Source: EUTL

Sub-sector 2 – Cement and lime

Table 4.2 shows the 30 largest emitters in the production of cement and lime. Only three of the largest emitters on this list are lime plants. The other installations are classified as belonging to the cement industry. The largest installation involved in the production of cement and lime is the lime plant in Flandersbach, south of the Ruhr region, which emits 1.8 million tons of CO_2. The cement works with the highest CO_2 emissions in Germany is the plant in Rüdersdorf (east of Berlin). On average, the cement works shown here emit 0.6 million tons of CO_2 per installation.

Table 4.2: Cement and lime – 30 largest emitters

	EUTL ID	Company	Installation	Town/city	Activity	Emissions (million t CO_2)		
						2021	2022	2022 vs. 2021
1	DE 147	Rheinkalk	Werk Flandersbach-Anlage	Wülfrath	30	1.7	1.8	4%
2	DE 81	CEMEX Zement	Zementwerk Rüdersdorf	Rüdersdorf	29	1.3	1.1	−9%
3	DE 116	Dyckerhoff	Drehöfen Deuna	Deuna	29	1.1	1.0	−3%
4	DE 74	Holcim	Werk Lägerdorf	Lägerdorf	29	1.1	1.0	−9%
5	DE 109	HeidelbergCement	Zementwerk Burglengenfeld	Burglengenfeld	29	1.0	0.9	−16%
6	DE 83	OPTERRA Zement	Zementwerk Karsdorf	Karsdorf	29	1.0	0.8	−12%
7	DE 100	SCHWENK Zement	SCHWENK Werk Bernburg	Bernburg	29	0.8	0.8	0%
8	DE 105	Dyckerhoff	Drehofenanlage 8 Lengerich	Lengerich	29	0.7	0.7	1%
9	DE 103	Dyckerhoff	Drehöfen Göllheim	Göllheim	29	0.8	0.7	−4%
10	DE 99	HeidelbergCement	Zementwerk Schelklingen	Schelklingen	29	0.8	0.7	−17%
11	DE 80	SCHWENK Zement	SCHWENK WGS Standort Allmendingen	Allmendingen	29	0.7	0.7	−5%
12	DE 149	Rheinkalk	Werk Hönnetal	Menden	30	0.8	0.7	−11%
13	DE 94	HeidelbergCement	Zementwerk Lengfurt	Triefenstein	29	0.7	0.7	−4%
14	DE 108	Spenner	Spenner Drehofenanlage	Erwitte	29	0.6	0.7	0%
15	DE 89	HeidelbergCement	Zementwerk Geseke	Geseke	29	0.7	0.6	−7%
16	DE 117	Gebr. Wiesböck & Co.	Werk Rohrdorf	Rohrdorf	29	0.8	0.6	−14%

	EUTL ID	Company	Installation	Town/city	Activity	Emissions (million t CO_2)		
						2021	2022	2022 vs. 2021
17	DE 84	SCHWENK Zement	SCHWENK Werk Karlstadt	Karlstadt	29	0.6	0.6	−3%
18	DE 75	Holcim	Werk Höver	Sehnde	29	0.6	0.6	−3%
19	DE 88	HeidelbergCement	Zementwerk Ennigerloh	Ennigerloh	29	0.5	0.5	−4%
20	DE 82	SCHWENK Zement	SCHWENK WGS Standort Mergelstetten	Heidenheim	29	0.5	0.5	4%
21	DE 110	Märker Zement	Drehrohrofen 7	Harburg	29	0.6	0.5	−17%
22	DE 79	Holcim	Zementwerk Beckum-Kollenbach	Beckum	29	0.6	0.5	−8%
23	DE 87	Hugo Miebach Söhne KG	Portlandzementwerk Wittekind	Erwitte	29	0.5	0.5	0%
24	DE 85	OPTERRA Wössingen	Zementwerk Wössingen	Walzbachtal	29	0.5	0.5	4%
25	DE 112	Holcim	Drehrohrofen Dotternhausen	Dotternhausen	29	0.5	0.5	−9%
26	DE 111	HeidelbergCement	Zementwerk Hannover	Hannover	29	0.6	0.4	−26%
27	DE 98	thomas Zement	Drehrohrofen Werk Erwitte	Erwitte	29	0.5	0.4	−19%
28	DE 127	Fels-Werke GmbH	Kalkwerk DSO 5-8 Seesen	Seesen	30	0.3	0.3	−4%
29	DE 3595	Südzucker AG	Kalkofen der Zuckerfabrik Zeitz	Zeitz	30	0.2	0.3	28%
30	DE 104	Dyckerhoff	Drehofen 4 Lengerich	Lengerich	29	0.4	0.3	−12%
	Total					**21.3**	**19.9**	**−6%**
	Proportion of "Dirty Thirty" in the sector as a whole						73%	

