Trends in the Emissions Trading System in the EU & Greece, 2005-2025

May 2026

LIFE Effect

The Green Tank

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The views expressed in this policy report are solely those of the authors and the LIFE Effect project partners.

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Summary

This report analyses the emission trends of the sectors covered by the Emissions Trading System (EU ETS), namely electricity & heat production, industry, aviation and shipping. The analysis covers the period 2005–2025 and all EU-27 Member States. It is based on the latest data published in April 2026 in the Union Registry and the European Environment Agency (EEA).

The main findings are summarized as follows:

EU

- The 27 EU Member States cumulatively emitted 1,137 million tonnes (Mt) of CO_2 in 2025 through their activities covered by the EU ETS; just 1.7% less than in 2024.
- Cumulative emissions from electricity & heat production and industry, the two sectors covered by the ETS since 2005, fell to 994.3 Mt in 2025, corresponding to a 51.7% reduction compared to 2005. This performance is significantly below the -62% target set by the EU ETS directive, while compared to 2024 emissions in these two sectors were cut by merely 1.6%.
- The best performers in these two sectors were Portugal (-70.3%) and Denmark (-70.2%), while the worst performers were Cyprus (-14.7%) and Austria (-29%).
- Emissions from the combustion sector were 571.8 Mt, down by just 0.87% compared to 2024. Germany and Poland were the top two emitters with 169.9 and 108.4 Mt, respectively.
- Despite their small contribution to electricity production in 2025 (9.2%), lignite & hard coal plants accounted for 46% of emissions from the combustion sector. German and Polish plants (with 107.2 and 87.9 Mt, respectively) were responsible for 74.1% of emissions from all lignite & hard coal combustion plants. At the installation level, the Polish Belchatow plant was by far the largest polluter, emitting 25.1 Mt, more than the entire combustion sector of France.
- Industrial emissions declined by 2.6% in 2025, falling to 422.5 $MtCO_2$. Among the four most emissions-intensive sectors, the chemical industry recorded the largest annual decrease (-5.5%), followed by reductions in the iron & steel (-3.8%) and the cement (-3.1%) sectors. The refining sector saw the smallest improvement, with emissions down by just 1.1%.
- The German steel industry with 24.2 Mt was the largest emitter of all industrial sectors in all EU-27 Member States; it also recorded the largest annual decrease (-2.8 Mt) due to reduced steel production.
- The upward trend in emissions in aviation stopped in 2025 as the sector's carbon footprint (60.1 Mt) remained at the same levels as in 2024. Ireland (13.4 Mt), Spain (9.1 Mt) and Germany (8.8 Mt) topped the list.
- Shipping emissions declined modestly, from 86 $MtCO_2$ in 2024 to 82.7 $MtCO_2$ in 2025. Greece recorded the highest shipping emissions at 15.4 $MtCO_2$, followed by Spain (12.3 $MtCO_2$) and Italy (11.3 $MtCO_2$).

Greece

- With a 62.7% reduction in cumulative emissions from combustion and industrial sectors in 2025 compared to 2005, Greece ranked 8th in the EU-27—two places lower than the previous year. Compared to 2024, emissions declined by a further 1.8%.
- Despite further reductions in lignite use, emissions from the combustion sector increased in 2025, reaching 15.9 $MtCO_2$, driven by a significant rise in fossil gas consumption. Gas-fired power plants accounted for 8.8 $MtCO_2$, representing 55% of total combustion emissions.
- A notable 5% decline in industrial emissions between 2024 and 2025 brought total emissions from all installations covered by the EU ETS in Greece down to 11.6 $MtCO_2$—nearly twice the EU's average drop (-2.6%).
- The cement industry recorded the strongest improvement, cutting its carbon footprint by 9.2%—partly reflecting lower cement production in 2025—bringing emissions to below 4 $MtCO_2$ for the first time. The refining sector also achieved a 4.6% annual reduction, with emissions falling to 5.8 $MtCO_2$, despite industrial output remaining broadly the same compared to 2024.
- In addition to ranking first in the EU-27, Greece's shipping emissions—15.6 $MtCO_2$ in 2024 and 15.4 $MtCO_2$ in 2025—are comparable to those of the entire combustion sector.
- The most polluting installation in 2025 was once again the Agios Dimitrios lignite-fired power plant. It was followed by three oil refining units, while the country's newest fossil gas plant, Agios Nikolaos Power Plant, ranked fifth.

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Introduction

In 2023, the latest revision of the EU Emissions Trading System (ETS) Directive was finalized[1], introducing several key reforms. These include: (a) enhanced climate ambition, with a target to reduce emissions by 62% by 2030 compared to 2005 levels; (b) the gradual phase-out of free emission allowances for industry between 2026 and 2034, aimed at incentivizing investment in industrial decarbonization; (c) the inclusion of part of maritime emissions in the ETS from 2024; and (d) the creation of a distinct emissions trading system, ETS2, covering buildings and road transport from 2027, to address persistently high emissions in these sectors.

However, international developments over the past two years have led political groups across the European Union and several national governments to increasingly question the EU Emissions Trading System and the decisions agreed in 2023 following extensive negotiations among EU policymakers.

The first sign of backtracking was the one-year postponement of ETS2. At the same time, negotiations are advancing rapidly on revising the Market Stability Reserve for the new system (MSR2). The proposal[2] under discussion is expected to weaken MSR2, potentially allowing up to 600 Mt of extra CO_2 emissions from the two sectors covered by ETS2, while also reducing Member State revenues due to lower carbon prices.

In parallel, Germany is pushing to slow the phase-out of free allowances for industry and extend their use beyond 2034[3]. Italy has also called for a suspension of the ETS, arguing that its impact on electricity prices and the cost of emission allowances undermines industrial competitiveness[4]. In response to these pressures, the European Commission submitted a proposal on 1 April 2026 to weaken the current rules governing the Market Stability Reserve (MSR1), a core structural element of the ETS[5].

In addition, shipping companies are advocating for greater "flexibilities" in the implementation of the EU ETS, particularly its alignment with the yet-to-be-agreed carbon pricing framework under the International Maritime Organization's Net Zero Framework (NZF)[6]. However, as the United States and Saudi Arabia strongly oppose the NZF and are exerting pressure on other countries to follow suit, the future of global carbon pricing through the IMO remains highly uncertain.

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[1] Directive (EU) 2023/959 of the European Parliament and of the Council of 10 May 2023 amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union and Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading system, https://bit.ly/4ncVq0I

[2] European Commission, 27.11.2025, "Commission proposes targeted adjustments to the Market Stability Reserve Decision to support a smoother start for ETS2", https://bit.ly/4n2OVNO

[3] OSW, 02.2026, "Germany and the ETS: yes to softening, no to dismantling", https://bit.ly/4ejwWjY

[4] Euronews, 26.2.2026, "Italy calls for suspension of EU carbon market", https://bit.ly/4mZOy6B

[5] European Commission, 1.4.2026, "Proposal for a DECISION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Decision (EU) 2015/1814 as regards ceasing the invalidation of allowances in the market stability reserve", https://bit.ly/4t3TJDW

[6] Comments by the International Chamber of Shipping on the EU ETS revision, 14.4.2025, https://bit.ly/4tLBHYm

Against this complex political backdrop, and ahead of the European Commission's proposal to revise the ETS that is expected in July 2026[7], it is especially important to assess the actual performance of the economic sectors covered by the system across the EU.

This report analyses emission trends in all sectors currently covered by the ETS—namely electricity & heat production (combustion), industry, aviation, and shipping. It covers the period from the launch of the ETS in 2005 through 2025 across all EU-27 Member States. The analysis is based on the latest data published in April 2026 in the Union Registry[8] and by the European Environment Agency (EEA)[9], while applying the methodology and assumptions detailed in the annex.

