

The Emissions Aristocracy

How 30 companies cause half of EU
Emissions Trading System (EU ETS)
emissions and avoid footing the bill



Summary

1

Executive summary

p. 5

Introduction

p. 6

2

**The “aristocracy”
the top 30 polluters
under the EU ETS**

p. 8

2.1. Power vs industry: diverging trajectories
Free allowances: how do they work?

p. 11



3

Who are they?

Sectors and companies

p. 16

3.1. Steel and iron
ArcelorMittal
ThyssenKrupp
Voestalpine

p. 17

3.2. Cement
Heidelberg Materials AG
Holcim
CRH

p. 22

3.3. Refineries and petrochemicals
Orlen
TotalEnergies
ENI
Repsol
Shell
ExxonMobil

p. 26

4

**How do we make
polluters pay
and accelerate
climate action?**

p. 32

5

Annex

p. 34



Executive summary

The activities of all installations, such as factories and power plants, operating within the scope of the EU Emissions Trading System (EU ETS) are collected in the EU ETS Transaction Log. The data concerning emissions, allowances, and relevant sectors can be freely consulted. There is a piece of information, however, that is much harder to find: who do these installations belong to?

Installations are linked to “account holders” registered within the EU ETS system - but due to the often intricate ownership schemes of conglomerates, it is difficult to pinpoint which companies are polluting the most under the European carbon trading scheme. As a consequence, it is not possible without considerable sleuthing to determine who should be held responsible for producing the most CO₂ emissions and overall who is receiving the most free allowances - effectively, polluting for free.

Ranging from steel and cement production, to oil refinement and petrochemicals, heavy industries have avoided their responsibilities for too long, enjoying free passes since the EU ETS system was established. **It is urgent to make polluters pay**, and to do so, we need to know who exactly needs to pay and what.

Carbon Market Watch presents a unique, first-of-its-kind report pairing EU ETS account holders (and their installations) to their parent companies, assessing the highest level of private ownership possible. This report presents an overview of which companies have the biggest carbon footprint in the EU, who received the most free pollution permits, and which sectors are not delivering on their decarbonisation promises.

Based on the ownership of the most-polluting installations, we have compiled a list of **the top 30 companies that make up the EU's emissions aristocracy** and, together, produced, according to our analysis, **more than 50% of the total EU ETS emissions in 2022**.

Our investigation found that while the power sector is responsible for the majority of emissions, it pays for most of its pollution. However, companies operating in **sectors such as steel, cement, or petrochemicals** production are not only well represented among the top polluters, but also receive huge amounts of free pollution permits. For example, in 2022, steel behemoth ArcelorMittal received €3.7 billion in free allowances, while cement giant Heidelberg received €1.9 billion. To make sure we meet our 2030 and 2040 targets, and to avoid climate disaster, we know that emissions must be reduced steeply: but how will we bankroll these changes? It's time to make the polluters pay - in full.

Introduction

The European Union Emissions Trading System (EU ETS) stands as a cornerstone of the European Union's efforts to combat climate change. Established in 2005, it is the world's first and largest cross-border emissions trading system. Geared towards reducing greenhouse gas emissions, the EU ETS operates within the framework of the EU's broader strategy to meet its [climate targets](#) and international commitments such as the Paris Agreement.

At its core, the EU ETS is a market-based climate policy instrument designed to encourage industries and companies to lower their carbon emissions by placing a cap on the total amount of greenhouse gases they are allowed to emit (find out more in our [beginner's guide to the ETS](#)). This cap decreases over time in line with the EU's emission reduction goals. To facilitate compliance with this cap, emission allowances are systematically allocated to participating installations, primarily power plants and factories, through a combination of auctioned and free pollution permits based on sectoral benchmarks and historical emissions data.

As established in the EU ETS legal framework, each year companies must hand over enough allowances to cover their emissions. If they emit more than the allowances they own, they must purchase additional allowances from public auctions or the secondary market, or engage in emission reduction activities. Conversely, installations that have surplus allowances can sell them, fostering a market dynamic that rewards emission reductions and energy efficiency.

Some benefits of the EU ETS are its adaptability and economic efficiency. It promotes innovation and low-carbon practices by nudging companies to invest in emission-cutting technologies or practices, leading to the development of a cleaner industrial landscape. Furthermore, the trading nature of the system facilitates the transfer of emissions reductions from areas of lower cost to those where cutting emissions might be more expensive, thus optimising the overall reduction effort.

The EU ETS has passed through several phases to refine its effectiveness. The third phase (2013-2020) transitioned towards a more harmonised system with a greater focus on auctio-

ning as the main mechanism for distributing allowances. This reduced free allocations, and introduced measures to avoid alleged "carbon leakage" – in this context, the possible relocation of industrial plants outside the EU to avoid paying carbon taxation, and effectively to keep polluting elsewhere.

Despite its accomplishments, the EU ETS suffers from numerous weaknesses, largely due to the largesse of free allowances, generous benchmarks to calculate the carbon intensity of each product, and (previously) low carbon prices. The EU ETS has so far proved ineffective at fostering industrial climate innovation and, subsequently, the decarbonisation of industrial processes. The fourth phase, agreed upon in early 2023 and running until 2030, accelerates the reduction of the emissions ceiling and expands the EU ETS into additional sectors. It also involves the gradual phasing out of free allowances for sectors that will be covered by the upcoming [Carbon Border Adjustment Mechanism](#) (CBAM), which will impose a carbon price on imports from regions that do not set a fair price for emissions.

However, many sectors will still receive free allowances up until 2039. Carbon Market Watch has always advocated for an end to these freebies, which are effectively a licence to pollute with impunity and to leave society with the bill. The system of free allocation of allowances for certain industrial sectors has, unsurprisingly, not incentivised them to invest in cleaner and more efficient production technologies, and concurrently has prevented significant revenues from being reinvested into climate action.

[Previous CMW research](#) has shown that industry fears about carbon leakage is little more than scaremongering.

With CBAM (which is supposed to mirror the ETS in its functioning) entering its [transitional phase](#), it is time for an urgent rethink on how specific sectors pollute within the EU ETS legal framework, in some cases even [profiting from doing so](#). This report investigates how the continuous use of free allowances for certain ETS sectors has obstructed the decarbonisation pathway of the European economy. Specifically, the top 30 emitting companies under the EU ETS, and their decarbonisation paths, are analysed to show how the free allocation system has failed to deliver an effective decarbonisation path for heavy industry.