Source: EUTL

Sub-sector 3 – Chemicals

In the chemicals sector, CO_2 emissions are dominated by ammonia synthesis and ethylene cracking (Table 4.3). In the EU ETS emissions trading, emissions are reported on a installation basis. In 2022, the ammonia installation in Brunsbüttel was the largest individual emitter in this activity, emitting 1.1 million tons of CO_2. In second place was the ethylene cracker installation in Böhlen (the site is close to the Lippendorf lignite plant). Ordinarily, one company operates several installations at one site. Thus, at the Ludwigshafen site, BASF is responsible for a number of installations and is with six installations among the 30 largest chemical installations. In total, these six BASF installations emit 2 million tons of CO_2. In addition, other industrial installations and a number of power plants (not considered in this analysis) are operated at the site in Ludwigshafen.

In 2022, emissions generated by the synthesis of ammonia declined significantly in an order of magnitude of roughly 30%. Emission reductions are distributed very unevenly among the individual installations. In any case, they can be explained by the drop in production resulting from high natural gas prices. The highest reduction in emissions (60%) was achieved by BASF's ammonia installation 3 in Ludwigshafen. The installation manufacturing ammonia in Piesteritz reduced their emissions by 30% (in 2021, these installations were still the largest emitters in the chemical sub-sector). In Yara's ammonia installation in Brunsbüttel, on the other hand, emissions increased by 2%.

Table 4.3: Chemicals – 30 largest emitters

	EUTL ID	Company	Installation	Town/city	Activity	Emissions (million t CO_2)		
						2021	2022	2022 vs. 2021
1	DE 205626	YARA Brunsbüttel	Ammoniakanlage	Büttel	43	1.1	1.1	2%
2	DE 3596	Dow Olefinverbund	Ethylenanlage (Cracker) Böhlen	Böhlen	42	1.1	1.0	−15%
3	DE 202455	SKW Stickstoffwerke Piesteritz	Ammoniakanlage 2	Lutherstadt Wittenberg	41	1.3	0.9	−32%
4	DE 202457	SKW Stickstoffwerke Piesteritz	Ammoniakanlage 1	Lutherstadt Wittenberg	41	1.2	0.9	−30%
5	DE 2196	Basell Polyolefine	Ethylenanlage OM6 Wesseling	Wesseling	42	0.9	0.8	−9%
6	DE 201960	BASF	Ammoniak-Fabrik 4	Ludwigshafen	41	0.9	0.8	−12%
7	DE 2294	INEOS Manufacturing Deutschland	Kracker 4, Geb, T21 Köln	Köln	42	0.8	0.8	−5%
8	DE 2095	INEOS Manufacturing Deutschland	Kracker 5, Geb, S03 Köln	Köln	42	0.8	0.6	−21%
9	DE 2299	BASF	Steamcracker 2	Ludwigshafen	42	0.5	0.5	0%
10	DE 2198	Basell Polyolefine	Petrochemische Anlage	Münchsmünster	42	0.4	0.4	−2%
11	DE 205274	INEOS Manufacturing Deutschland	Ammoniak-Anlage, Geb, O 07 Köln	Köln	41	0.6	0.4	−37%
12	DE 2197	Basell Polyolefine	Ethylenanlage OM4 Wesseling	Wesseling	42	0.4	0.3	−18%
13	DE 3597	Deutsche Gasrußwerke	Anlage zur Herstellung von Furnaceruß	Dortmund	37	0.3	0.3	−1%
14	DE 206057	Linde Gas Produktionsgesellschaft	Werk 939, Leuna, Unit 824	Leuna	43	0.2	0.3	71%
15	DE 201962	BASF	Ammoniak-Fabrik 3	Ludwigshafen	41	0.7	0.3	−60%
16	DE 3398	Orion Engineered Carbons	Furnacerußanlage	Köln	37	0.3	0.2	−3%

