Trends in the Emissions Trading System in the EU and in Greece 2005-2023

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Text:

Ioanna Souka, Data Analyst, The Green Tank

Coordination:

Nikos Mantzaris, Policy Analyst & Co-Founder, The Green Tank

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Contact details

50, Vas. Sofias Avenue, Athens 115 28
✆ 210 7233384
https://thegreentank.gr
info@thegreentank.gr

Summary

This report analyzes the emission trends of the three sectors included in the ETS (electricity & heat production; industry; aviation) for the period 2005-2023 in both the EU-27 and Greece. The analysis is based on the latest data published in 2024 by the Union Registry and the European Environment Agency. The main findings are summarized as follows:

- 2023 saw **the lowest emissions** in the sectors included in the ETS since 2005 -the starting year of the ETS- in **both the EU-27 (1,114.8 million tons)** and Greece **(29 million tons)**
- **Greece** ranks **4th** among Member States regarding the reduction of emissions from the electricity and heat production and energy-intensive industry sectors between 2005 and 2023 **(-65.4%).**
- Greece outperformed **by 17 percentage points the EU-27**, which reduced its emissions by **48.3%** over the same period**, and the EU average emission reduction target for 2030** (-62% compared to 2005).
- **Progress** in Greece is mainly **attributed to the reduction in the use of lignite** in electricity production **(-85.8%** fewer emissions in 2023 compared to 2005). The reduction from fossil gas plants was much smaller in the same period (-3.7% between 2005 and 2023), while 2023 -for the second time after 2021- exceeded those from lignite-fired plants.
- **Industry** showed little progress, recording **the second lowest emissions in the last decade (12.2 million tons)**, just short of the 2020 all-time low. **Emissions from refineries have been relatively stagnant**, while the cement production sector saw a slight increase over the past year. The overall reduction was mainly driven by other industrial sectors, such as aluminum, mining and fertilizers.
- **The Agios Dimitrios TPP firmly leads the ranking of the top 10 polluters** in Greece, while in 2023, Ptolemaida 5, the new PPC plant, joined the list (4th place). **The top five is completed by the three large refineries**: Motor Oil (2nd place), Hellenic Petroleum in Elefsina (3rd place) and Hellenic Petroleum in Aspropyrgos (5th place).

Contents

Acronyms

RES	Renewable Energy Sources
EU	European Union
CBAM	Carbon Border Adjustment Mechanism
ETS	Emissions Trading System
EEA	European Environment Agency

Introduction

The multiple economic and climate crises in recent years have rendered the transformation of Europe's energy model necessary. For decades, the latter had based its economy on fossil fuels; nonetheless, especially after Russia's invasion of Ukraine, fluctuations in fossil gas prices had a negative impact on electricity prices, making the need to decouple from fossil fuels even more urgent. EU Member States responded to the crisis by increasing RES penetration; indeed, 2023 was a landmark year with renewables' share in electricity production exceeding 40%.

This progress resulted from the continued uncertainty of recent years but is also due to the plethora of legislative developments in the EU. The 'fit for 55' package stands out, as it aims to align the European climate and energy policy with the EU-27's central 2030 climate target of reducing net greenhouse gas emissions by at least 55% compared to 1990 levels. Importantly, this legislative package included the revision of the EU-27 Emissions Trading System (ETS).

The ETS has been in operation since 2005 as a key tool for meeting climate targets for reducing greenhouse gas emissions in the electricity and heat production, energy-intensive industry and aviation sectors. Under the latest revision of the relevant Directive[1], from January 2024 onwards, the ETS was extended to cover 100% of emissions from large ships (5,000 tons and above) moving between EU ports and 50% of emissions from ships transiting through third countries but departing from or terminating at EU ports. In addition, in 2027 or 2028 at the latest, a second Emissions Trading Scheme (ETS-2) will be introduced, covering greenhouse gas emissions from the buildings and road transport sectors. The Social Climate Fund -along with its corresponding Regulation- has been established, also under the 'fit for 55' framework, in order to address the socio-economic impacts of ETS-2.

Against the background of all these developments, the Green Tank's annual report examines the trends in emission changes in the three ETS sectors, aiming at a more complete assessment of the ETS's contribution to the EU's shift towards climate neutrality. In particular, the report documents the evolution of emissions in the electricity and heat production, industry, and aviation sectors in both the EU-27 and Greece, analyzing the factors driving changes. At the same time, the report presents the top polluters in Greece and the ranking of the most polluting sectors from 2005 to 2023. The analysis is based on the latest available data published by the Union Registry[2] (April 2024) and the European Environment Agency[3] (May 2024).

[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/4eEdpsa.
[2] Union Registry, https://bit.ly/3KzGxTC
[3] European Environment Agency, https://bit.ly/3KwqO7R

Emissions in the European Union

Comparison between Member States

Greece ranks 4th among EU Member States and has exceeded the target set by the revised ETS for 2030.

The European Union has reduced its emissions by 48.3% in 2023 compared to 2005 in the two sectors covered by the ETS since its launch in 2005 (electricity and heat production and energy-intensive industry)[4]. This performance ranks it 15th among Member States, as illustrated in Figure 1. Greece is now among the EU-27 leaders, as it has reduced its emissions by 65.4% in 2023 compared to 2005, thus ranking in 4th place, two places higher than last year[5]. This performance exceeds the average European emission reduction target of -62% in 2030 compared to 2005, which was set during the recent revision of the relevant directive in 2023[1]. Greece was outperformed only by Luxembourg (-69.5%), Portugal (-66.7%) and Romania (-66.2%). At the opposite end of this ranking are Poland (-31%), Sweden (-26.9%) and Cyprus (-14.5%). The effectiveness of the ETS is confirmed by the fact that no Member State has recorded an increase in emissions between 2005 and 2023.
With regard to countries' performance in 2023 compared to 2022, the EU-27 ranked 11th, reducing emissions by 16.3%. Greece achieved a larger reduction of 18.2%, climbing at 5th place.