2 The “aristocracy” – the top 30 polluters under the EU ETS

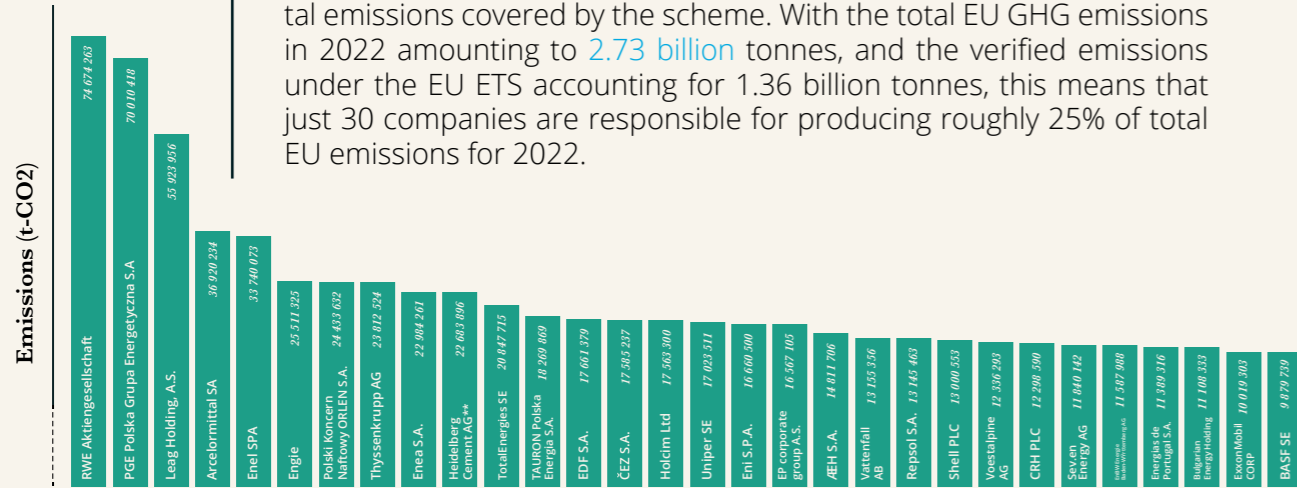
Company name	Sector*	Emissions (tonnes of CO ₂)	Free allowances	Country (headquarters)
RWE AKTIENGESELLSCHAFT	Power production	74,674,263	913,745	DE
PGE POLSKA GRUPA ENERGETYCZNA S.A.	Power production	70,010,418	638,546	PL
LEAG HOLDING, A.S.	Power production	55,923,956	264,565	CZ
ARCELORMITTAL SA	Steel production	36,920,234	44,052,621	LU
ENEL SPA	Power production	33,740,07	0	IT
ENGIE	Power production	25,511,325	487,662	FR
Polski Koncern Naftowy ORLEN S.A.**	Power production/ refining and petrochemicals	24,433,632	8,697,547	PL
THYSSENKRUPP AG	Steel production	23,812,524	22,241,247	DE
ENEA S.A.	Power production	22,984,261	156,795	PL
HeidelbergCement AG**	Cement production	22,683,896	23,030,300	DE
TOTAL ENERGIES SE	Power production/ refining and petrochemicals	20,847,715	9,631,534	FR
TAURON POLSKA ENERGIA SA	Power production	18,269,869	334,516	PL
TAURON POLSKA ENERGIA SA	Power production	18,269,869	334,516	PL
EDF SA	Power production	17,661,379	304,631	FR

Company name	Sector*	Emissions (tonnes of CO ₂)	Free allowances	Country (headquarters)
ČEZ, a. s.	Power production	17,585,237	318,638	CZ
HOLCIM LTD.	Cement production	17,563,300	16,743,92	CH
UNIPER SE	Power production	17,023,511	110,562	DE
ENI S.P.A.	Refining and petrochemicals	16,660,500	4,946,355	IT
EP CORPORATE GROUP, A.S.	Power production	16,567,105	130,928	CZ
ΔEH A.E (PPC)	Power production	14,811,706	13,845	GR
VATTENFALL AB	Power production	13,155,356	573,641	SE
REPSOL S.A.	Power production/ refining and petrochemicals	13,145,463	7,238,215	ES
SHELL PLC	Power production/ refining and petrochemicals	13,000,553	8,963,741	GB
VOESTALPINE AG	Steel production	12,336,293	9,470,348	AT
CRH PLC	Cement production	12,298,590	9,606,879	IE
SEV.EN ENERGY AG	Power production	11,840,142	28,457	LI
ENBW ENERGIE BADEN-WÜRTTEMBERG AG	Power production	11,587,988	183,083	DE
EDP - ENERGIAS DE PORTUGAL S.A.	Power production	11,389,316	32,925	PT
BULGARIAN ENERGY HOLDING	Power production	11,108,333	17,636	BG
EXXON MOBIL CORP	Refining and petrochemicals	10,019,303	7,214,236	US
Total for top 30		667,566,241	176,347,127	
Total for EU ETS in 2022		566,560,482	1,360,225,557	

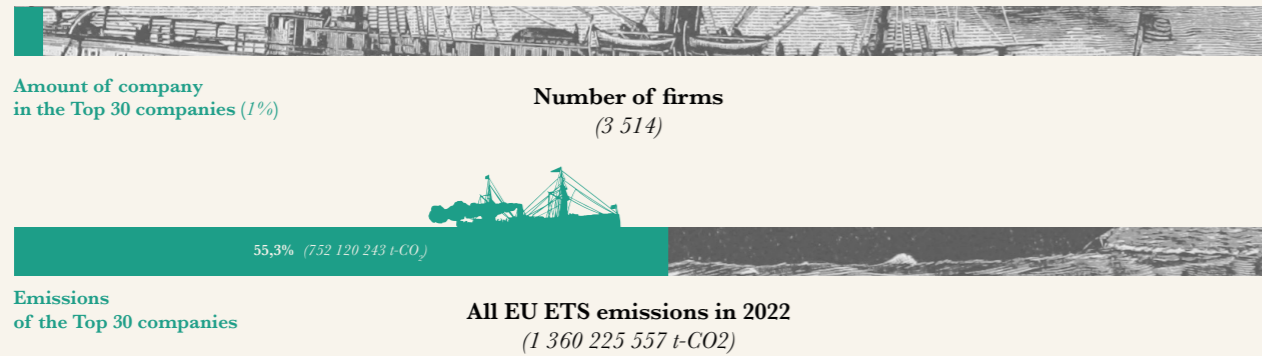
* The sectors indicated here reflect the company’s main activity and are based on the ETS sectors for the registered EU ETS installations of each company. Most companies operate across several different industrial and business sectors.

** HeidelbergCement AG changed its name to Heidelberg Materials AG in May 2023.
Polski Koncern Naftowy ORLEN S.A. changed its name to Orlen S.A. in July 2023.

Out of 3,515 companies covered by the EU ETS in 2022, the top 30 (representing less than 1% of the total) emitted more than 50% of the total emissions covered by the scheme. With the total EU GHG emissions in 2022 amounting to 2.73 billion tonnes, and the verified emissions under the EU ETS accounting for 1.36 billion tonnes, this means that just 30 companies are responsible for producing roughly 25% of total EU emissions for 2022.



Top 30 biggest polluters



These staggering figures show clearly that certain large companies have a disproportionately large role in fuelling the climate crisis and, hence, should bear a greater responsibility for taking climate action.

Power production dominates the very top of the high emitters list: the German multinational energy company RWE was the biggest emitter in the EU for 2022, accounting for a remarkable 74.6 millions tonnes of CO₂. This is because our society relies heavily on fossil fuels for electricity and heating. However, the relatively high carbon price paid by utility companies has played an effective role in speeding up their decarbonisation by encouraging greater investment in renewable sources and energy efficiency, a process accelerated by the war in Ukraine and high energy prices.

Nonetheless, heavy industry giants such as ArcelorMittal, ThyssenKrupp and HeidelbergCement rank very high on the top emitters list: and as the table above shows, they also received the overwhelming majority of free pollution permits (both in 2022 and historically). Their historical emissions demonstrate how receiving favourable treatment under the EU ETS has affected their sectors' decarbonisation trajectories and why ensuring the full application of the polluter pays principle¹ would result in better and more efficient climate action.

2.1. Power vs industry: diverging trajectories

Let's start by drawing a comparison between CO₂ emissions from the power sector (generating electricity through fossil and non-fossil sources) and industry (producing goods such as steel, cement, chemicals, etc.).

Overall, the EU ETS sectors achieved a total decline in GHG emissions of 38% since the scheme was put in place in 2005 (with a net 1.8% decrease from 2021 to 2022). As the emissions covered by the ETS before the latest revision roughly amounts to 45%, this is a significant reduction of the carbon intensity of the European economy. But not all sectors contributed equally. This can be seen when we consider what happened after the EU ETS Phase 3 started in 2013.



Between 2013 and 2022, power sector emissions fell overall by 28.6% with no decrease in net electricity generation. It's important to emphasise how the power sector, since ETS Phase 3 started in 2013, is not entitled to receive free allowances (with the exemption of plants in some lower income member states). The sector has managed, through a mix of public incentives, private investments, and favourable regulation, to significantly slash its emissions.

¹ Article 191(2) of the Treaty on the Functioning of the European Union.