	EUTL ID	Company	Installation	Town/city	Activity	Emissions (million t CO_2)		
						2021	2022	2022 vs. 2021
17	DE 202349	Linde Gas Produktionsgesellschaft	Leuna Sr 1,2	Leuna	43	0.4	0.2	−33%
18	DE 201896	Evonik Operations	Wasserstoff-Anlage	Marl	43	0.2	0.2	−2%
19	DE 202439	Solvay Chemicals	Solvay Chemicals Gmbh	Bernburg	44	0.2	0.2	−4%
20	DE 2298	BASF	Steamcracker 1	Ludwigshafen	42	0.3	0.2	−39%
21	DE 206021	Sasol Germany	Produktionskomplex Brunsbüttel	Brunsbüttel	42	0.2	0.2	−7%
22	DE 201955	BASF	Wasserstoff-Anlage	Ludwigshafen	43	0.3	0.2	−48%
23	DE 201954	BASF	Synthesegasanlage-Ab_2013	Ludwigshafen	43	0.2	0.2	2%
24	DE 205571	YARA	Salpetersäureanlagen 2.01/2.02	Poppendorf	38	0.2	0.2	−7%
25	DE 203800	Solvay Chemicals	Soda	Rheinberg	44	0.1	0.1	0%
26	DE 203110	Vynova Wilhelmshaven	VCM-Anlage	Wilhelmshaven	42	0.1	0.1	−4%
27	DE 203739	Huntsman Products	MSA-Anlage	Moers	42	0.2	0.1	−16%
28	DE 202878	Evonik Superabsorber	Acrylsäure-/Acrylsäuresteranlage	Marl	42	0.1	0.1	−5%
29	DE 204725	CIECH Soda Deutschland	Sodawerk Staßfurt	Staßfurt	44	0.1	0.1	−4%
30	DE 203444	Rain Carbon Germany GmbH	RÜTGERS Basisaromaten	Castrop-Rauxel	42	0.1	0.1	−17%
	Total					**14.1**	**11.7**	**−17%**
	Proportion of the "Dirty Thirty" in the sector as a whole						83%	

Source: EUTL

Refineries

The refinery in Schwedt had the highest CO_2 emissions in Germany. It was followed by the refineries in Scholven (Ruhr region) and Karlsruhe. Overall, only 21 ETS installations were classified as engaging in refinery activities (Table 4.4).

Table 4.4: Refineries – 30 largest emitters

	EUTL ID	Company	Installation	Town/city	Activity	Emissions (million t CO_2)		
						2021	2022	2022 vs. 2021
1	DE 19	PCK Raffinerie	Glocke Schwedt	Schwedt	21	3.5	3.6	3%
2	DE 4	Ruhr Oel	Ruhr Oel Gmbh – Werk Scholven	Gelsenkirchen	21	3.0	3.1	2%
3	DE 11	MiRO Mineraloelraffinerie Oberrhein	Werk 1 Und Werk 2 Karlsruhe	Karlsruhe	21	2.5	2.6	6%
4	DE 31	Shell Deutschland	Raffinerie Wesseling	Wesseling	21	1.8	2.0	12%
5	DE 20	TotalEnergies	Mineralölraffinerie Leuna	Spergau	21	1.6	1.9	19%
6	DE 32	Shell Deutschland	Raffinerie Godorf	Köln	21	1.4	1.4	−2%
7	DE 3	Ruhr Oel	Ruhr Oel Gmbh – Werk Horst	Gelsenkirchen	21	1.0	1.1	9%
8	DE 16	BP Europa	Raffinerie Lingen	Lingen (Ems)	21	1.1	1.1	1%
9	DE 7	BAYERNOIL Raffineriegesellschaft	Standort Neustadt	Neustadt	21	0.9	1.0	18%
10	DE 10	Raffinerie Heide	Raffinerie Heide	Hemmingstedt	21	0.9	1.0	6%
11	DE 5	OMV Deutschland Operations	Mineralölverarbeitung Burghausen	Burghausen	21	1.1	1.0	−13%
12	DE 28	HOLBORN Europa Raffinerie	Raffinerie Hamburg	Hamburg	21	0.7	0.8	3%
13	DE 1	Gunvor Raffinerie Ingolstadt	Raffinerie Ingolstadt	Ingolstadt	21	0.7	0.7	4%
14	DE 978	ROMONTA	Schmierstoffraffinerie Amsdorf	Seegebiet Mansfelder Land	21	0.4	0.4	−3%
15	DE 9	BAYERNOIL Raffineriegesellschaft	Standort Vohburg	Vohburg	21	0.4	0.4	7%