Large reductions in emissions from electricity and heat production were observed in Bulgaria, Estonia and Portugal in the last year.

The leading countries in reducing emissions under the ETS between 2022 and 2023 were Bulgaria (-48.7%), Estonia (-36.5%), France (-19.3%), and Portugal (-19%). These countries' performance is mainly attributed to a decrease in emissions from the electricity and heat production sector, with the exception of France. In particular, emission reduction was driven by a sharp drop in the use of lignite in electricity production in the case of Bulgaria (-47%)[6], and by a marked decrease in the use of oil (-41%), which remains the main source of electricity production, in Estonia. Portugal set a record with clean energy accounting for 73% of electricity production, further displacing fossil fuels. In the case of France, the use of fossil fuels in electricity production was cut by 29%; nonetheless, industry also made a significant contribution to the country's overall performance, reducing its emissions by 12.7%, mainly due to a decline in the steel sector (-18.5%).

On the other hand, four countries increased emissions between 2022 and 2023. In particular, Cyprus, Hungary and Latvia recorded relatively small increases of 1-4%, while Malta's

[4] Total emissions from the two sectors for each country include the estimated emissions for the years 2005-2012 according to the European Environment Agency, based on Directive 2003/87/EC as in force, with regard to the inclusion of plants and countries in the ETS.
[5] The Green Tank, 2022, https://bit.ly/3z79xQc
[6] Ember,2023, Electricity Data Explorer, https://bit.ly/3XcQDRW

emissions surged by 59.4%. This rise is entirely due to the aviation sector, whose emissions nearly tripled in one year, albeit remaining low (1.29 million tons in 2023) compared to other Member States' respective emissions.

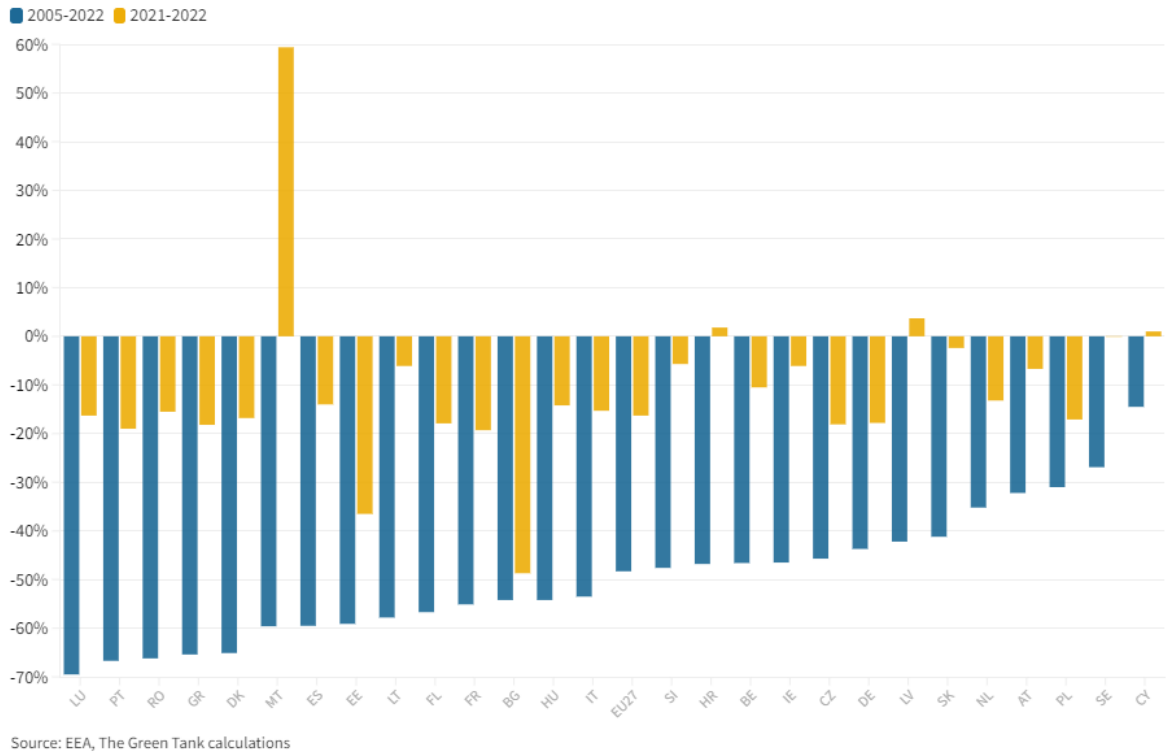

***Figure 1**: Change in ETS emissions for each EU-27 Member State in 2023 compared to the ETS baseline year (2005) and the previous year (2022)[7]. Source: EEA, The Green Tank calculations.*

In absolute terms, in 2023, all three ETS sectors in the EU-27 emitted a total of 1,114.8 million tons. More than half of these emissions (633.4 million tons or 56.8%) came from the electricity and heat production sector, followed by industry with 430.6 million tons (38.6%). The aviation sector accounted for 50.7 million tons (4.6%).

Germany, Poland, Italy and Spain are among the major polluters in 2023.

Four countries made the largest contribution to total emissions, accounting for more than half (58.8%) of the EU-27 total: Germany, Poland, Italy and Spain were responsible for 26.6%, 13.7%, 10.5% and 8% of emissions, respectively. The largest share in the first three countries, as in the EU-27 total emissions, came from the electricity and heat production sector. In contrast, industry was responsible for the largest share of Spain's emissions.

Evolution of emissions in the three ETS sectors

All-time low in emissions from electricity & heat production and industry.

[7] In the comparison between 2005-2023 only the electricity and heat sectors and industry are taken into account, as there was no aviation in 2005, while in the comparison between 2022-2023 all three sectors are included.