² Article 10c of the EU ETS Directive allows 10 lower-income member states to allocate a portion of their auctioned allowances to electricity generation facilities, supporting investments that aim to promote cleantech and diversify the energy mix, as well as modernise infrastructure. Only Bulgaria, Hungary, and Romania have chosen to provide free allowances under Article 10c. The investment shall be carried out by 31 December 2024.

For the industrial sector, the reduction in emissions has been lacklustre compared with electricity production: in the same time-frame, emissions from industrial installations decreased **by less than 3%** in total.

The variation that can be observed between the second half of 2020 until 2022 is attributed to the joint effect of COVID-19 restrictions and the energy crisis: in 2022, the power sector's emissions increased slightly compared to 2021 (+2.4%), and industrial emissions dropped 6.4% compared to 2021 levels. Overall, the upsurge of energy prices in 2022 negatively affected sectors such as cement production and metalworks but favoured industrial activities that used fossil fuels; the combination of these effects resulted in an overall decline in industrial emissions in 2022. For these reasons, 2022 data is not reflective of more effective climate policies, and needs to be read within the bigger picture of (insufficient) decarbonisation efforts.

Why have emissions from heavy industry remained so stubbornly stagnant?

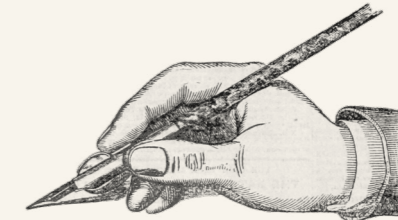
Industrial installations still receive huge amounts of free pollution permits: this means that companies benefiting from free allocation do not fully internalise the cost of carbon allowances - which would be bought at auction or in the secondary market. This could **delay the pace of industrial decarbonisation**.

This flaw in the EU ETS, together with a lack of cohesive climate policies focused on the decarbonisation of energy-intensive industries, has slowed the decarbonisation of heavy industry, eroding the EU's prospect of being a global leader of the "green industrial revolution".

Moreover, following the substantial upswing in EU ETS prices of recent years, free allowances have emerged as a pivotal financial asset. The 566 million free allowances handed out by the EU in 2022 alone were worth approximately €47.6 billion (based on an average carbon price of €84). In the current political context there is a demand for higher climate ambition³, and increased scrutiny on **who is paying** for their pollution and who is shirking the bill.

³ More than 80% of Europeans think that tackling climate and environmental concerns should be a priority to improve public health. https://climate.ec.europa.eu/system/files/2023-07/citizen_support_report_2023_en.pdf

"Free allocation: how does it work?" on page 14



Industrial installations which receive the majority (or entirety) of their emissions allowances at no cost do not bear the financial responsibility for their greenhouse gas pollution.

Instead of encouraging decarbonisation efforts, these complimentary allowances have ironically had the opposite effect, enabling emitting industries to sidestep the expected emission reduction measures and mutating these allowances into speculative assets through which some companies not only do not pay for their pollution but also actively profit from it.

As revealed in an investigation by *Le Monde*, the steel behemoth ArcelorMittal generated a profit of €1.9 billion from selling allowances on the secondary market between 2005 and 2019. Similarly, in the cement industry, LafargeHolcim accrued €986 million through a similar practice in the same timeframe. Heavy industries have gained **€8.1 billion** between 2008-2014 by selling surplus allowances - and an estimated €15.3 billion by cost-pass through, meaning letting their customers pay the price for freely obtained allowances.

These massive windfall profits are additional to the compensation of indirect carbon costs that is permitted by the EU ETS Directive as a state aid subsidy that member states can disperse. It is intended as a measure to protect energy-intensive industries from carbon leakage, covering the costs of consuming electricity for their production activities. This subsidy was handed out by **13 member states** in 2022, and amounted to €2.16 billion to sectors including chemicals, steel and aluminium. These funds came from auction revenues of carbon allowances, effectively reducing the budget available for real climate action. Starting in 2023, member states need to fully spend their EU ETS revenues on climate action: phasing out free allocation faster would unlock billions in revenues that could be re-allocated to fund technological innovation and support for vulnerable households and SMEs affected by the transition to a carbon-free economy.

⁶ Article 10(3) of the EU ETS Directive as revised in 2023.

Free allocation: how does it work?

Under the Emissions Trading System, free emissions allowances are the key mechanism to shield heavy industry and (until 2026) aviation from the unproven risk of carbon leakage. Over Phases 2 and 3, approximately €200 billion worth of allowances were handed out at no cost to heavy industry. Despite auctioning being the default rule in Phase 4 (2021-2030), for industrial installation, it remains the exception: more than 95% of industrial emissions are covered by free allowances. The phase-out of free allocation for sectors that will be covered by the CBAM is planned for 2034, which is still over a decade away, while sectors that don't fall under the scope of CBAM will be exposed to full auctioning after 2030. This means *tens of billions of missed revenues* for member states to reinvest in climate-related activities, and huge industrial conglomerates not internalising the cost of GHG pollution - which ultimately falls on citizens.

Calculating the Benchmark Value

Sectors that are deemed ‘at risk’ of carbon leakage receive a larger share of these free allowances. Once a sector is on the list, individual installations receive up to 100% of their estimated emissions for free based on the emissions intensity of their production compared to other installations in their sector.

This is estimated using so-called product benchmarks, set by calculating the average emissions of the most efficient 10% of producers of a given product across the EU ETS.

Every installation in the sector receives free allocations up to the benchmark level. Those with less intensive emissions than the benchmark actually receive more allowances than they need, while those emitting more must purchase additional pollution permits. The logic behind this is to reward the most efficient installations, while encouraging those lagging behind to catch up with (and hopefully) overtake the benchmark. In Phase 4, the benchmarks will be stricter and more demanding, with fewer free allowances, but at such a slow annual pace⁴ that the incentive for industrial sectors to reduce their emissions is minimal. These very low annual reduction rates undermine the EU's goal of becoming climate neutral by 2050.

Windfall profits with nothing to show

A European Court of Auditors (ECA) [report from 2020](#) ocused on the role of free allocation of allowances within the EU ETS and found that better targeting of free allocation would have resulted in multiple benefits for decarbonisation, public finances and the operation of the single market.

As the report mentions, the ETS Directive defines free allowances as a transitional method of allocating allowances in contrast to the default method (auctioning). However, for both phase 3 and 4 of the EU ETS, free allowances continue to represent more than 40% of the total number of available allowances. The situation is especially favourable for heavy industries: before 2016, sectors deemed at risk of carbon leakage [consistently received more allowances than their verified emissions](#); and even in 2020, 2021 and 2022, free allocation covered respectively 104.5%, 89.5% and 94.7% of these industrial emissions.⁵



In the ECA's own words, “free allowances imply a financial transfer from consumers (or client industries) to energy-intensive industries, which would give rise to what is often referred to as ‘windfall profits’⁶.”

⁴ Between 0.2 and 1.6% from 2021 to 2025, and between 0.3% and 2.5% from 2026 to 2030.

⁵ Own calculation based on the EUTL (2023). The figures are not adjusted for steel waste gases.

⁶ For an in-depth analysis on carbon leakage risks and how industry lobbying has allowed for billions in windfall profits across several industrial sectors, see https://carbonmarketwatch.org/wp-content/uploads/2021/06/Phantom_leakage_WEB.pdf

3 Who are they? Sectors and companies

So which sectors and which companies are benefiting most from this system?

In the sub-chapters below, each sector appearing in the top 30 list will be analysed highlighting the main sources of GHG emissions in the industrial process, possible decarbonisation strategies, and company profiles of the main actors included in the list. The figure representing the value in euro (€) of the free allowances allocated in 2022 per company is based on the average carbon price of €84/tCO₂ in 2022.



Definitions: how to navigate the report

Company

The most significant owners (meaning, the controlling shareholders according to the ORBIS database⁸) of the considered account holders (excluding national governments).