[7] European Commission, 16.1.2026. "Revision of the EU emissions trading system", https://bit.ly/4ueF2yP
[8] Union Registry, https://bit.ly/3KzGxTC
[9] European Environmental Agency, https://bit.ly/3KwqO7R

Emissions in the European Union

In 2025, total emissions in the EU-27 from the four sectors covered by the EU ETS exceeded 1,137 $MtCO_2$, representing a 1.7% decrease compared to 2024. Just over half of these emissions (571.8 $MtCO_2$, or 50.3%) came from electricity & heat production (combustion), followed by industry at 422.5 $MtCO_2$ (37.2%), shipping at 82.7 $MtCO_2$ (7.3%), and aviation at 60.1 $MtCO_2$ (5.3%).

The ETS sectors at a glance

Combined emissions from electricity and heat production and industry—the two sectors covered since the launch of the EU ETS in 2005—fell below 1 billion tonnes of CO_2 for the first time in 2025, reaching 994.3 $MtCO_2$. This corresponds to a 51.7% reduction compared to 2005 levels, well short of the 62% reduction target for 2030 set under the EU ETS Directive[1].

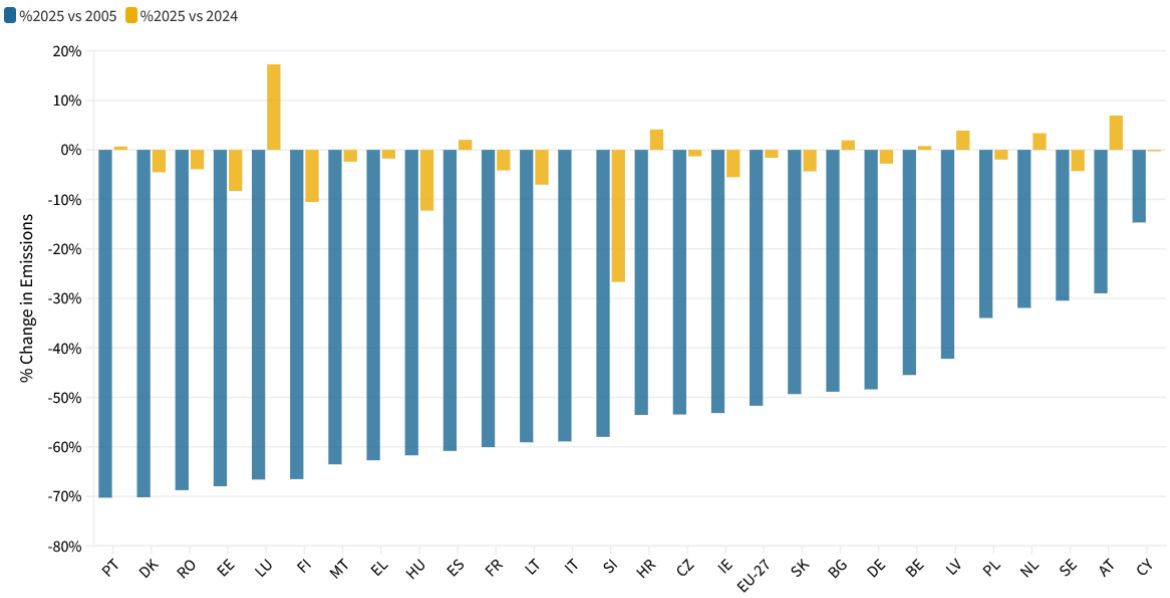
At Member State level (**Figure 1**), the strongest cumulative reductions since 2005 were achieved by Portugal (-70.3%), Denmark (-70.2%), and Romania (-68.8%), while the smallest reductions were observed in Cyprus (-14.7%), Austria (-29%), and Sweden (-30.5%).

However, climate progress slowed in 2025, with emissions in the two main ETS sectors declining by only 1.6% compared to 2024—the weakest performance of Phase 4 and well below the average annual reduction of 8.3% recorded between 2021 and 2024. At Member State level, 18 countries reduced emissions in these sectors, while 9 recorded increases.

The largest reductions relative to 2024 were observed in Slovenia (-26.7%), Hungary (-12.3%), and Finland (-10.5%), whereas the strongest increases came from Luxembourg (+17.3%), Austria (+6.9%), and Croatia (+4.1%).

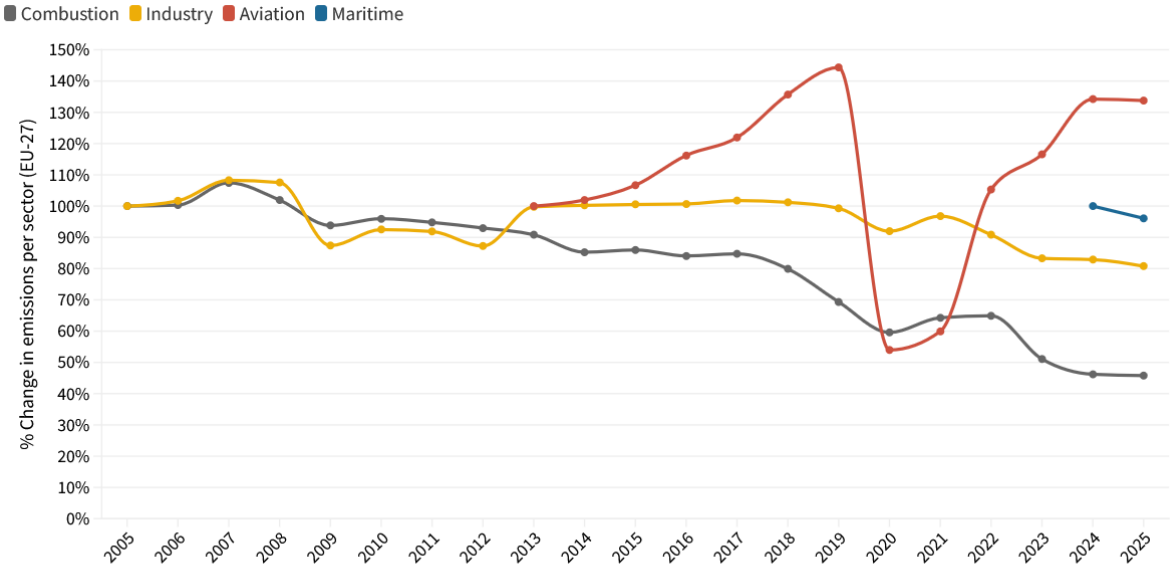
For the newer sectors, aviation within the European Economic Area emitted 60.1 $MtCO_2$ in 2025, remaining broadly stable compared to 2024 (60.3 $MtCO_2$). By contrast, the shipping sector showed a modest decline of 3.9%, from 86 $MtCO_2$ in 2024 to 82.7 $MtCO_2$ in 2025 (**Figure 2**)[10].

[10] The EEA's estimates of emissions from these two sectors in 2025 contain the greatest uncertainty compared to the combustion and industry sectors, as the relevant file of the Union Registry is missing the records of many aviation and shipping companies. Specifically, of the 342 aviation companies that had recorded emissions in 2024, 156 did not declare their emissions in 2025. In the shipping sector, the number of companies that do not have records for 2025 in the Union Registry files reaches 1626 out of a total of 3130 companies that declared emissions in 2024.