The electricity and heat production sector accounted for the largest share of emissions in 2023; nonetheless, the evolution of emissions in the three ETS sectors in the EU-27 between 2005-2023 shows that this sector has made the most progress. In particular, over the aforementioned period, this sector's emissions have decreased by 49.3%. From 2007 onwards, emissions have followed a downward trend with small fluctuations, while over the three-year period of 2018-2020 they were continuously decreasing. One year after the start of the pandemic there was a slight increase; the latter, however, only lasted until 2022, since in 2023 was recorded the lowest level of emissions since the start of the ETS (2005). This is attributed to the systemic characteristics of the fossil fuel phase-out, as well as to the overall shift towards clean energy. Specifically, the greatest annual decrease in the use of lignite and coal was recorded in 2023 (-26%)[8], accompanied by a reduction in the use of fossil gas for electricity production (-15%).

Emissions from the aviation sector are on the rise. A reduction is noted in industry.

A different trend is observed in the case of aviation. This sector was first introduced into the ETS in 2012 in a broad framework[9], which was subsequently amended to establish how companies' emissions are calculated from 2013 onwards[10]. As of 2013, aviation emissions have followed a continuous upward trend, which was halted in 2020 due to the COVID-19 pandemic. One year later, emissions were once again on the rise, fully recovering and surpassing 2013 levels in 2022. In 2023 they further increased, exceeding by 112% the emissions recorded in the first year of the pandemic (2020).

In industry, the third ETS sector, emissions decreased by 17.7% between 2005-2023. The economic crisis of 2008-2012 had a significant impact on emission reduction; subsequently, for several years up to the pandemic, emissions remained at 2005 levels, showing minor fluctuations. The lowest emissions (479.6 million tons) of the third phase of the ETS (namely, between 2013-2020) were recorded in 2020. A new low of 430.6 million tons was achieved in 2023.

[8] Ember, 2024, «European Electricity Review», https://bit.ly/45bJrY9.
[9] In 2014 the ETS framework regarding aviation was amended; since then, for the period 2013-2020, only emissions from flights within the European Economic Area are included. In addition, emission thresholds were introduced for commercial and non-commercial flights to fall under the ETS, further limiting the total number of emissions included from the aviation sector.
[10] The analysis includes only emissions falling under the EU-ETS, excluding those under the Swiss ETS, which was added as a parallel scheme from 2020 onwards.

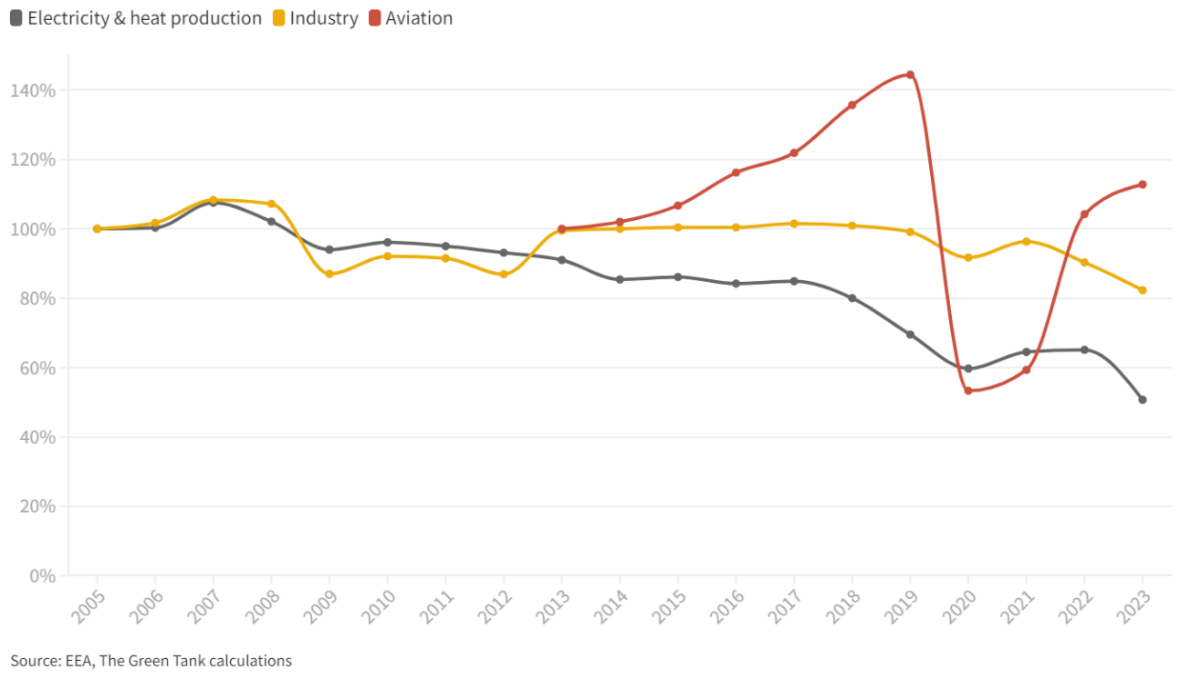

***Figure 2**: Annual change in EU-27 emissions in the three ETS sectors, normalized against 2005 (100%=2005) for the electricity & heat production and industry sectors and against 2013 (100%=2013) for aviation. Source: EEA, The Green Tank calculations.*

The decrease in emissions in 2023 came from all industrial sectors, except refineries, which show relatively constant emissions over time (Figure 3). Behind refineries, the second largest share of industrial emissions is held by the steel and cement sectors.

Among the factors affecting industrial emissions are fluctuations in the prices of fossil gas and electricity, as well as the quantities of products produced. According to Eurostat, total production from industry in the EU-27 decreased by 2%[11] in 2023 compared to 2022; the corresponding decrease in production specifically in the steel industry over the same period was much larger (-7.4%)[12]. Moreover, the savings and process transformation practices that companies implement to decarbonize their operations also have an impact on emission patterns.