Account holder

The entities registered under the EU ETS are the “account holders” that operate the different installations - each parent company can own several account holders (its subsidiaries).

Installation

Production plants engaging in activities covered by the EU ETS - in this report we refer to stationary installations.

Emissions

Emissions monitored, registered and verified under the EU ETS, in tonnes of CO₂.

⁸ See Annex I

3.1. Steel and iron

One of the most polluting sectors in the EU, steelmaking must radically reduce its emissions if the EU is to achieve climate neutrality before 2050.

Steel products can broadly be categorised into two types: flat steel products, such as steel sheets used in the automotive sector, and long products, such as beams or rods used for structural applications.

In 2020, Germany produced 26% of all EU steel, followed by Italy (15%), France (8%) and Spain (8%). Over half of all steel produced in the EU in 2020 (56%) was made via the primary route (virgin steel) and 44% was made through the secondary route (recycled steel), with large variations between countries.

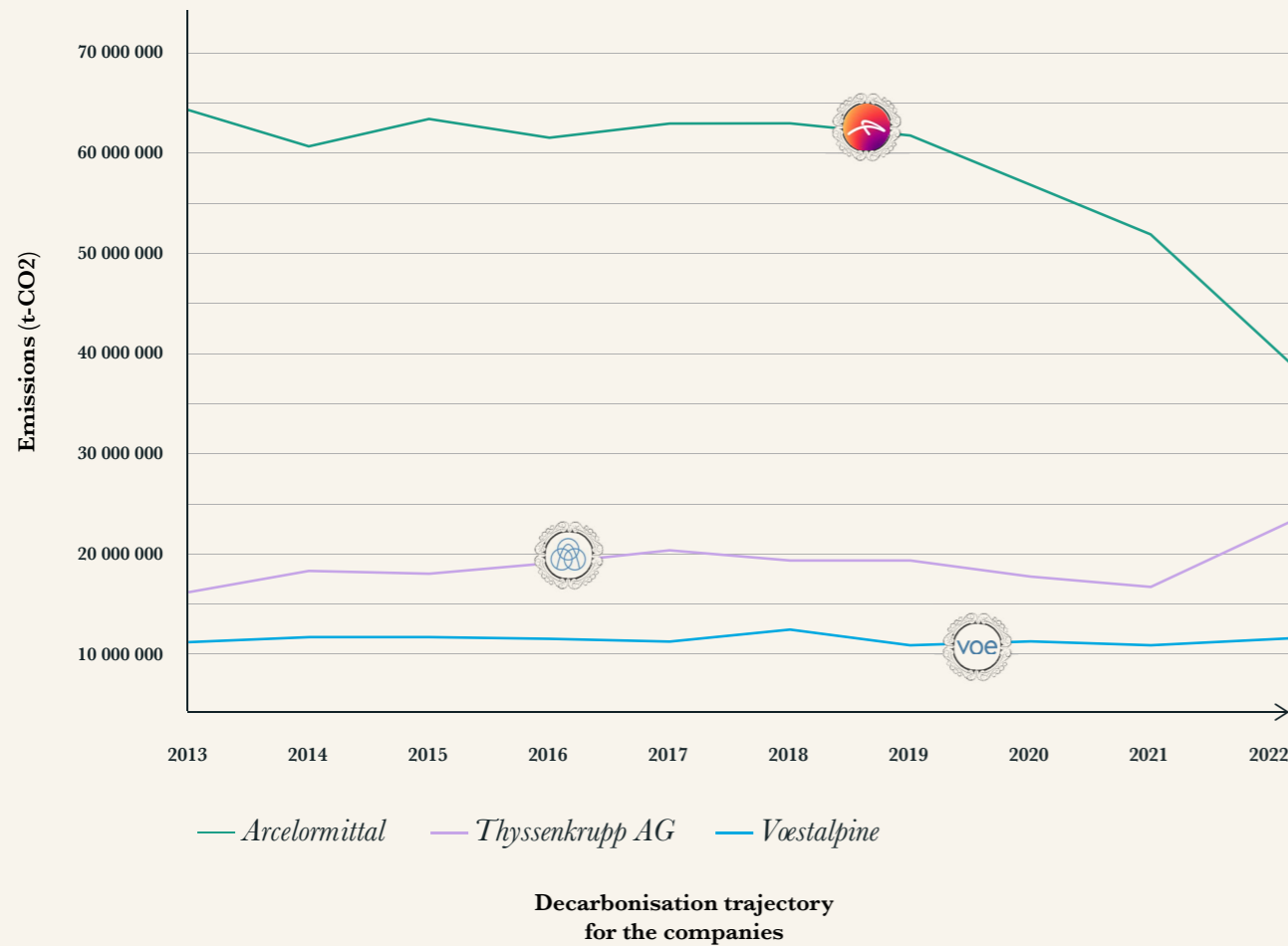
European producers release around 1.9 tonnes of CO₂ per tonne (tCO₂/t) of steel, with [wide local variations](#). For example, Polish and German steel plants emit up to three times more CO₂ per tonne of crude steel produced compared with Italian or Spanish plants (principally due to the differences in the countries’ energy mixes).

To bring the EU steel sector in line with the transition to climate neutrality in 2050, its emissions have to [fall by at least 48% by 2030 and 97% by 2050](#) compared with 2020 levels. Emissions intensity in the steel industry needs to be reduced from 1 tCO₂/t of steel produced, to 0.6 tCO₂/t in 2030 and 0.03 tCO₂/t in 2050⁹. Given the lacklustre efforts to date, the International Energy Agency (IEA) explicitly declared the steel sector “[not on track](#)” to reach net zero by 2050.

According to the criteria defined in the EU ETS Directive, steel is considered to be at risk of carbon leakage. As mentioned before, every installation in these sectors receives free allocation up to the benchmark level. Those steelmaking plants that are less emissions intensive than the benchmark receive more allowances than they need, while those emitting more must purchase additional allowances to cover the rest.

⁹ This data refers to a 2050 carbon neutral economy in the EU as a baseline; CMW however supports economy-wide carbon neutrality by 2040.

The ETS benchmarks are not static. They are designed to decrease over time to take into account technological developments, investments and better practices that reduce the emission intensity of the products. However, the pace at which benchmarks improve is extremely slow and does not reflect the efficiency gains and improvements that actually happen. The steel industry even managed to secure a specific exemption¹⁰ from the annual updates to the ETS benchmarks that define the reduction rate of free allocations: the reduction rate for hot metal became fixed at only 0.2% for the 2026-2030 period. This unfair exemption provides little incentive for this industrial sector to reduce its emissions, and this is clearly reflected in its glacial decarbonisation trajectory.



¹⁰ At the end of paragraph 2 of article 10a of the ETS Directive: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02003L0087-20180408&qid=1555059451857&from=en>

ArcelorMittal

ArcelorMittal, formed by the merger of Arcelor and Mittal Steel in 2006, is a prominent steel and mining company with a presence in over 60 countries. It operates across diverse markets, specialising in flat carbon steel, long carbon steel, and special steels. It is headquartered in Luxembourg.

**Acciaierie d'Italia is currently 63% owned by the ArcelorMittal Group. The account holder in the EU ETS registry is AdI Energia, who manages the electricity production in the ILVA steel plant (Taranto, IT).*

Last disclosed yearly revenue: €74.3 billion
 Total value of free allowances received in 2022: €3.7 billion
 Total accounts under the EU ETS: 26
 Verified emissions in 2022: 36,920,234 t/CO₂
 Decarbonisation: ArcelorMittal Europe has committed to reduce CO₂ emissions by 35% by 2030, with a further ambition to be carbon neutral by 2050.



ThyssenKrupp

ThyssenKrupp AG is a global industrial conglomerate with operations spanning various sectors. The company operates in over 60 countries, specialising in steel, automotive technology and materials services. It was founded in 1811 and is headquartered in Essen, Germany.