Sources: EEA, Union Registry, own calculations

***Figure 1**: Change in emissions for each EU Member State in 2025 compared to 2005 and 2024 in the two largest sectors (combustion and industry) covered by the EU ETS since its launch in 2005.*



Sources: EEA, Union Registry, own calculations
Combustion & Industry: 100% = 2005, Aviation: 100% = 2013, Shipping: 100% = 2024

***Figure 2:** Normalized emissions of the EU-27 compared to 2005 for the electricity & heat production and industry sectors; compared to 2013 for aviation and compared to 2024 for shipping.*

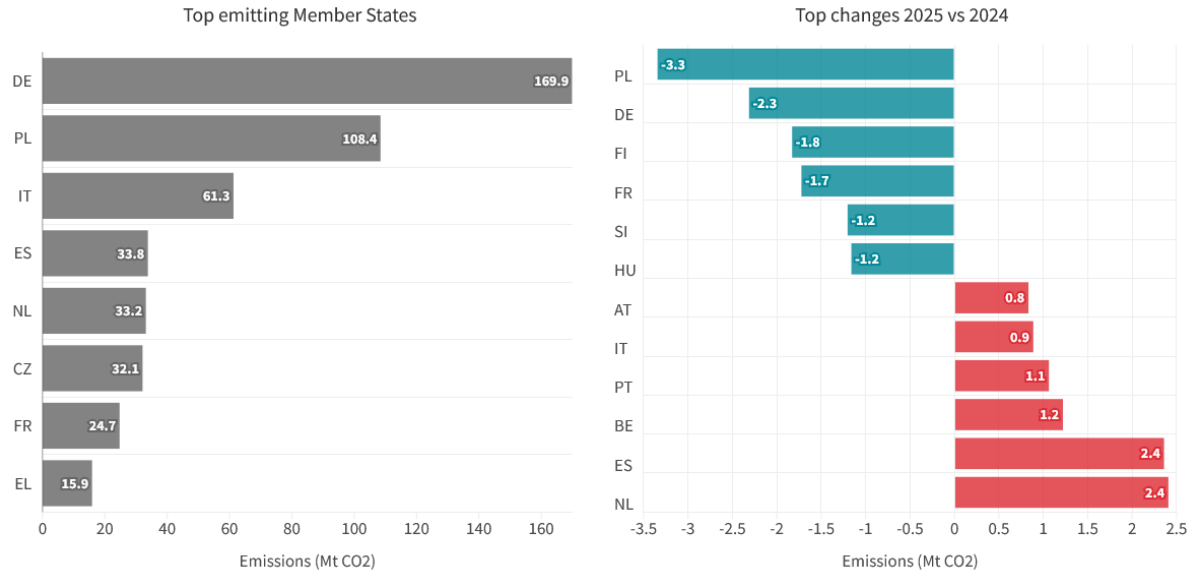
Evolution of Emissions by Sector

Combustion

Emissions from the largest ETS sector—covering all fossil fuel combustion installations for electricity & heat production in the EU-27—declined by just 0.87% in 2025 compared to 2024, equivalent to a reduction of around 5 $MtCO_2$.

As shown in **Figure 3**, Germany remained the largest emitter in this sector in 2025, with nearly 170 $MtCO_2$, followed by Poland (108.4 $MtCO_2$) and Italy (61.3 $MtCO_2$). Far below the top 3, Spain, the Netherlands, and Czech Republic recorded 33.8, 33.2, and 32.1 $MtCO_2$ respectively.

Compared to 2024, 17 Member States reduced emissions in this sector, while 10 recorded increases. The largest absolute reductions were achieved by Poland (–3.3 $MtCO_2$) and Germany (–2.3 $MtCO_2$), whereas the most significant increases were observed in the Netherlands (+2.4 $MtCO_2$) and Spain (+2.4 $MtCO_2$).



Sources: EEA, Union Registry, own calculations

Figure 3: *EU-27 Member States with the highest emissions (left) and the largest annual changes (right) in the combustion sector in 2025.*

Lignite & hard coal account for 46% of combustion emissions in the EU-27

In the context of the recent gas price crisis, several countries—most notably Italy—have begun considering the temporary reactivation of the more polluting lignite and hard coal plants, citing concerns over energy security and exposure to high gas prices[11]. At the same time, the EU ETS is entering a new revision phase in the coming months, where the issue of carbon price containement is likely to play a central role in negotiations among policy makers. Against this backdrop, assessing the contribution of lignite and hard coal generation to total emissions from the combustion sector is particularly relevant for understanding progress toward EU climate objectives.

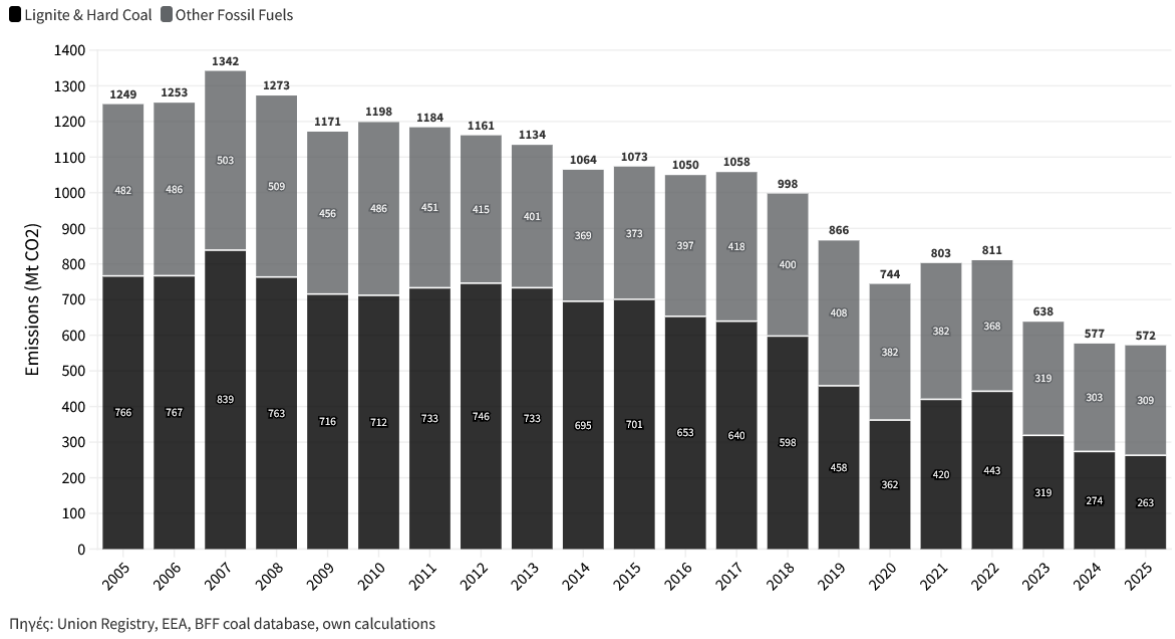
According to data from Ember, lignite and hard coal plants accounted for just 9.2% of electricity generation in the EU-27 in 2025, with their share below 5% in 19 Member States[12]. However,

[11] Reuters, March 31,2026. "Italy to postpone shutdown of coal-powered plants by 13 years", https://www.reuters.com/sustainability/climate-energy/italy-postpone-shutdown-coal-powered-plants-by-13-years-2026-03-31/

[12] Ember, January 2026, "European Electricity Review 2026", https://ember-energy.org/latest-insights/european-electricity-review-2026/

analysis of the Union Registry data shows that these same plants were responsible for a disproportionately large share of emissions—around 46% of total emissions from the combustion sector.

As shown in **Figure 4**, emissions from lignite and hard coal plants peaked at 838.8 $MtCO_2$ in 2007, when they represented 62.5% of the combustion sector's total carbon footprint. Their share fell below 50% for the first time in 2024, reaching 273.9 $MtCO_2$, and declined further in 2025 to 263.2 $MtCO_2$. Despite this continued downward trend, they still account for a substantial portion of overall emissions from the sector.