[11] Eurostat, 2024, «Industrial production analysis», https://bit.ly/3wXaOsp.
[12]World Steel Association, 2024, «2023 - Total world crude steel production», https://bit.ly/3RkeWcW.

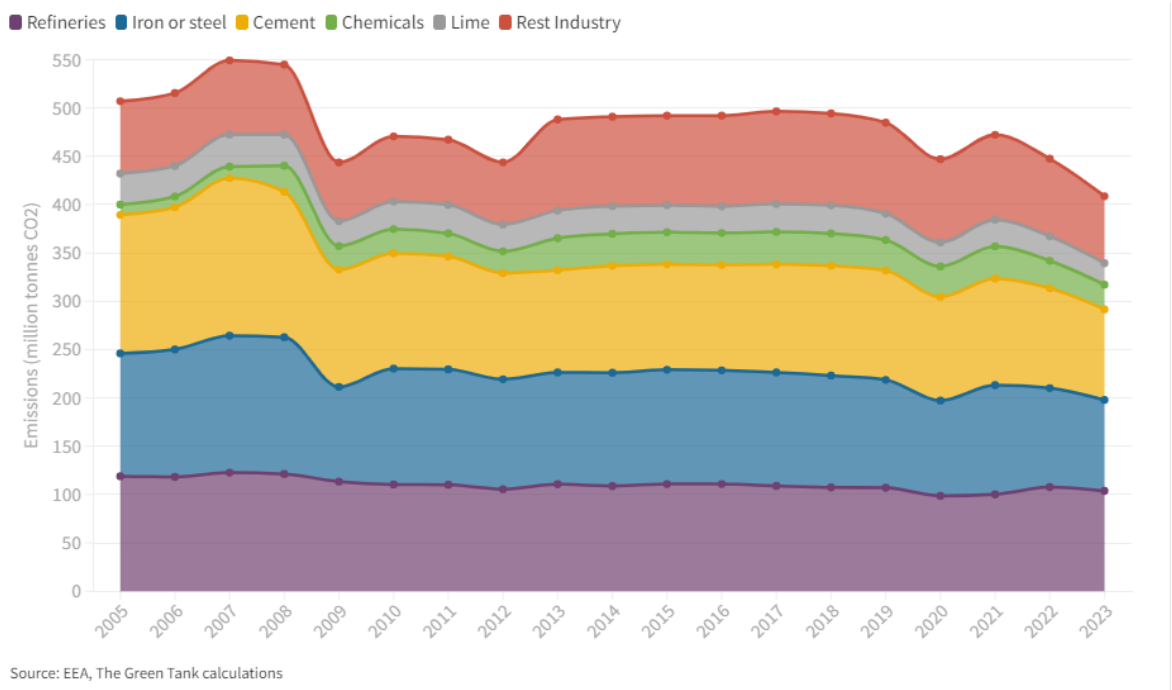

***Figure 3**: EU-27 emissions in industrial plants under the ETS from 2005 to 2023. Source: Union Registry, The Green Tank calculations.*

Emissions in Greece

Evolution of emissions in the three ETS sectors

The evolution of emissions in Greece in the three ETS sectors (Figure 4) follows qualitatively the trends of the EU-27. However, there are significant quantitative differences.

***Emissions from electricity and heat production record a new low in 2023**.*

The electricity and heat production sector's emissions have followed a downward course since 2005. Overall, between 2005 and 2023 emissions have been reduced by 71%, exceeding by more than 20 percentage points the corresponding decrease in the EU-27 (-49.3%). Furthermore, as was the case in the EU-27, in 2023, Greece recorded the lowest emissions since the start of the ETS (2005).

***A small decrease is noted in industrial emissions between 2022-2023**.*

On the other hand, in the case of industry, Greece has not regularly followed EU-27 trends. Initially, from 2008 onwards, emissions had remained lower compared to the first three years of the ETS (2005-2007). The economic crisis had a profound impact on the industrial sector in Greece, with emissions never being restored to pre-crisis levels. A small decrease was recorded in the first year of the pandemic (2020) but emissions have subsequently returned to pre-pandemic levels. Overall, between 2005 and 2023 emissions in the industrial

sector in Greece have decreased by 32%, approximately 14 percentage points more than in the EU-27 (17.7%). However, the annual decrease between 2022 and 2023 in Greece (-2.2%) was significantly smaller compared to that recorded in the EU-27 (-8.8%) but also compared to the decrease recorded in Greece in the previous year (-3.2% between 2021 and 2022).
In the aviation sector, 2023 saw the largest increase in emissions since 2013, which was the year of their inclusion in the ETS under the current framework. The pandemic visibly affected aviation, producing a marked drop in emissions in 2020; nevertheless, emissions subsequently recovered, reaching their highest levels in 2023. Over the past decade (2013-2023), emissions from the aviation sector have increased by 80%; specifically, compared to the all-time low noted in the first year of the pandemic (2020), in 2023, emissions from the aviation sector in Greece recorded a 172% increase, which is 60 percentage points higher than that noted in the EU-27 (+112%).