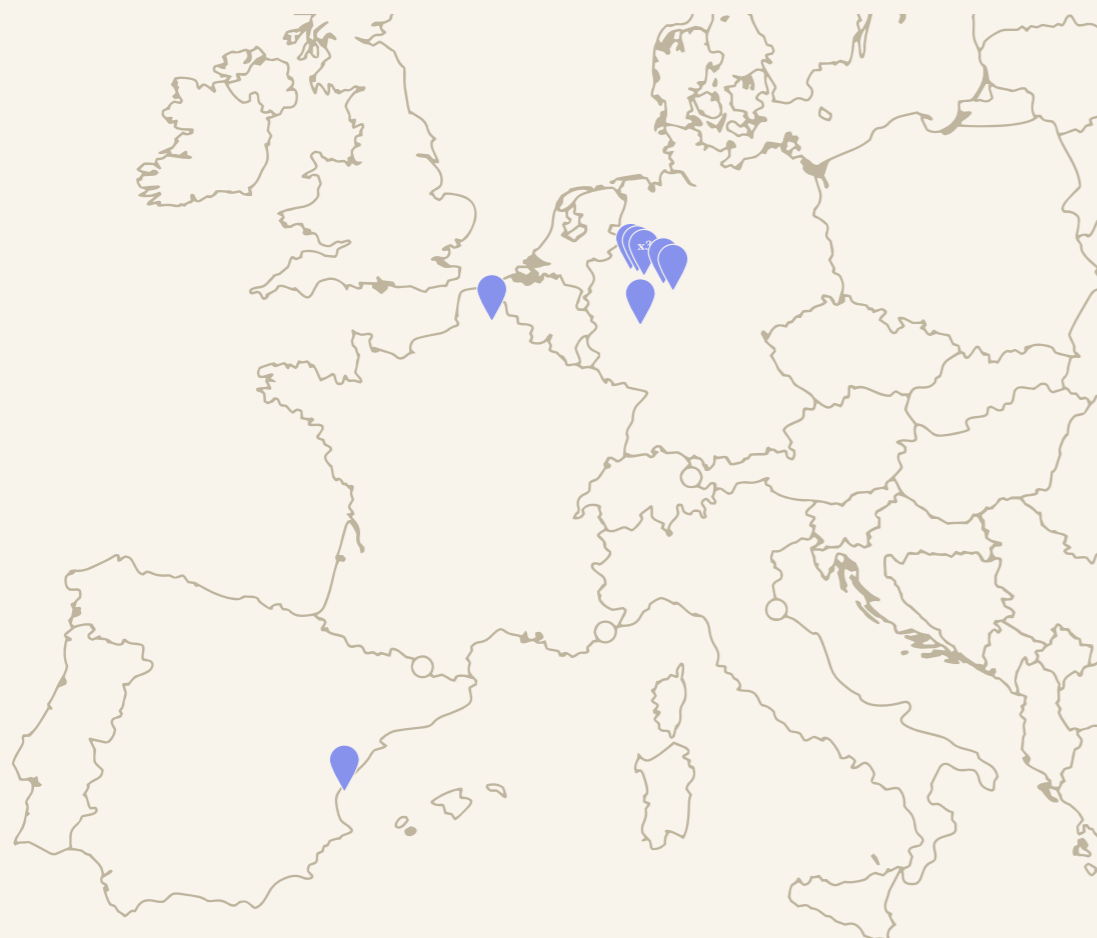
Last disclosed yearly revenue: €38.2 billion

Total value of free allowances received in 2022: €1.8 billion

Total accounts under the EU ETS: 7

Verified emissions in 2022: 23,812,524 t/CO₂

Decarbonisation: ThyssenKrupp [aims](#) to become climate neutral by 2050 at the latest and sets itself a 30% reduction target for scope 1 and scope 2 emissions by



Voestalpine

Voestalpine is a global steel and technology group with an Austrian, European, and international presence. The company specialises in steel and technology products, in industries such as automotive, railway systems, and aerospace. The company is headquartered in Linz, Austria.

Last disclosed yearly revenue: €17 billion

Total value of free allowances received in 2022: €795 million

Total accounts under the EU ETS: 9

Verified emissions in 2022: 12,336,293 t/CO₂

Decarbonisation: Voestalpine started a [campaign](#) with the goal of reducing production carbon emissions to 0% by 2035.

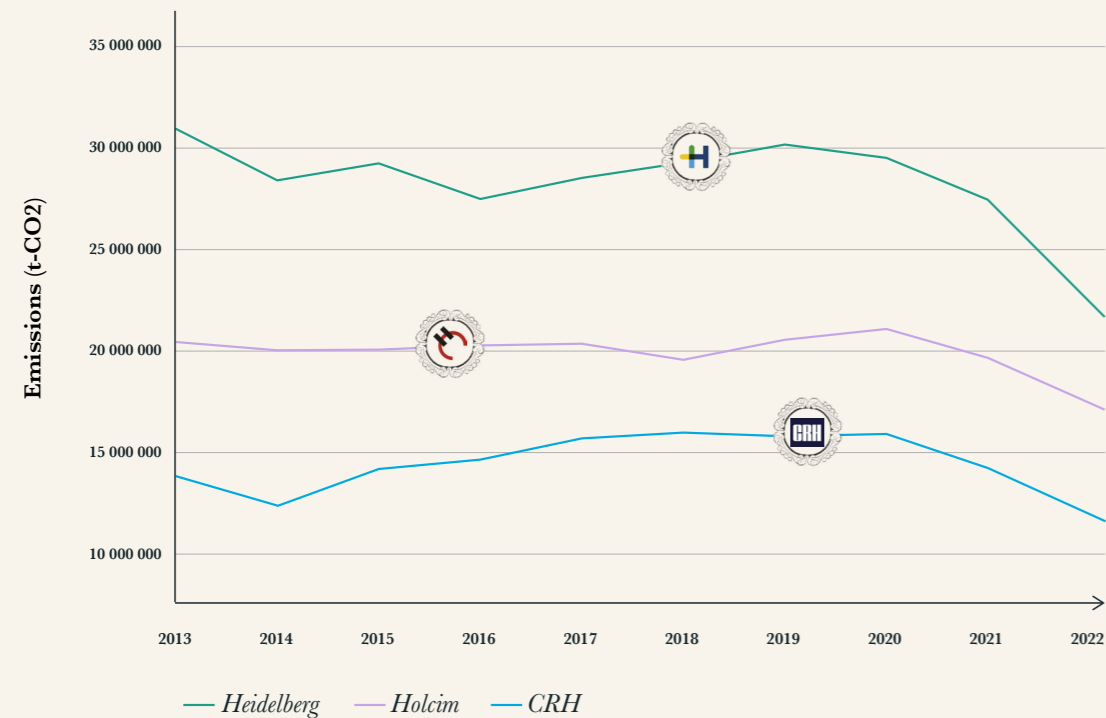


3.2. Cement

Cement is one of the most manufactured materials in the world. In Europe, cement is primarily used in the construction of buildings (50%), infrastructures (30%) and for various forms of maintenance and repair work across these two categories (20%). Cement is used in construction to bind other materials together, and is mixed with sand, gravel and water to produce concrete.

The production of clinker, which acts as the binder, is crucial to make “standard” cement (commonly referred to as Portland cement). Limestone is “calcinated” at high temperatures in a cement kiln to produce lime, leading to the release of waste CO₂. Around 90% of CO₂ emissions from cement manufacturing result from the production of clinker.

The EU cement industry has made glacial progress towards reducing its emissions. This is partly due to the fact that the sector has relied greatly on measures to boost energy efficiency and to switch fuels which does nothing to tackle the pollution from the chemical process of limestone calcination in the clinker kiln. Reducing these stubborn emissions will require enhanced circularity and material efficiency, as well as the roll-out of some emerging technologies that would reduce the clinker-to-cement ratio.