	EUTL ID	Company	Installation	Town/city	Activity	Emissions (million t CO_2)		
						2021	2022	2022 vs. 2021
16	DE 13	H&R Chemisch-Pharmazeutische Spezialitäten	Raffinerie Salzbergen	Salzbergen	21	0.1	0.1	11%
17	DE 33	H&R Ölwerke Schindler	Schmierstoffraffinerie Neuhof	Hamburg	21	0.1	0.1	−18%
18	DE 14	Nynas	Raffinerie Hamburg	Hamburg	21	0.1	0.1	−60%
19	DE 212260	HES Wilhelmshaven Tank Terminal	LSFO-Anlage HES Wilhelmshaven	Wilhelmshaven	21	0.1	0.0	−35%
20	DE 6	TotalEnergies Bitumen Deutschland	Destillation und Nebenanlagen Brunsbüttel	Brunsbüttel	21	0.0	0.0	−3%
21	DE 37	AVISTA OIL Deutschland	AVISTA OIL Deutschland Gmbh	Uetze-Dollbergen	21	0.0	0.0	−15%
	Total					**21.4**	**22.3**	**4%**
	Proportion of the "Dirty Thirty" in the sector as a whole						100%	

Source: EUTL

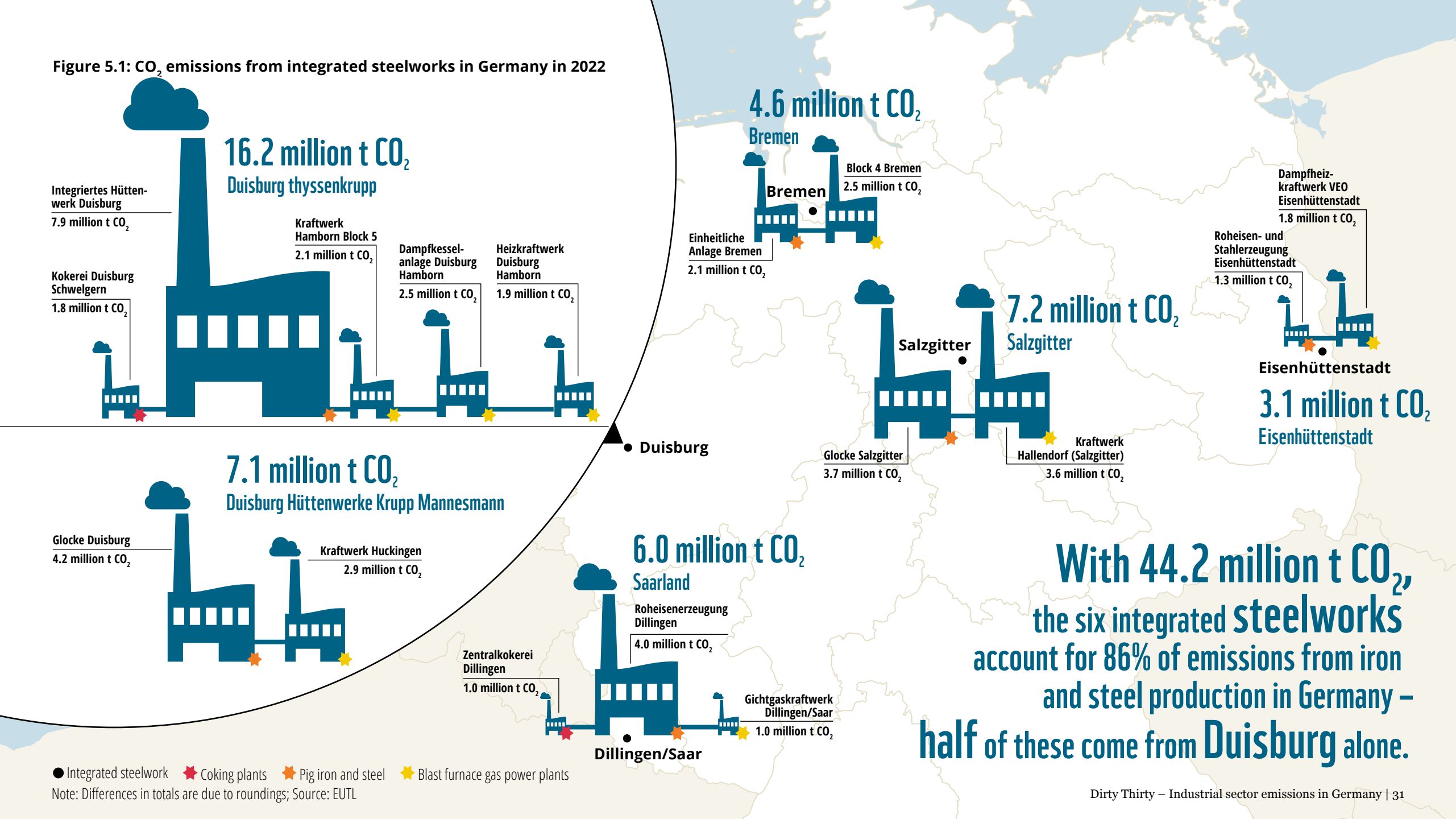
5 Detailed analysis of iron and steel

Table 5.1 shows the six integrated steelworks in Germany. In each case, the installations with emissions in excess of more than one million tons of CO_2 are shown.

Duisburg is home to two large integrated steelworks.. They emit more than half the CO_2 emissions of all integrated steelworks. Of these emissions, the thyssenkrupp site accounts for 16 million tons of CO_2 and the Hüttenwerke Krupp Mannesmann (HKM) site accounts for 7 million tons of CO_2.

In the blast furnace process, blast furnace gases are emitted as a by-product. Blast furnace gases consist primarily of carbon dioxide and carbon monoxide. Some of these blast furnace gases are consumed by the blast furnace (e.g. in the hot blast stoves) and some are transferred to other installations (coking plants, electricity generation plants). In the case of the blast furnace gases that are transferred to other installations, the emissions are only reported as such in the