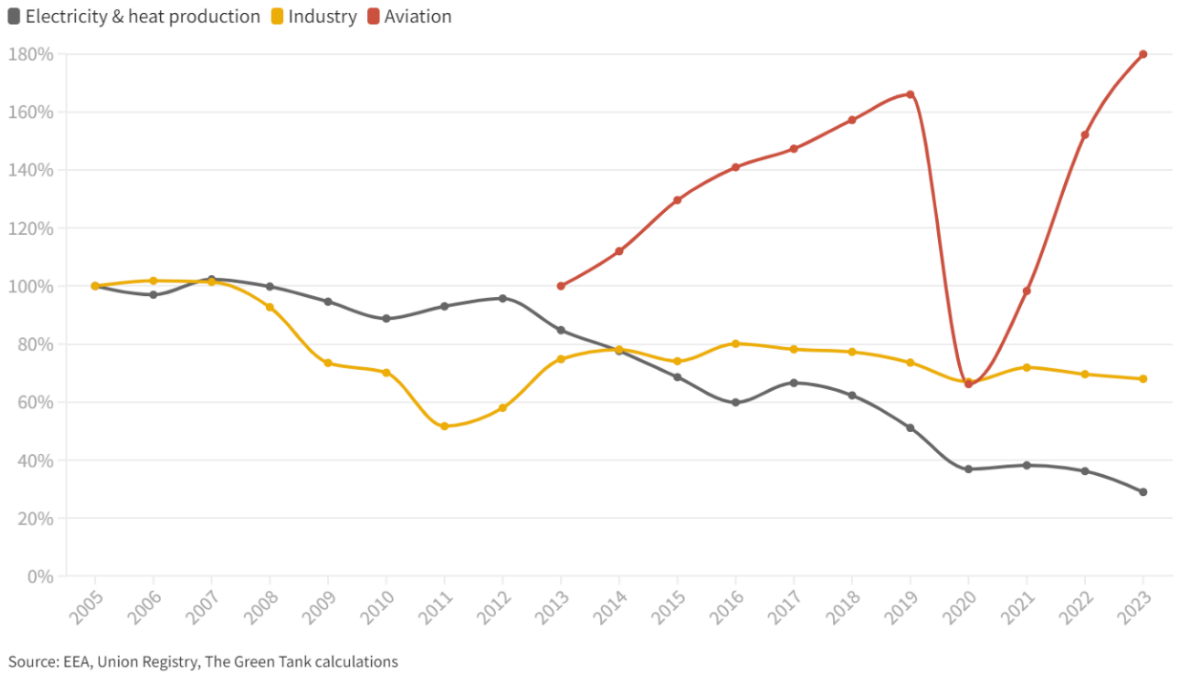

***Figure 4**: Annual change in emissions in Greece in the three ETS sectors, normalized against 2005 (100%=2005) for the electricity & heat production and industry sectors and against 2013 (100%=2013) for aviation. Source: EEA, The Green Tank calculations.*

An all-time low was recorded in cumulative emissions from the three ETS sectors in Greece

In absolute terms, compared to 2005, emissions from the three ETS sectors in Greece reached an all-time low in 2023 (29 million tons), surpassing the previous low recorded in 2020 (32.2 million tons), which was partly due to the effects of the pandemic. From 2020 onwards, emission reduction has been driven primarily by the electricity and heat production sector and, secondarily, by industry. In particular, the former sector achieved a new low in emissions (15.5 million tons), while the latter recorded the second lowest emissions of the decade (12.2 million tons), close behind 2020 all-time low levels (12 million tons). In stark contrast, aviation recorded its highest emissions since 2013 (1.3 million tons).

The electricity and heat production sector continues to hold the largest share of Greece's total emissions (53.3%); nevertheless, this share is significantly reduced compared to 2005 (74.8%). On the other hand, industry has significantly increased its share of emissions (42.1% in 2023 from 25.2% in 2005). Despite a large increase in emissions from the aviation sector, the latter still accounts for a fairly small portion (4.6%) of total emissions in 2023.

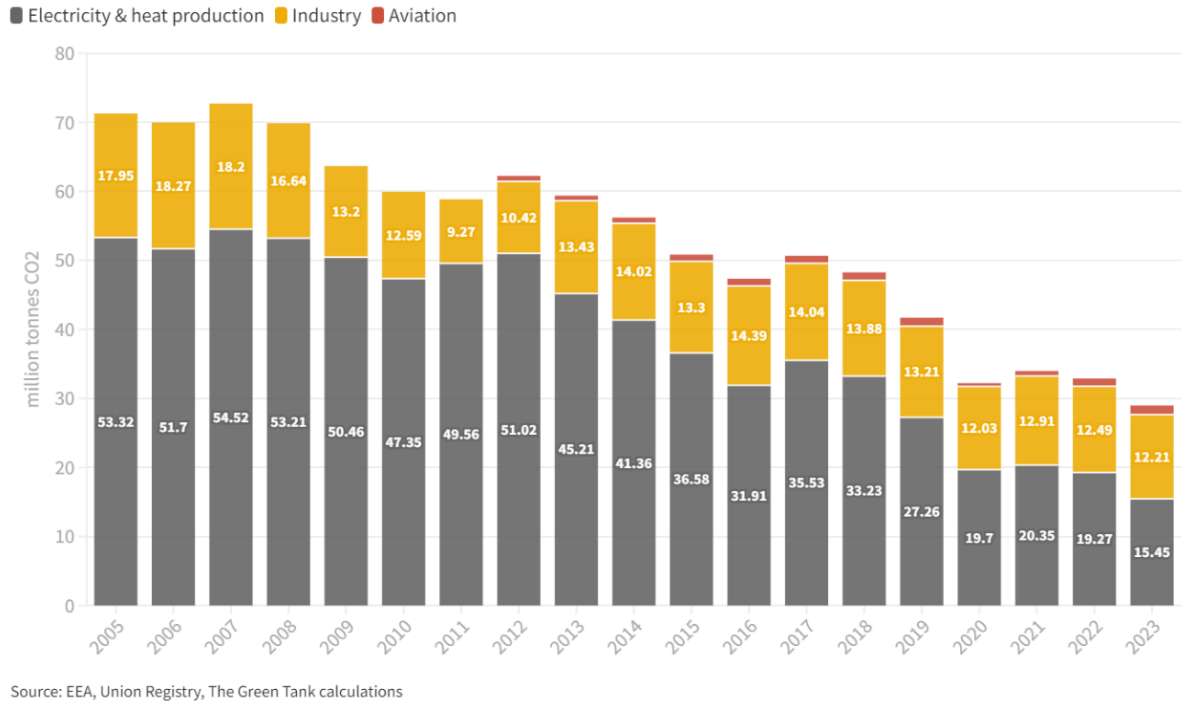

***Figure 5**: Emissions from the three ETS sectors (electricity & heat production; industry; and aviation) in Greece for each year from 2005 to 2023. Source: EEA, Union Registry, The Green Tank calculations.*

Electricity and heat production

The sharp decline in the use of lignite reduces the carbon footprint of electricity production.