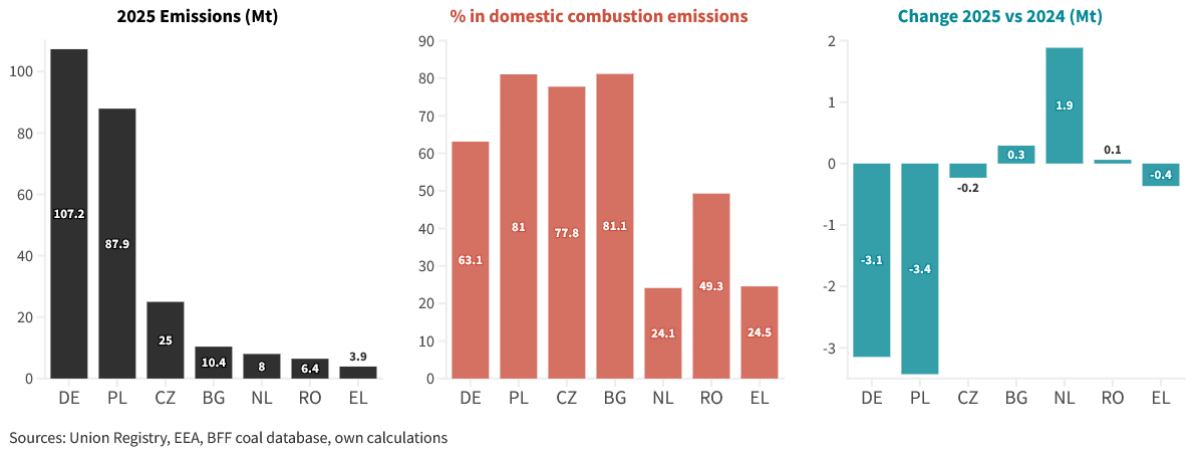
Πηγές: Union Registry, EEA, BFF coal database, own calculations

***Figure 4**: Time evolution of emissions from lignite & hard coal (black) plants and from other fossil fuel combustion plants in the EU-27.*

In terms of the distribution of emissions from lignite and hard coal plants across Member States (Figure 5), Germany remains the largest emitter, with 107.2 $MtCO_2$—accounting for 63.1% of its total combustion-sector emissions and 40.7% of all emissions from all lignite and coal plants in the EU-27. Poland follows with 87.9 $MtCO_2$, a level that represents an even higher dependency on coal, covering 81% of its combustion-sector emissions. Together, Germany and Poland account for nearly three-quarters (74.1%) of all emissions from lignite and hard coal plants in the EU-27. They are followed at a considerable distance by the Czech Republic (25 $MtCO_2$, 77.7% share in domestic combustion emissions), Bulgaria (10.4 $MtCO_2$, 81.1% share), and the Netherlands (8 $MtCO_2$, 24.1% share).

The case of the Netherlands is particularly noteworthy, as emissions from coal-fired plants increased by 1.9 $MtCO_2$ (+30.8%) compared to 2024. Smaller increases were also observed in Slovakia, Bulgaria, and Romania. The rise in coal use in the Netherlands is linked to a more than threefold increase in electricity exports compared to 2024, which could not be fully covered by higher generation from renewables and fossil gas. However, this export-driven increase in coal-fired generation came at a cost: the carbon footprint of electricity production rose by 2.4 $MtCO_2$

(+7.8%) compared to 2024, with the majority of this increase (1.9 $MtCO_2$) attributable specifically to higher coal use.



Sources: Union Registry, EEA, BFF coal database, own calculations

Figure 5: *The 7 EU-27 Member States with the highest emissions from lignite & hard coal plants in 2025. Left: Emissions (in MtCO2), Middle: Share of emissions from lignite & hard coal plants in total domestic emissions from the combustion sector, Right: Change in emissions from lignite & hard coal plants between 2024 and 2025 (in MtCO2).*

At installation level, the Belchatow power plant in Poland remains the largest emitter among lignite and hard coal plants. Although its emissions have declined significantly from the 2013 peak of 37.2 $MtCO_2$, it still emitted 25.1 $MtCO_2$ in 2025—more than the entire combustion-sector emissions of France. The top ten emitters also include seven plants in Germany: Boxberg (13.1 $MtCO_2$), Neurath (12.1 $MtCO_2$), Niederaussem (11.4 $MtCO_2$), Jänschwalde (9.6 $MtCO_2$), Schwarze Pumpe (8.7 $MtCO_2$), Weisweiler (8.3 $MtCO_2$), and Lippendorf (7.3 $MtCO_2$). They are complemented by two additional Polish facilities: Kozienice (11.8 $MtCO_2$) and Turów (7.8 $MtCO_2$).

Overall, these figures underline that achieving the EU ETS climate target of a 62% emissions reduction by 2030 compared to 2005 remains closely tied to the pace of coal phase-out across the EU. A partial return to lignite and hard coal use by even a limited number of countries could therefore jeopardise progress toward EU climate objectives, particularly given that 2025 emissions remain well below the required cuts (-51.7% vs. the 2030 target).

Industry

EU-27 emissions from industrial activities covered by the EU ETS—excluding combustion—declined by 11.2 $MtCO_2$ between 2024 and 2025, a reduction of 2.6%, slightly exceeding the rate of decrease observed in the combustion sector.

Among the four most emissions-intensive industrial sectors (refining, iron and steel, cement, and chemicals), the strongest annual reduction was recorded in the chemical industry (-5.5%), followed by declines in the steel industry (-3.8%) and the cement industry (-3.1%). The weakest improvement was observed in the refining sector, where emissions fell by just 1.1%.

The longer-term evolution of emissions in these sectors (**Figure 6**) shows a relatively slow pace of decarbonisation, with industrial emissions falling by less than 100 $MtCO_2$ (around 19%) between 2013 and 2025. This slow pace is largely linked to the continued allocation of free

allowances to energy-intensive industries under the EU ETS. While this policy was somewhat revised in the latest ETS reform, it has historically shielded industry from the full impact of rising carbon prices—particularly after 2018—thereby weakening incentives for investment in low-carbon industrial processes.

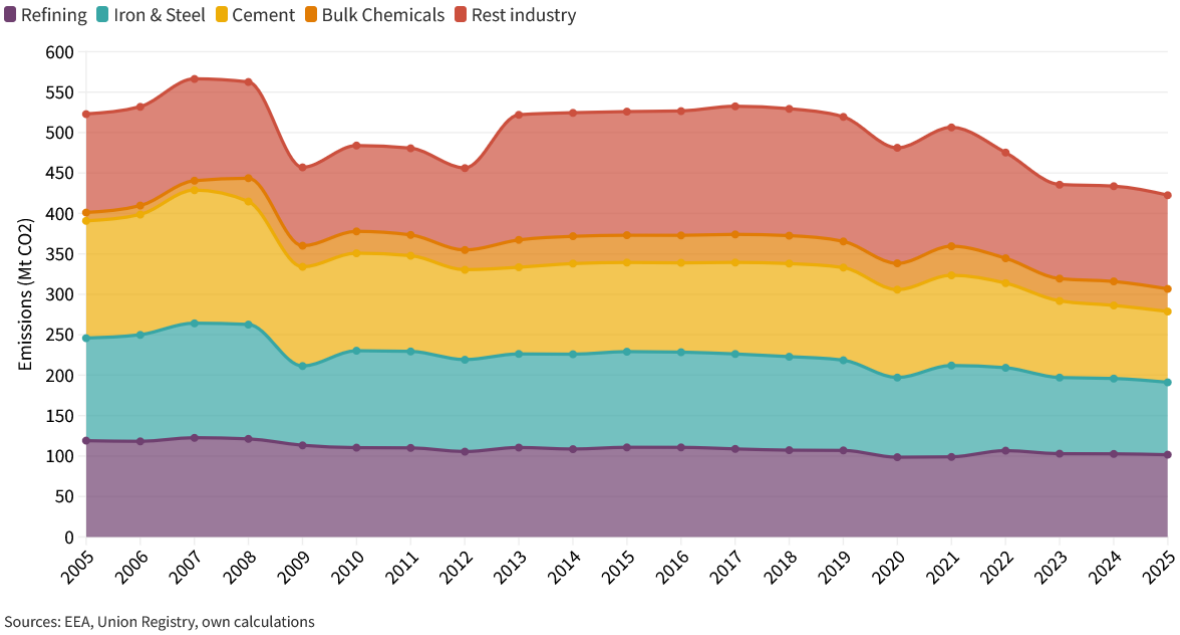


***Figure 6**: Time evolution of emissions from the four most polluting industrial sectors in the EU-27 (refineries, iron & steel, cement and chemicals) for the period 2005-2025.*

Figure 7 illustrates the distribution of emissions in 2025 across the four largest industrial sectors, which together account for 72.6% of total industrial emissions. Germany holds the leading position in three of these sectors: refining (19.7 $MtCO_2$), iron and steel production (24.2 $MtCO_2$), and cement (14.4 $MtCO_2$). In the chemical industry, Germany ranks second with 6.1 $MtCO_2$, narrowly behind Belgium, which leads with 6.2 $MtCO_2$.