blast furnace gas power plant because they are only released into the air from the power plant. This also applies to the proportion of CO_2 in the blast furnace gases that have already developed in the blast furnace. In Germany, blast furnace gas power plants are recorded as stand-alone plants in the ETS. The blast furnace gas power plants report their emissions under activity 20, while the blast furnaces report their emissions under activity 24. Among the two smallest integrated steelworks in Bremen and Eisenhüttenstadt, more than half the emissions are attributed to the blast furnace gas power plant. These sites do not have their own coking plant at the same site. The proportion of blast furnace gas power plant emissions is therefore somewhat higher here. Coking plants are operated at the remaining sites. At HKM and in Salzgitter, the coking plants are part of the integrated steelworks and are not reported separately.

Figure 5.1: CO_2 emissions from integrated steelworks in Germany in 2022



Note: Differences in totals are due to roundings; Source: EUTL

Table 5.1: Integrated steelworks in Germany

EUTL ID	Installation	Activity	Verified emissions 2022 (million t CO_2)
Duisburg thyssenkrupp			**16.2**
DE 69	Integriertes Hüttenwerk Duisburg	24	7.9
DE 1415	Dampfkesselanlage Duisburg Hamborn	20	2.5
DE 1850	Kraftwerk Hamborn Block 5	20	2.1
DE 1411	Heizkraftwerk Duisburg Hamborn	20	1.9
DE 65	Kokerei Duisburg Schwelgern	22	1.8
Salzgitter			**7.2**
DE 43	Glocke Salzgitter	24	3.7
DE 1132	Kraftwerk Hallendorf	20	3.6
Duisburg Hüttenwerke Krupp Mannesmann			**7.1**
DE 53	Glocke Duisburg	24	4.2
DE 1486	Kraftwerk Huckingen	20	2.9
Saarland			**6.0**
DE 52	Roheisenerzeugung Dillingen/Saar	24	4.0
DE 4137	Gichtgaskraftwerk Dillingen/Saar	20	1.0
DE 49	Zentralkokerei Dillingen/Saar	22	1.0