The electricity and heat production sector records the greatest progress in reducing emissions; the latter has been driven by the decline in the use of lignite for electricity production. Between 2005-2023, emissions from lignite-fired power plants dropped by 85.8%, due to a corresponding 86% reduction[13] in lignite-fired electricity production over the same period. Emissions from fossil gas plants were slightly lower than in 2005 (-3.7%), while the percentage decrease from oil plants in Greece's non-interconnected islands was higher (-18.2%). In the quantitatively less important combustion sector category of other combined heat and power (CHP) plants, emissions increased by 16.9% between 2005 and 2023. Nonetheless, their share of total emissions corresponds to less than 1%, so this increase does not have a significant impact.

[13] IPTO, Monthly Energy Reports, https://bit.ly/3xpe5Rz.

In 2023, emissions from lignite reached an all-time low (6.12 million tons), due to the all-time low recorded in production from lignite (4.5 TWh)[14]. Compared to 2022, emissions from lignite decreased by 27.8%, reversing the slightly upward trend noted between 2021-2022 (+0.7%).

Fossil gas takes the lead in electricity production emissions.

Emissions from fossil gas-fired power plants amounted to 6.17 million tons in 2023, down 17.7% compared to 2022 and approaching 2020 levels. However, for the second time since 2021, they surpassed emissions from lignite (+0.05 million tons); these data indicate a reversal of the longstanding trend of lignite leading the way among fossil fuels in the electricity production sector's emissions. Indeed, this reversal seems to be further confirmed in the first quarter of 2024, with emissions from fossil gas plants (2.1 million tons) exceeding those from lignite plants (1.8 million tons)[15].

Oil plants show a stability over time, with small fluctuations in their emissions. In 2023 they emitted 2.84 million tons, recording a 6.1% decrease compared to 2022.

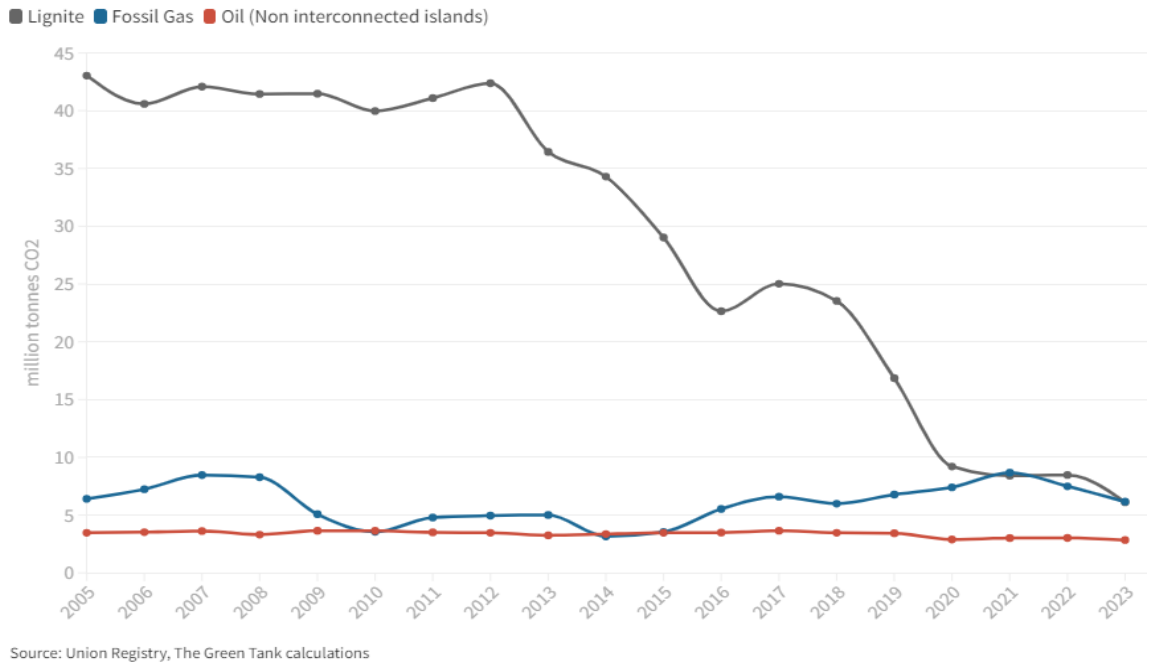

***Figure 6**: Emissions by fuel used in the electricity and heat production sector in Greece from 2005 to 2023[16] [17].*
Source: Union Registry, The Green Tank calculations.

[14] The Green Tank, 12.2023, "Trends in Electricity Production - December 2023" https://bit.ly/3xws2x1.
[15] The Green Tank, 04.2024, "Trends in Fossil Gas Consumption & Imports - April 2024" https://bit.ly/45OWOOo.
[16] Emissions include an estimate of emissions from the "Ptolemaida 5" lignite power plant and the "Agios Nikolaos 2" fossil gas-fired thermal power plant, both of which started trial operation in December 2022 but are not yet officially included in the ETS list of power plants. These emission estimates are based on the carbon intensity stated in the respective Environmental Impact Assessments.
[17] Industrial emissions also include part of the emissions from the vertically integrated "Aluminio" plant, even though the latter is officially classified only under the electricity and heat production sector in the ETS. Specifically, based on the average derived from the official data of the Ministry of Environment and Energy for the years 2019-2021, the plant's emissions are allocated to the electricity and heat production and industry sectors (56% and 44% of total emissions, respectively) for all years from 2005 to 2023, in accordance to the plant's distinct processes for electricity production and other industrial activities.