The German steel sector was not only the largest industrial emitter in 2025 (24.7 $MtCO_2$) but also recorded the largest annual reduction, cutting emissions by 2.8 $MtCO_2$ (-10.3%) compared to 2024 (**Figure 8**). However, this decline was driven primarily by lower production levels rather than structural decarbonisation measures. According to the German Steel Federation, steel output fell by 9% year-on-year[13]. As shown in Figure 8, no other industrial sector in any Member State achieved emission reductions exceeding 1 $MtCO_2$. German refineries were the closest, achieving emission cuts of 0.9 $MtCO_2$ (-4.4%). By contrast, several sectors recorded increases, most notably in Poland, where refinery emissions rose by 0.54 $MtCO_2$ (+5.9%), and in the Austrian steel industry, which increased emissions by 0.44 $MtCO_2$ (+3.9%).

[13] Eurometal, 23.1.2026, "Germany sees another year of declining steel production", https://eurometal.net/germany-sees-another-year-of-declining-steel-production/

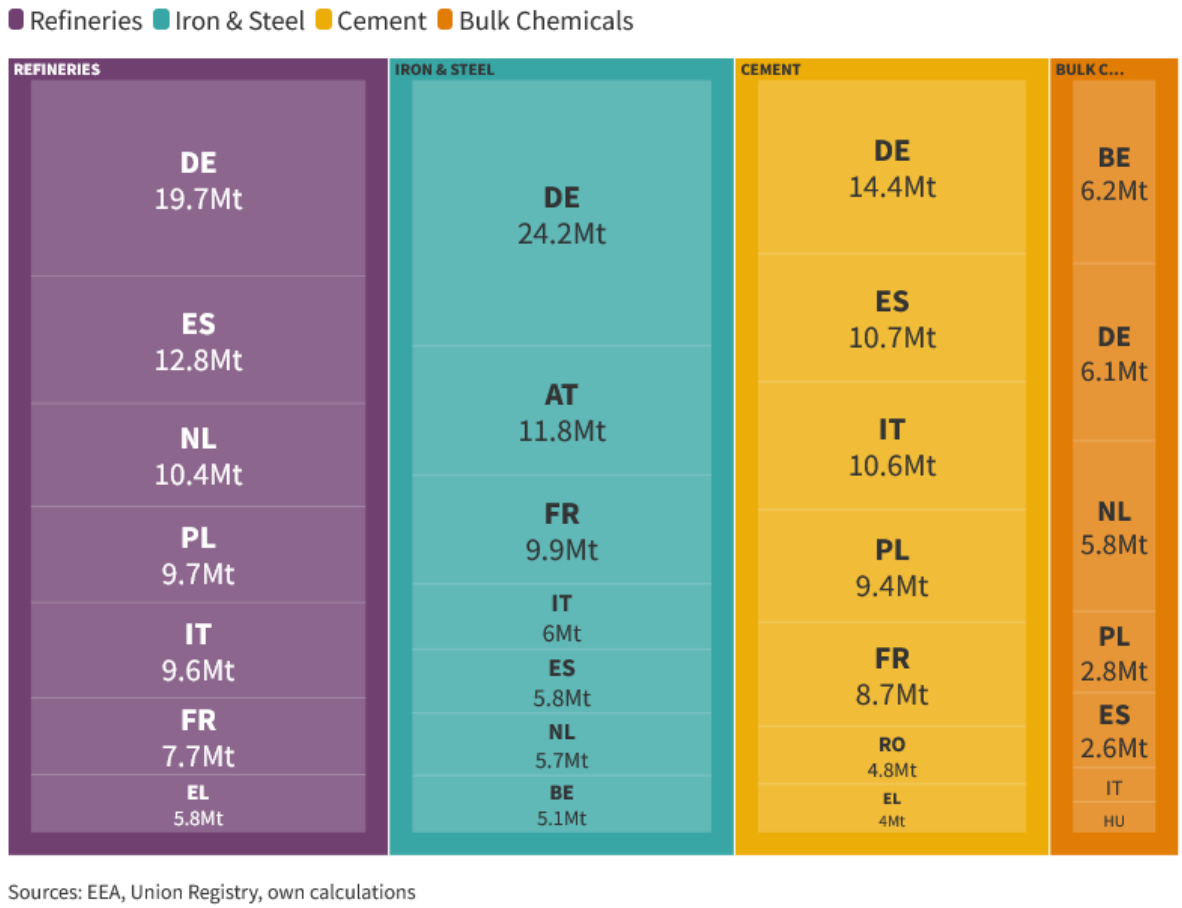


***Figure 7**: Emissions of the 7 EU-27 Member States with the highest emissions by industry sector (refineries, iron & steel, cement and chemicals) in 2025.*

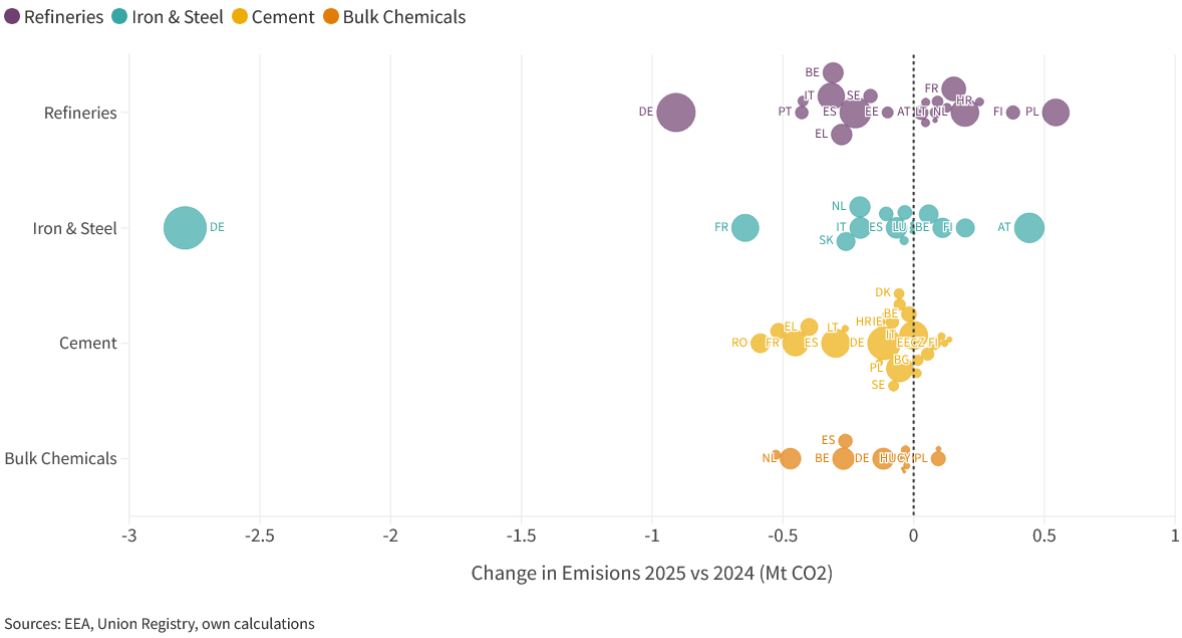
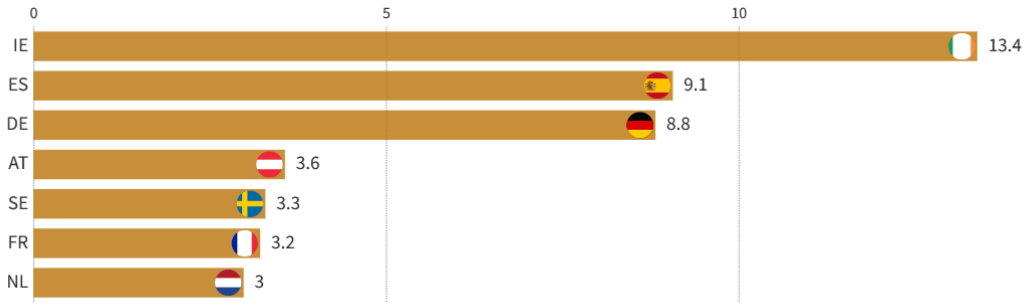