Decarbonisation trajectory
for the companies

Heidelberg Materials AG

Heidelberg Materials AG, together with its subsidiaries, produces and distributes cement, aggregates, ready-mixed concrete, and asphalt worldwide. Heidelberg Materials AG was founded in 1873 and is headquartered in Heidelberg, Germany.

Last disclosed yearly revenue: €19.5 billion

Total value of free allowances received in 2022: €1.9 billion

Total accounts under the EU ETS: 18

Verified emissions in 2022: 22,683,896 t/CO₂

Decarbonisation: Heidelberg aims to achieve net zero emissions for all products by 2050.



Larnaka, Cyprus

Holcim

Holcim Ltd, together with its subsidiaries, operates as a building materials company worldwide: it produces cement, clinker, and other cementitious materials. The company also engages in retail activities, and was formerly known as LafargeHolcim Ltd, changing its name to Holcim Ltd in May 2021. Holcim Ltd was founded in 1833 and is headquartered in Zug, Switzerland.

Last disclosed yearly revenue: €27 billion

Total value of free allowances received in 2022: €1.4 billion

Total accounts under the EU ETS: 17

Verified emissions in 2022: 17,563,300 t/CO₂

Decarbonisation: Holcim aims to be net-zero by 2050 on all scope emissions and to cut scope 1 emissions by 22.4% by 2030. [Holcim climate goals](#) have been validated by the Science Based Targets initiative (SBTi).



CRH

CRH plc, through its subsidiaries, manufactures and distributes building materials (such as cement, lime and aggregates) in Ireland and internationally. Furthermore, it provides building and civil engineering contracting, operates logistics, as well as sells and distributes cement. CRH plc was founded in 1936 and is headquartered in Dublin, Ireland.

Last disclosed yearly revenue: €30.4 billion

Total value of free allowances received in 2022: €807 million

Total accounts under the EU ETS: 10

Verified emissions in 2022: 12,298,590 t/CO₂

Decarbonisation: CRH has expressed the [ambition](#) of achieving carbon-neutral production by 2050.



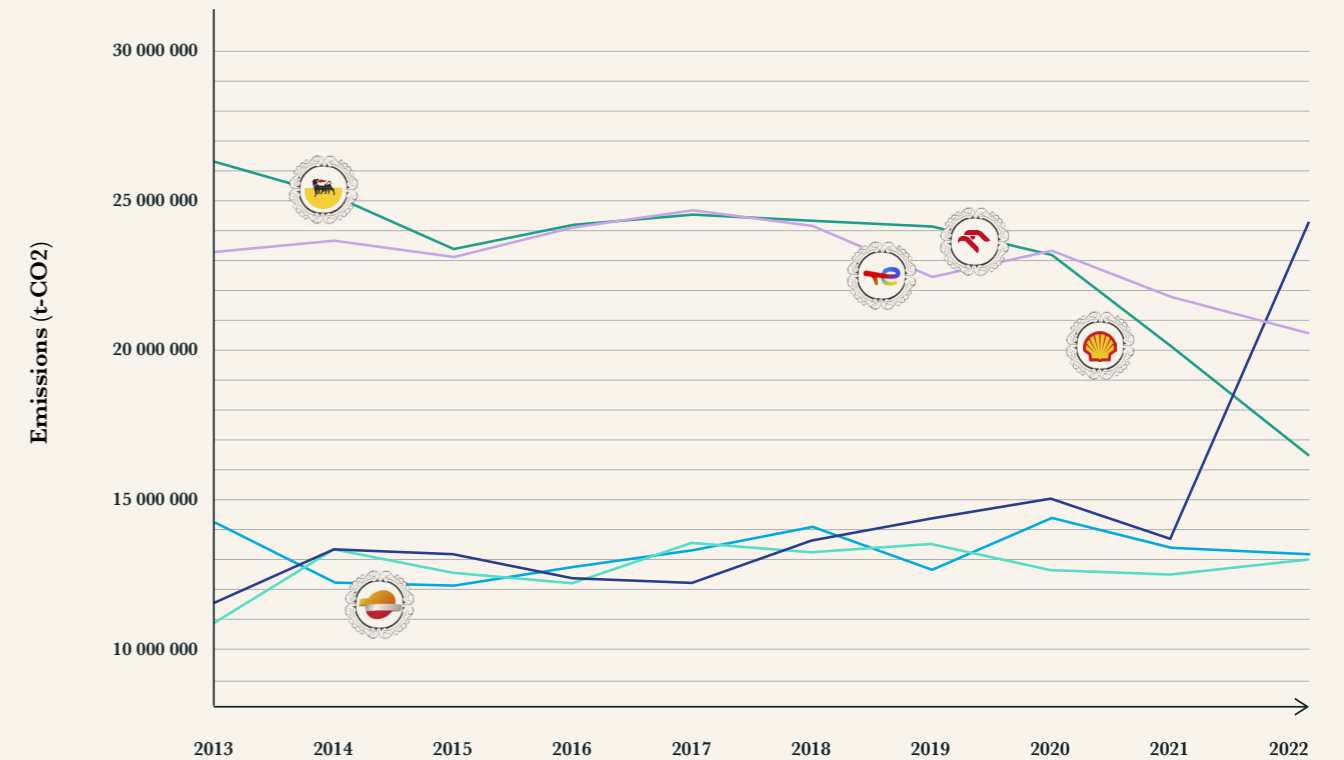
3.3. Refineries and petrochemicals

The oil refinement and petrochemical industry is responsible for processing crude oil and fossil gas into a wide range of products such as transportation fuels, chemicals, and plastics. It relies on inherently carbon-intensive processes and long investment life cycles. The need for fossil fuel inputs, the necessary chemical transformations, and the antiquated infrastructure and technologies make it difficult to achieve substantial emissions reductions without significant technological advancements. Meanwhile, the industry is reluctant to rapidly transition, especially when no stringent regulatory requirements are in place.

Petrochemical companies are most typically 'vertically integrated' within the energy supply chain, meaning they deal with all stages of energy production starting from exploration, extraction, refinement, cracking, and polymerisation. The companies included in this report are those mostly involved in oil refinement and petrochemical production, but their portfolios are often quite diverse and overlap different business types. The inverse is true for power production companies (not listed here) that also diverge into oil extraction and refinement (like ENI). For the purpose of this report, the companies have been categorised based on the sector where most of their EU ETS emissions are.



Not everything in the petrochemicals supply chain is covered by the EU ETS. While the refinement of crude oil and the production of bulk chemicals are covered, the majority of the sector's emissions (between 50 and 80 Mt/CO₂) per year occur during the production of goods and waste incineration stages - which do not fall under the scope of the EU ETS.



— ENI — Total Energies — Repsol — Orlen (before Polski Koncern) — Shell

No reliable data available for ExxonMobil

Decarbonisation trajectory
for the companies

TotalEnergies



TotalEnergies, a multi-energy company, produces and markets fuels, gas, and electricity in France and internationally. Among its several business branches, the refining and chemicals division provides refining, petrochemicals, and specialty chemicals; and supply and trading of oil, and marine shipping services. TotalEnergies SE was formerly known as TOTAL SE and changed its name to TotalEnergies SE in June 2021. The company was founded in 1924 and is headquartered in Courbevoie, France.

Last disclosed yearly revenue: €263 billion
Total value of free allowances received in 2022: €809 million
Total accounts under the EU ETS: 22
Verified emissions in 2022: 20,847,715 t/CO₂
Decarbonisation: TotalEnergies aims to achieve [net zero](#) for all scopes' of emissions by 2050.

ENI



Eni S.p.A. is an integrated energy company active worldwide. It engages in exploration, development, extracting and processing of crude oil and gas, oil-based fuels, chemical and petrochemical products, and gas-fired power, as well as hydrogen production. The company was founded in 1953 and is headquartered in Rome, Italy.