Industry

Refineries and cement production plants are the front-runners in industrial emissions.

In the industrial sector in Greece, the largest share of emissions comes from refineries and cement plants (Figure 7). While the latter have made the largest contribution to reducing emissions since the ETS came into operation (-57.3% between 2005-2023), emissions from refineries have increased by 61.5% over the same period.

In 2023, refineries held the largest share (48.1% or 5.9 million tons) of industrial emissions (total of 12.2 million tons), followed by cement production plants with a share of 38.4% (or 4.7 million tons). Other industrial sectors accounted for 13.5% (or 1.6 million tons) of total emissions.

Between 2022 and 2023, emissions from industry as a whole were reduced by just 2.2% (or 0.28 million tons), namely, less than between 2021-2022 (-3.2%). As emissions from the cement industry increased (+3.2%) and emissions from refineries only slightly decreased (-0.5%), this reduction in total emissions was mainly driven by the other industrial sectors (-19.4%).

The increase in emissions from cement plants in Greece contrasts with the downward trend recorded in the EU-27 as a whole. As this sector in Greece is in the process of planning and early implementation of decarbonization practices, the observed rise in emissions is likely due to an increase in the production of final products over the past year.

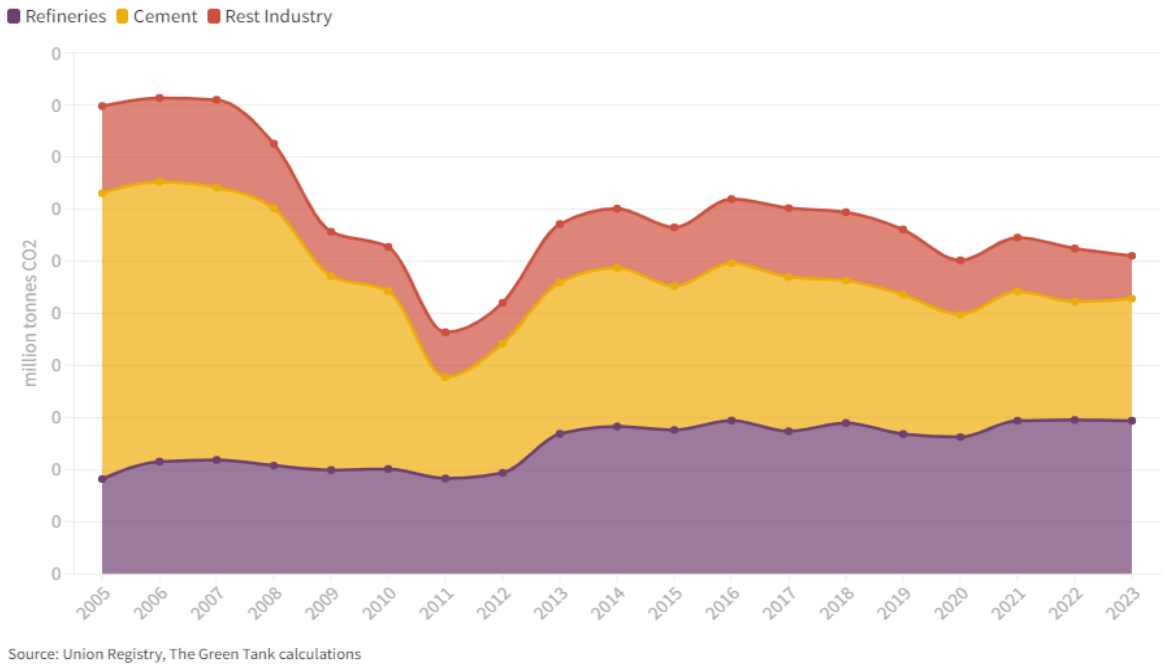

***Figure 7**: Emissions from Greece's industrial installations under the ETS from 2005 to 2023. Source: Union Registry, The Green Tank calculations.*

Aluminum production plants, mining plants and the limestone industry significantly contribute to the reduction of emissions between 2022 and 2023.

In addition to refineries and the cement industry, 'other' industrial activities under the ETS include the following sectors: aluminum, mining, limestone, paper, fertilizers, steel, ceramics, glass, brick, iron, gypsum, chemicals, and stone wool. Looking at the absolute amounts of emissions from each sub-sector, also in relation to the changes recorded between 2022-2023 (Figure 8), it can be observed that, in 2023, the largest share of emissions came from aluminum (31.1% of total emissions from 'other' industry), where emissions decreased by 10.2% between 2022-2023. Mining and limestone hold the next two largest shares (15.6% and 12.6% respectively). The largest percentage decrease in emissions between 2022 and 2023 was noted in iron plants (-52%), which contributed a mere 1.7% to total emissions. A significant reduction in emissions was also observed in the mining (-37.1%) and fertilizer (-42.4%) sectors, both of which hold a much larger share of total emissions among 'other' industrial activities (15.6% and 9.4%, respectively). At the same time, certain sectors' emissions rose between 2022 and 2023; for instance, paper mills and gypsum plants recorded, respectively, a 6.7% and 39.6% increase. Cumulatively, across all 'other' industry sectors, emissions decreased by 19.4% between 2022 and 2023.