***Figure 8:** Changes between 2025 and 2024 in emissions in the four most polluting industries in the EU-27 (refineries, iron & steel, cement and chemicals). The size of each sphere is proportional to the emissions in 2025.*

Aviation

After four consecutive years of growth, in 2025 aviation emissions remained stagnant based on EEA estimates, which, however, in the aviation and shipping sectors contain significant uncertainties as many companies have not yet declared their emissions for 2025[10]. The ranking of the Member States with the most emissions in the aviation sector did not change compared to 2024. In absolute terms, the worst place in 2025 is held by Ireland (13.4 $MtCO_2$), while in second and third places are, respectively, Spain (9.1 $MtCO_2$) and Germany (8.8 $MtCO_2$). Austria (3.6 $MtCO_2$), Sweden (3.3 $MtCO_2$), France (3.2 $MtCO_2$) and the Netherlands (3 $MtCO_2$) complete the top7 list.

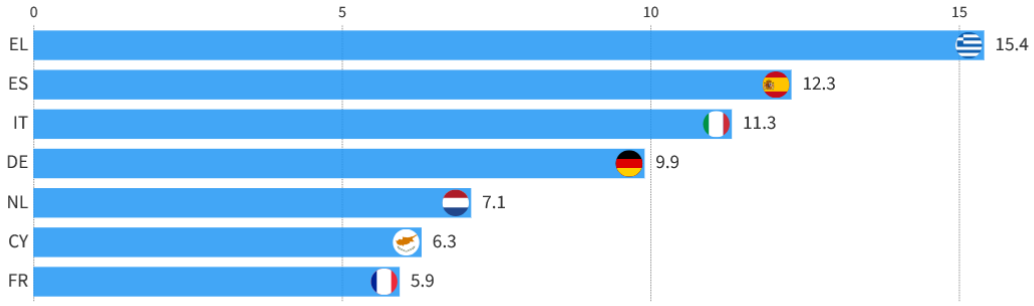


Source: EEA

Figure 9: *Top 7 EU Member States in aviation emissions in 2025.*

Shipping

Based on the EEA estimates and despite uncertainties[10], EU-27 shipping emissions covered by the ETS[14] decreased from 86 $MtCO_2$ in 2024 to 82.7 $MtCO_2$ in 2025 (or -3.9%). As Figure 10 shows, the top polluter is Greece, whose ships emitted 15.6 and 15.2 million tonnes in 2024 and 2025, respectively. These quantities are comparable to the total emissions of the Greek combustion sector, which includes all fossil-fuel-fired power plants (fossil gas, lignite and oil) which emitted 15.8 and 15.9 $MtCO_2$ in 2024 and 2025, respectively. Spain holds second place (12.3 $MtCO_2$), followed by Italy (11.3 $MtCO_2$), Germany (9.9 $MtCO_2$) and the Netherlands (7.1 $MtCO_2$), while Cyprus is in sixth place with 6.3 $MtCO_2$.



Source: EEA

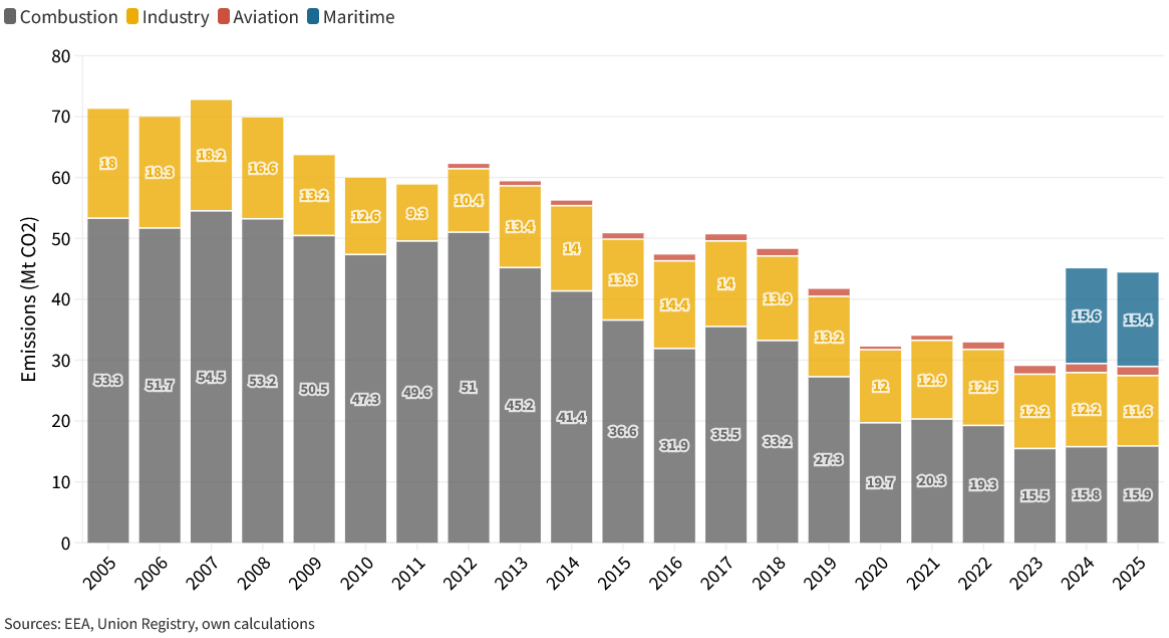
Figure 10: *Top 7 EU Member States in shipping emissions in 2025.*

[14] Shipping emissions covered by the ETS include only ships larger than 5000 GT. They cover 100% of the voyages of these ships between EU ports but only 50% of the voyages between EU ports and third countries.

Emissions in Greece

As shown in **Figure 11**, substantial progress has been achieved over the past two decades, with cumulative emissions from the combustion and industrial sectors in Greece falling from 73.6 $MtCO_2$ in 2005 to 27.5 $MtCO_2$ in 2025—a reduction of 62.7%. As a result, Greece ranks 8th in the EU-27. However, this position has declined by two places compared to 2024, reflecting the recent stagnation in the two most significant ETS sectors.

Overall progress in 2025 was limited, with total emissions declining by just 1.8%, driven entirely by reductions in industry, as emissions from the combustion sector increased from 15.8 to 15.9 $MtCO_2$. In aviation, the rapid growth observed in previous years has stabilised. Nevertheless, emissions in this sector remain significantly above the EU average when compared with 2013 levels (the sector's base year). Specifically, Greece emitted 1.5 $MtCO_2$ in 2025—more than twice the 2013 level of 0.7 $MtCO_2$—while the EU-27 average increase over the same period was 33.8%. In maritime emissions, Greece maintained its first place in the EU-27 in 2025 with 15.4 million tonnes, according to the estimate of the EEA.