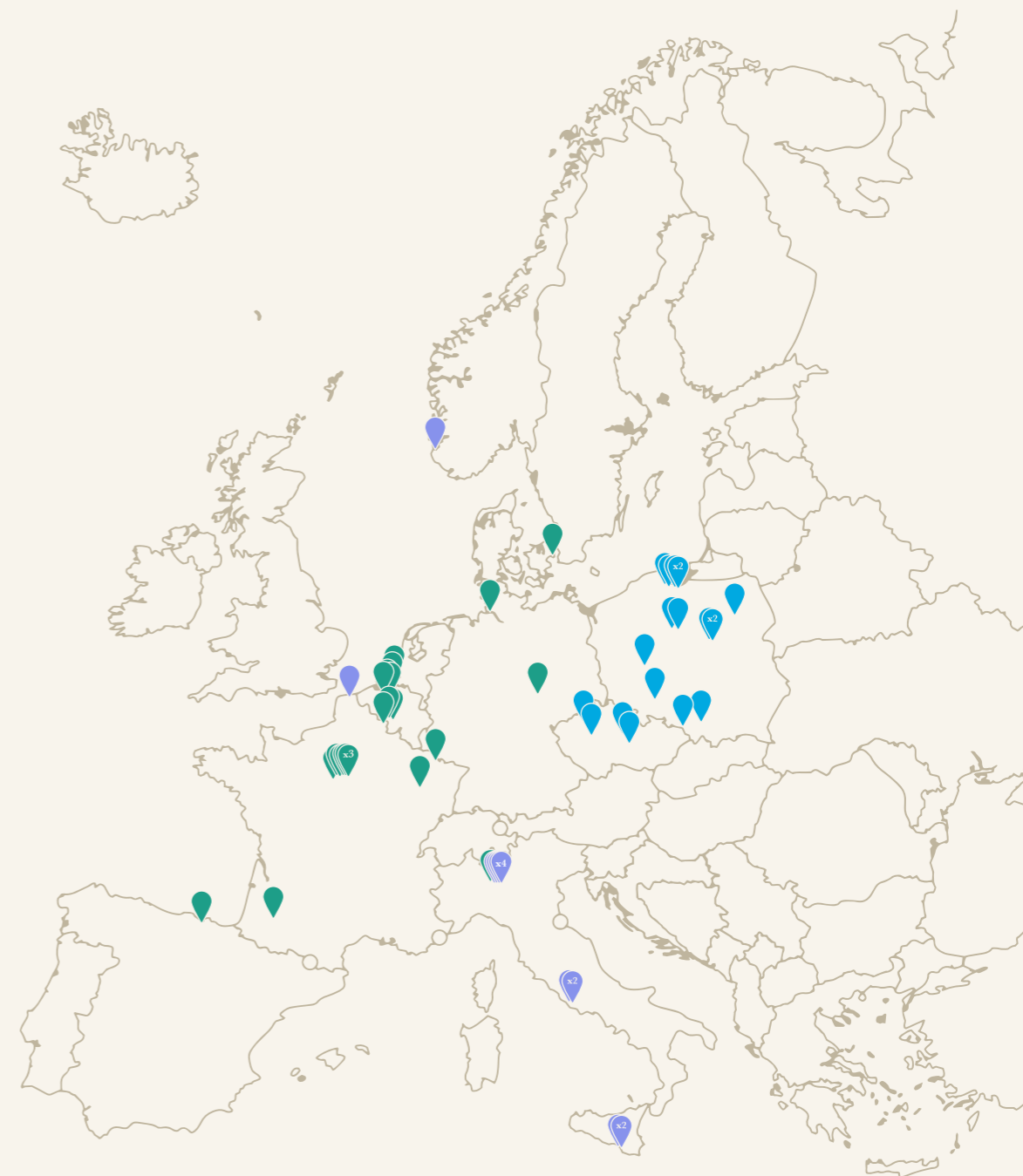
Last disclosed yearly revenue: €123 billion
Total value of free allowances received in 2022: €415 million
Total accounts under the EU ETS: 10
Verified emissions in 2022: 16,660,500 t/CO₂
Decarbonisation: Eni's goal is to achieve [net zero](#) by 2050 and it aims to shave 35% of all scopes of GHG emissions by 2030.

Orlen



Orlen S.A. operates in refining, petrochemical, energy, retail, and upstream activities, with operations in Poland and beyond. The company was founded in 1999 and is headquartered in Plock, Poland.

Last disclosed yearly revenue: €61.8 billion
Total value of free allowances received in 2022: €730.5 million
Total accounts under the EU ETS: 16
Verified emissions in 2022: 24,433,632 t/CO₂
Decarbonisation: Orlen has the goal of [overall carbon neutrality](#) by 2050 and aims to cut 25% of its CO₂ emissions related to refineries and petrochemicals by 2030.



Repsol

Repsol, S.A. operates as an integrated energy company worldwide. Within the company's wide portfolio, its upstream segment engages in the extraction of crude oil and natural gas, while the company's industrial section is involved in refining activities and the petrochemicals business. The company was formerly known as Repsol YPF, S.A. and changed its name to Repsol, S.A. in May 2012. Repsol, S.A. was founded in 1927 and is headquartered in Madrid, Spain.

Last disclosed yearly revenue: €69 billion
Total value of free allowances received in 2022: €608 million
Total accounts under the EU ETS: 6
Verified emissions in 2022: 13,145,463 t/CO₂
Decarbonisation: Repsol aims to achieve **net zero** by 2050 with intermediate targets for 2025, 2030, and 2040.

Exxon Mobil

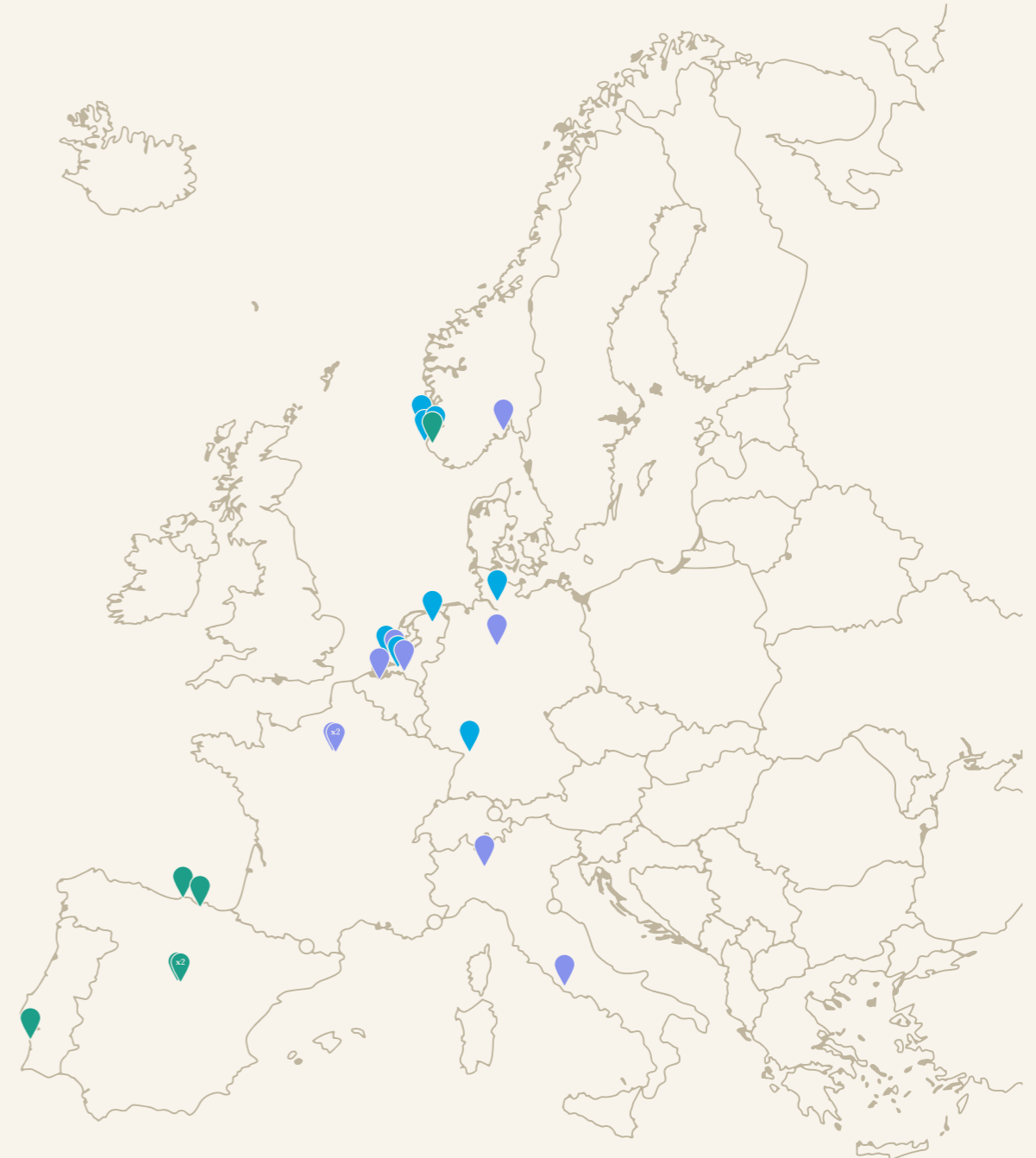
Exxon Mobil Corporation operates in the United States and internationally. The company is involved in the extraction and trade of crude oil, natural gas, petroleum products, petrochemicals, and other specialty products. ExxonMobil (originally known as Standard Oil, which was broken up into 43 different entities in 1911) was founded in 1870 and is headquartered in Irving, Texas.