EUTL ID	Installation	Activity	Verified emissions 2022 (million t CO_2)
Bremen			**4.6**
DE 1228	Block 4 Bremen	20	2.5
DE 60	Einheitliche Anlage Bremen	24	2.1
Eisenhüttenstadt			**3.1**
DE 1386	Dampfheizkraftwerk VEO	20	1.8
DE 70	Roheisen- und Stahlerzeugung	24	1.3
Total			**44.2**

Note: Differences in totals are due to rounding
Source: EUTL

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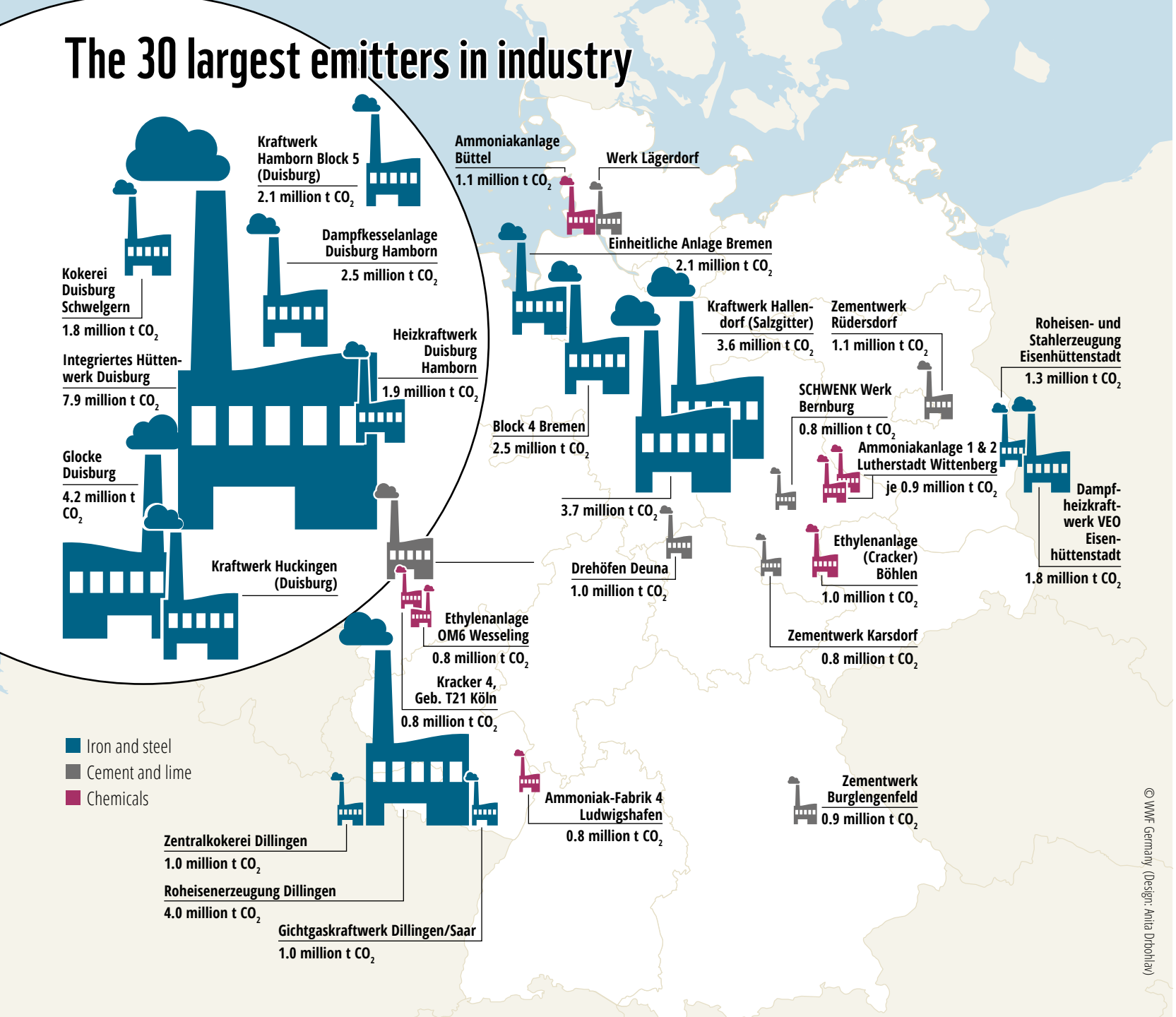