Sources: EEA, Union Registry, own calculations

Figure 11: *Time evolution of emissions of the four ETS sectors in Greece during the period 2005-2025.*

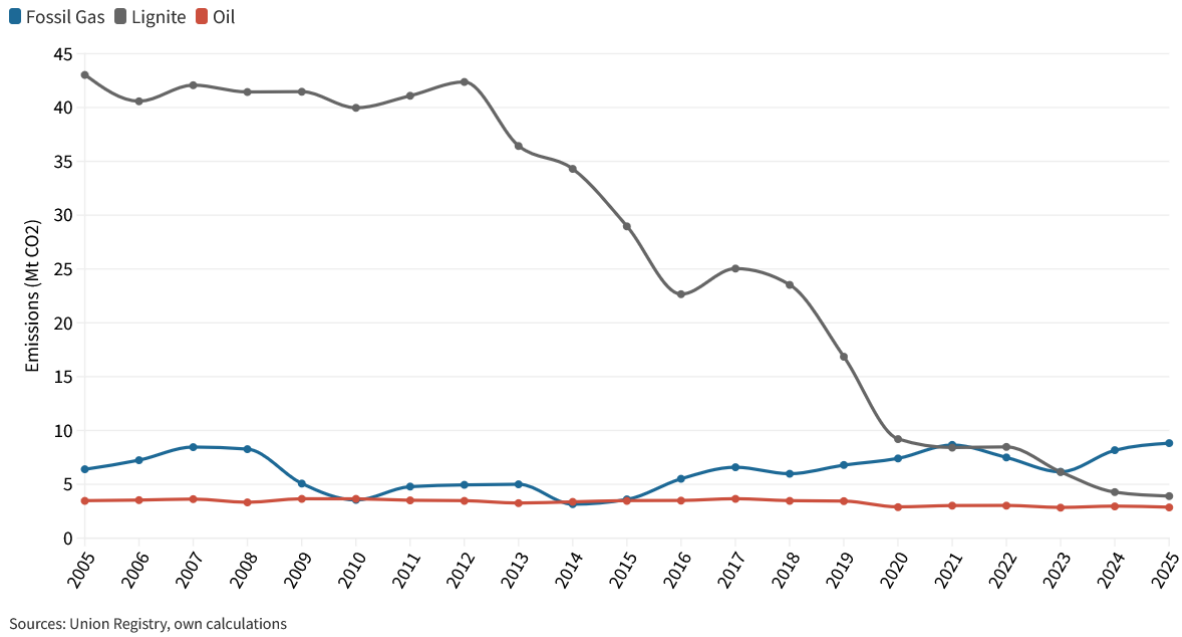
Combustion

Specifically, in the combustion sector, emissions in Greece declined from 53.3 $MtCO_2$ in 2005 to 15.9 $MtCO_2$ in 2025. This progress is primarily the result of the sharp reduction in lignite-based electricity generation. As shown in **Figure 12**, the downward trend began with the start of 3rd EU ETS phase in 2013, when lignite-fired plants became exposed to CO_2 pricing.

Over the past two decades, emissions from lignite plants have fallen by more than 10-fold: from 43 $MtCO_2$ in 2005 to just 3.9 $MtCO_2$ in 2025. However, overall progress in the combustion sector would have been stronger if lignite had been replaced more extensively by renewables rather than

fossil gas. The significant increase in gas use in 2025 resulted in emissions of 8.8 $MtCO_2$, accounting for 55% of total combustion-sector emissions in Greece.

In contrast, emissions from oil-fired plants on the islands have shown relatively limited change and low volatility. From 3.5 $MtCO_2$ in 2005, emissions peaked at just over 3.6 $MtCO_2$ in 2009 before declining slightly below 2.9 $MtCO_2$ in 2025. Further reductions are expected in the coming years as oil-fired plants in Crete are progressively decommissioned following the completion of the island's main interconnection. Additional interconnections are also expected to be completed by 2029, in line with the National Energy and Climate Plan, thus enabling further emission cuts.



Sources: Union Registry, own calculations

Figure 12: *Emissions from the electricity & heat production sector in Greece by fuel for the period 2005-2025.*

Industry

A 5% reduction in industrial emissions between 2024 and 2025 brought total emissions from all ETS-covered industrial facilities in Greece down to 11.6 $MtCO_2$ (Figure 13). This performance is almost twice as strong as the EU-27 average decline (-2.6%) and is primarily driven by improvements in the two largest industrial sectors—refining and cement production—which together account for over 81% of Greece's industrial carbon footprint over time (84.1% in 2025).

The cement industry recorded the strongest improvement, reducing emissions by 9.2% compared to 2024 and falling below 4 $MtCO_2$ for the first time. This decline was partly driven by a 5.6% annual reduction in cement production. However, cement output in 2025 remained higher than in 2021–2023—years in which emissions were higher than in 2025—suggesting that process-level improvements also contributed to decarbonisation. This performance places Greece's cement sector fourth in the EU-27 in terms of annual emissions reduction, behind Hungary (-17.2%), Portugal (-13.2%), and Romania (-10.8%), all of which have broadly comparable cement production scales.

The refining sector also achieved a solid improvement, with emissions falling by 4.6% to 5.8 $MtCO_2$ in 2025—the best performance of the last five years—despite industrial production remaining broadly stable compared to 2024, according to ELSTAT's Industrial Production Index.

By contrast, smaller industrial sectors moved in the opposite direction. Lime production increased emissions by 7.1%, while aluminium production rose by 1.6%. Taken together, other industrial activities (including ceramics, paper, fertilizers, and others) recorded a cumulative increase of 2.6% over the year.

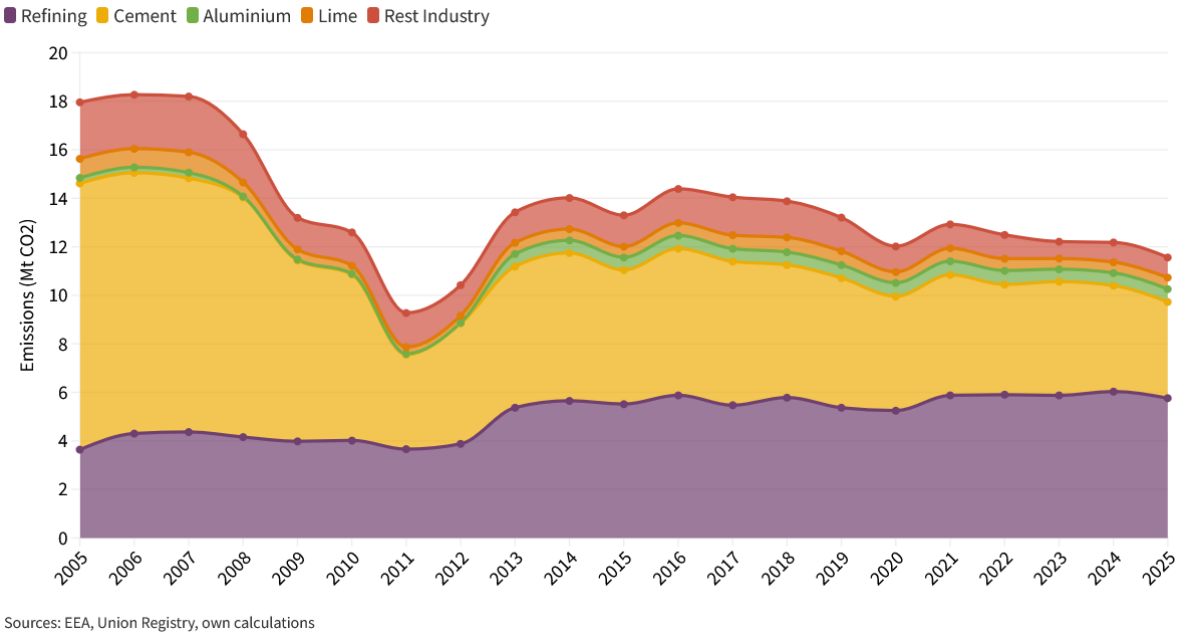


***Figure 13**: Emissions trends in Greece's industrial sectors over the 2005-2025 period.*

Top 10 polluters

The composition of the top ten most polluting installations and companies in Greece has changed dramatically since the launch of the EU ETS, as illustrated in **Figure 14**. In 2005, the ranking was overwhelmingly dominated by lignite-fired plants, which occupied the first six positions, as well as the tenth spot, while only one fossil gas plant (Lavrio) appeared in the top 10 (in seventh place). Two cement production facilities completed the list in the 8th and 9th spots.