Last disclosed yearly revenue: €370 billion
Total value of free allowances received in 2022: €606 million
Total accounts under the EU ETS: 9
Verified emissions in 2022: 10,019,303 t/CO₂
Decarbonisation: Exxon Mobil aims to achieve **net zero** emissions by 2050 and to lower by about 20% its GHG intensity by 2030.

Shell

Shell plc operates as an energy and petrochemical company that is active worldwide. It is an integrated company involved in exploration, production, refining, and distribution of energy products, fuels, production of petrochemicals and chemicals for industrial use, not to mention electricity and hydrogen generation. The company was formerly known as Royal Dutch Shell plc and changed its name to Shell plc in January 2022. Shell plc was founded in 1907 and is headquartered in London, the United Kingdom.

Last disclosed yearly revenue: €355 billion
Total value of free allowances received in 2022: €753 million
Total accounts under the EU ETS: 8
Verified emissions in 2022: 13,000,553 t/CO₂
Decarbonisation: Shell aims to become **net zero** by 2050 and to reduce its emissions by 41 million tonnes of CO₂ by 2030.



4 How do we make polluters pay and accelerate climate action?

As shown by our investigation, there's a pressing need for EU policymakers to bolster the effectiveness of the EU ETS, align it with climate goals, and ensure a fair and ambitious framework for emissions reduction. In order to achieve this, a mix of targeted policy improvements is required before and after 2030:

Reform the EU ETS to align it with the overall goal of achieving net-zero emissions in the EU by 2040

- Speed up the reduction of the emissions cap before 2030 and implement a higher 'linear reduction factor' that aligns with economy-wide climate neutrality by 2040
- Maintain the 24% withdrawal rate of surplus emission allowances going to the Market Stability Reserve (MSR), and permanently remove excess units in the MSR above 400 million allowances
- Phase out all free emission allowances and move towards a system of full auctioning by 2030, to ensure that polluters pay for their emissions
- Include all international aviation and shipping emissions in the EU ETS

Prevent free emission allowances from undermining industrial decarbonisation before 2030, by improving the benchmarking for free allocation

- Implement the «one product-one benchmark» approach for all sectors, to support zero emitting technologies and material circularity
- Continuously review and strengthen benchmarks to reflect technological advancements and best practices aligned with climate neutrality by 2040 - with no "fixed benchmark" exemptions

Ensure the EU ETS continues encouraging companies to decarbonise their own operations instead of allowing them to offset emissions

- Keep the expanded ETS for road transport and buildings separate from the existing ETS covering the power sector and industry. Combining them prematurely may compromise the functioning of the original ETS
- Keep carbon removals and land use sinks out of the ETS to ensure the necessary decarbonisation through the continued pressure of the carbon price signal on large emitters

Support effective climate policies and zero-carbon technologies through auctioning revenues

- Improve the definition of the policies and projects that can be financed using EU ETS revenues to ensure long-lasting climate benefits and prevent supporting activities that act as a backdoor for more fossil fuels
- Through the Innovation Fund, use EU ETS revenues to fund research into, the development of, and innovation in proven, scalable zero-carbon technologies that facilitate deep emissions reduction

Annex

Methodological note¹¹

The data for this report were aggregated based on the publicly available EU ETS transaction log data for 2022, following the methodology described in Millischer et al. (2023). Installations were first aggregated to account holders, which in turn were aggregated to owners using the ownership structure as represented in the ORBIS database. As opposed to the procedure in Millischer et al. (2023), all firms, whether publicly traded or not, were included in the dataset, and the highest firm in the controlling ownership tree that was neither a private person, a financial firm or a government entity was chosen as the ultimate «owner».

<https://www.sciencedirect.com/science/article/abs/pii/S0140988323001135?via%3Dihub>

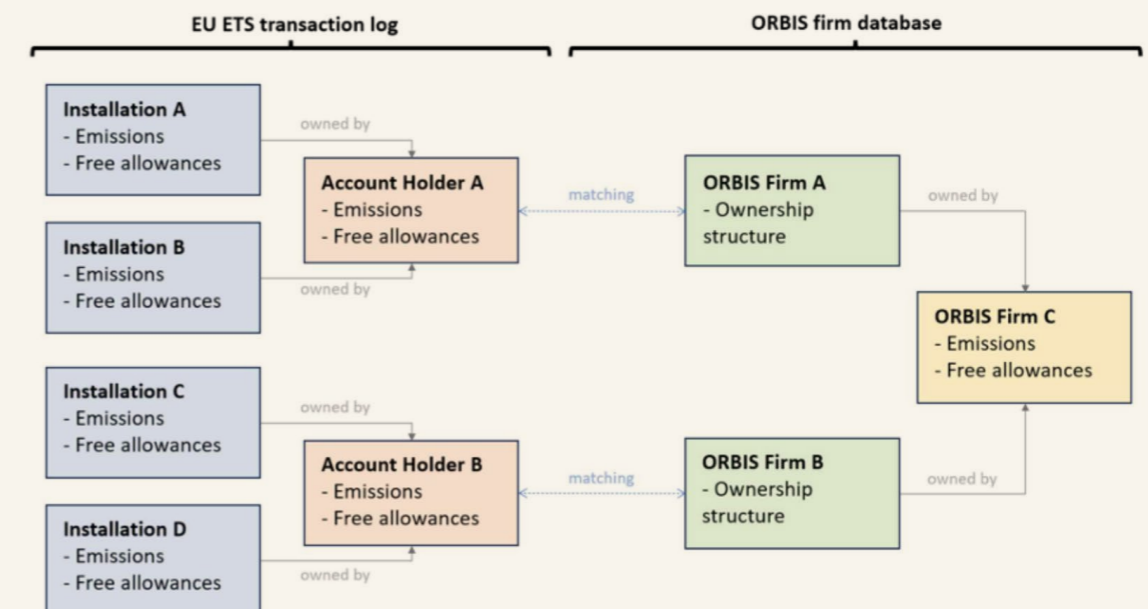


Figure 1. Aggregation methodology

¹¹ The full dataset and comprehensive methodological note are available to NGOs and think tanks upon written request.



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