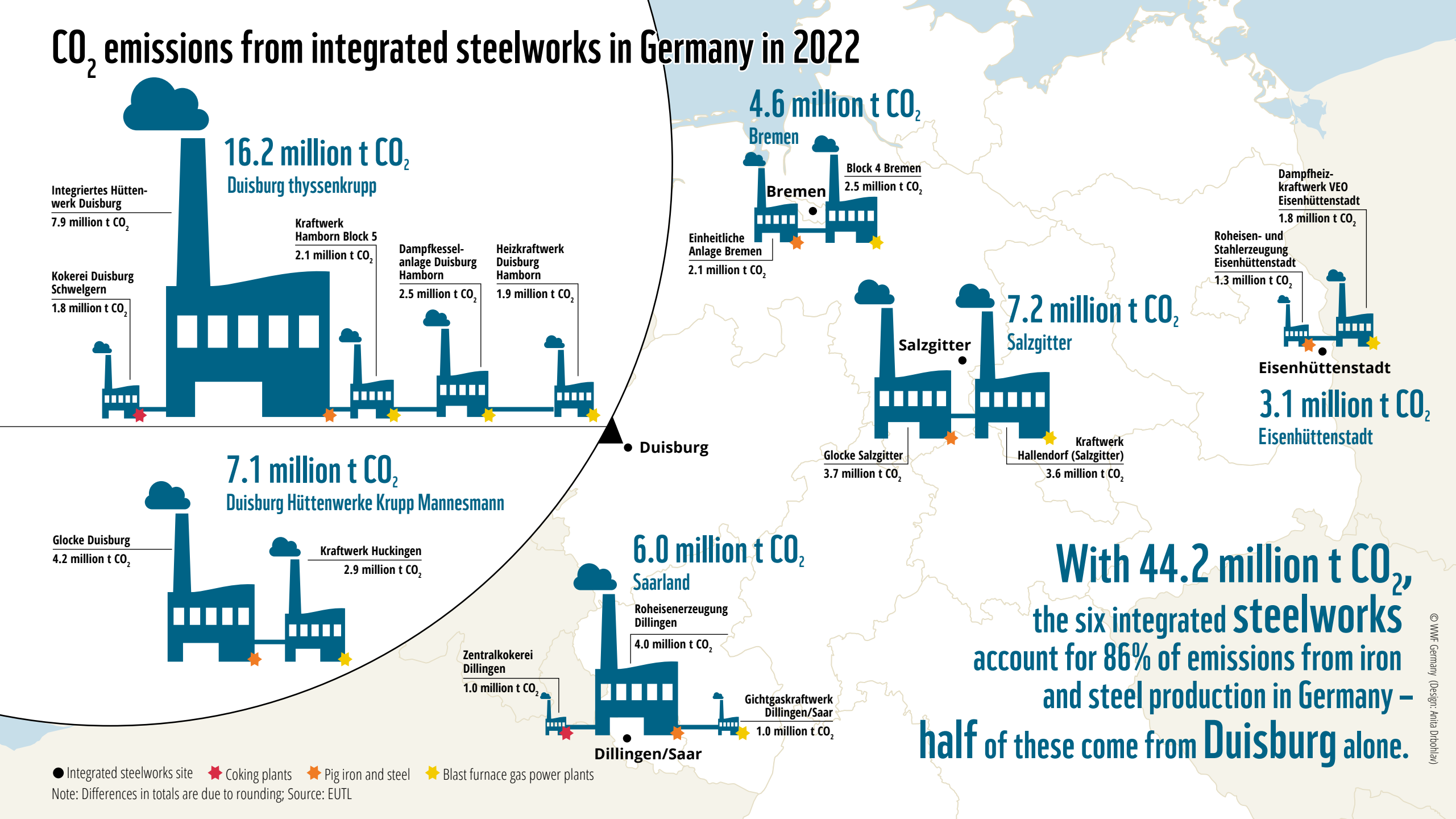
The 30 largest emitters in industry



CO_2 emissions from integrated steelworks in Germany in 2022



With 44.2 million t CO_2, the six integrated steelworks account for 86% of emissions from iron and steel production in Germany – half of these come from Duisburg alone.

● Integrated steelworks site ★ Coking plants ★ Pig iron and steel ★ Blast furnace gas power plants

Note: Differences in totals are due to rounding; Source: EUTL