Over time, absolute emissions from the largest polluters declined substantially. The Agios Dimitrios Power Station, which occupies the top spot throughout the lasty two decades, reduced its emissions output from 13.6 $MtCO_2$ in 2005 to 2.7 $MtCO_2$ in 2025. Moreover, by 2025, the structure of the top ten had shifted significantly. Positions 2—4 are now occupied by oil refineries, while fifth place is taken by the new fossil gas power plant in Agios Nikolaos, which was also Greece's largest electricity producer in 2025. Sixth place is occupied by a shipping company (Shanghai), followed by Aluminium Greece, the country's aluminium production facility in seventh place, and Aegean Airlines in eighth place. The ranking is completed by the lignite plant Ptolemaida 5 and the older gas-fired plant Lavrio, which displaced the more modern PPC gas plant (Megalopoli 5) from the top ten. Notably, all cement production units have also exited the top ten entirely—a situation that has not been observed since 2011.

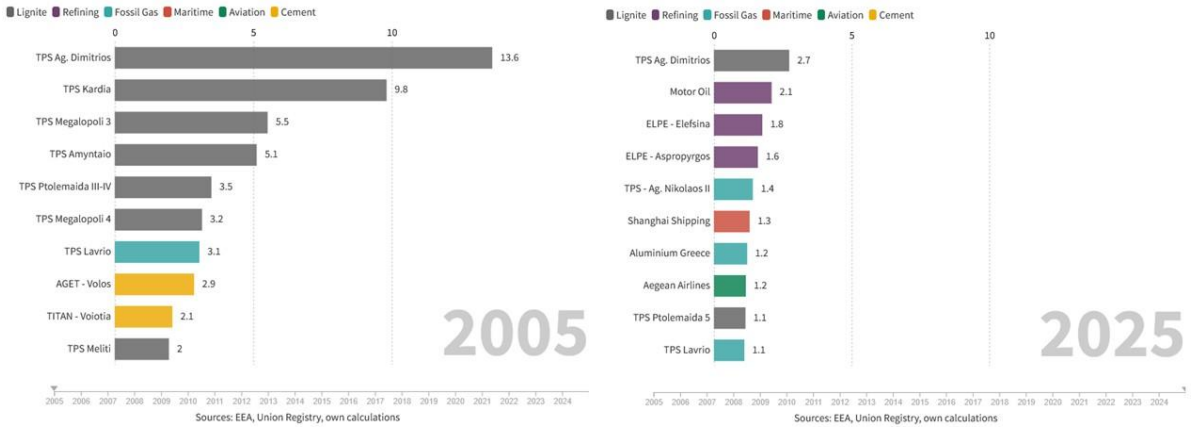


***Figure 14**: Top 10 emitting installations or companies in 2005 (left) and 2025 (right).*

Conclusions

The climate crisis represents an existential threat to both human societies and biodiversity, with particularly severe economic consequences. A recent analysis by the European Environment Agency (EEA) found that extreme weather and climate-related events between 2021 and 2024 alone, caused €208 billion in damages to assets, while warning that further intensification of such events will significantly increase future economic losses[15].

It is therefore evident that climate action is not a policy option that can be suspended during periods of geopolitical instability or economic stress. On the contrary, a major driver of the recent economic crisis in 2021—2022—particularly following the Russian invasion of Ukraine, and the US and Israeli war on Iran —was Europe's structural dependence on fossil fuels, which also drive the climate crisis. Hence, strengthening the resilience and competitiveness of the EU economy is closely linked to reducing reliance on fossil fuels.

Within this framework, the EU Emissions Trading System stands out as the most effective EU climate policy instrument, as demonstrated by its long-term contribution to emissions reductions through the gradual decarbonisation of the energy and industrial sectors.

Against this background, the shared objective of Member States, the European Parliament, and the European Commission in the forthcoming ETS revision should be to strengthen—not weaken—the system.

In particular, the continued allocation of free emission allowances to industry has weakened incentives for decarbonisation investments, while also reducing public revenues for the Member States that could otherwise support the green transition. According to EEA data, during the first half of the 4th EU ETS phase (2021—2025), approximately 2,184 million allowances were allocated for free to industrial installations (excluding combustion), nearly matching total verified industrial emissions over the same period (2,245 million tonnes of CO_2). Based on average allowance prices over this period, the value of these free allocations is estimated at €154.4 billion. Redirecting even a portion of these resources toward decarbonisation investments would have reduced industrial emissions more substantially while improving the sector's resilience to energy price shocks. It is therefore essential to maintain and complete the planned phase-out of free allowances by 2034.

In addition, policy measures that reduce allowance prices—whether through adjustments to the Market Stability Reserve or other provisions of the ETS Directive—risk reducing Member State revenues. At the same time, lower carbon prices, particularly if combined with high fossil gas prices, could incentivise a partial come-back of lignite and hard coal to the EU-27 electricity mix. The long-term decline in coal use has been one of the key drivers of EU emissions reductions, especially since 2018, and reversing this trend would jeopardise progress toward climate targets.

[15] EEA, 14.10.2025, "Economic losses from weather- and climate-related extremes in Europe", https://bit.ly/4decyzE

Annex

Methodology and assumptions

The analysis is based on a harmonised dataset designed to ensure comparability across years. Where 2025 data were incomplete at the time of extraction (April 2026), estimates provided by the European Environment Agency (EEA) were used to fill the gaps. These gaps are particularly significant in the aviation and shipping sectors, where a substantial number of operators had not yet submitted verified emissions data. In aviation, 156 out of 342 companies that reported emissions in 2024 had not yet reported for 2025. In shipping, the reporting gap is even larger, with 1,626 out of 3,130 companies missing from the 2025 Union Registry records. As a result, uncertainty is highest in these two sectors for the 2025 estimates.

A specific adjustment was applied to lignite and hard coal combustion plants. Out of 189 installations recording emissions in 2024, 28 had not yet reported 2025 emissions. These plants were responsible for 19.7 $MtCO_2$ out of 275 $MtCO_2$ total in 2024. To fill the gaps for those 28 installations, emissions were projected by applying the average annual rate of change observed over the 2013–2024 period.

For Greece, additional corrections were introduced to improve accuracy. The emissions of the vertically integrated Aluminium of Greece facility were disaggregated between electricity generation and industrial process emissions using data provided to The Green Tank by the Ministry of Environment and Energy: 56% of emissions were attributed to electricity generation and 44% to aluminium production. This adjustment was applied to both combustion and industrial totals for Greece and, where relevant, for the EU-27 aggregate.

Further corrections were made for new fossil gas plants not yet fully integrated into the ETS reporting system. For the Agios Nikolaos Power Plant, emissions were estimated using the plant's reported carbon intensity from its Environmental Impact Assessment combined with electricity generation data from monthly bulletins of Greece's Independent Power Transmission Operator (IPTO). The same approach was applied to the newly commissioned Komotini Power Plant, which was still in trial operation during the reporting period and has not yet been formally included in ETS accounting.


LIFE Effect