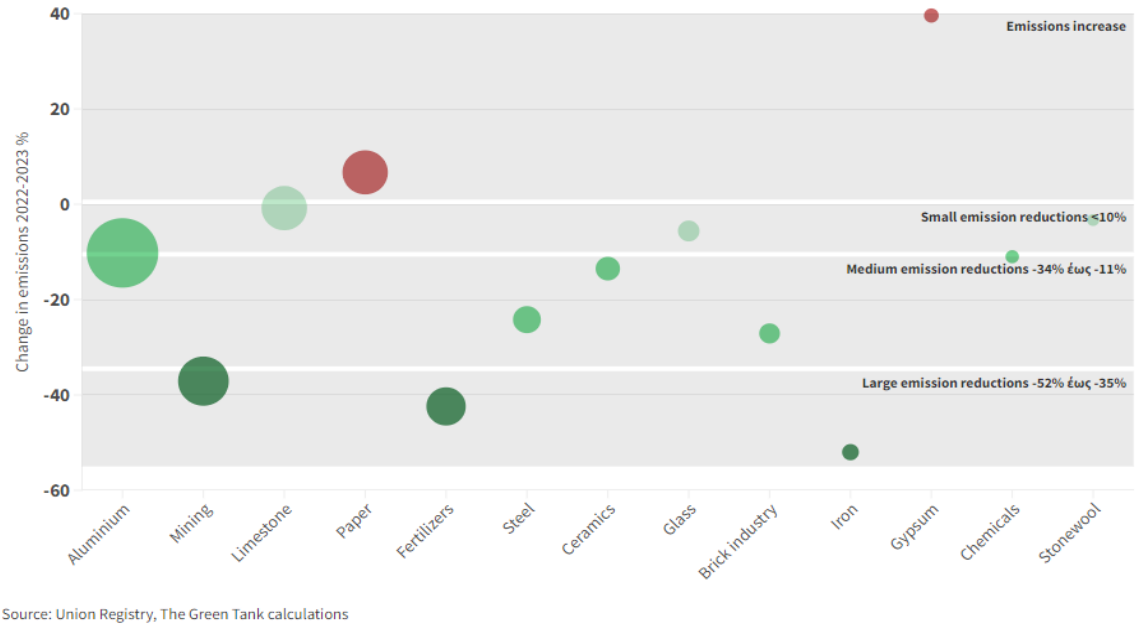

***Figure 8**: Change in emissions between 2022-2023 in 'other' industrial sectors (excluding refineries and cement plants) under the ETS (y axis). The size of the circle reflects each sector's share in the total emissions from 'other' industry. Source: Union Registry, The Green Tank calculations.*

Emissions by activity

Fossil gas, lignite and refineries are among the most polluting activities in 2023.

As shown in Figure 9, the distribution of emissions among the different activity categories covered by the ETS clearly indicates that, in 2005, lignite was by far the leading polluter. This wide difference shrunk over the years; in fact, for the first time in 2021, and once again in 2023, fossil gas surpassed lignite.

With regard to other activities, up until the financial crisis, cement plants ranked second, to be displaced in 2010 by fossil gas. Refineries -the other highly polluting industrials sector- has long occupied the third or fourth place across the years, while oil used for electricity production, 'other' industry, and aviation have consistently ranked in the bottom three. Between 2022 and 2023, the ranking for the majority of electricity production fuels has not been altered, with the exception of the switching of positions between lignite and fossil gas.

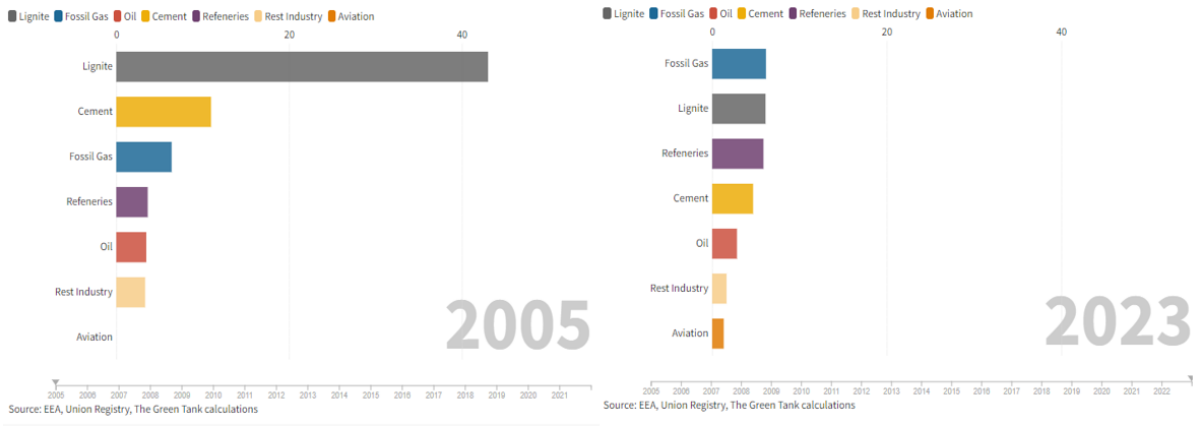

***Figure 9**: Annual emissions by sector in Greece in 2005 (left) and 2023 (right)[18]. Source: EEA, Union Registry, The Green Tank calculations.*

Top 10 polluters

The Agios Dimitrios lignite plant is consistently the top polluter. Two refineries rank second and third.

Lignite's long-standing lead in emissions -which only recently ended- is reflected in the number of lignite plants found in the top 10 polluters list in 2005 (7 out of 10 plants), as illustrated by Figure 10. A significant change occurred from 2020 onwards, with lignite plants holding the minority of positions in the ranking. With regard to fossil gas plants, in 2005, only Lavrio TPP was included in this list. Since then, and until 2019, there were no gas plants among the top ten polluters, while, in 2020, the Alouminion CHP plant appeared in sixth place. As fossil gas has begun to replace lignite over the past three years, a higher number of gas plants are now featuring among the top ten polluters.

With regard to industry, Motor Oil has consistently ranked among the top ten polluters over the years, while Hellenic Petroleum (ELPE) entered the list after 2012. Cement production plants (mainly TITAN and AGET) alternate in the ranking, while, during the economic crisis (2009-2012), only AGET Heraklis appeared.

The top ten ranking in 2023 is identical to that of 2022, with two exceptions: firstly, Ptolemaida 5 has replaced the Megalopolis 4 lignite plant, moving up one place. Secondly, Lavrio TPP and AGET Heracles have switched places in the bottom of the list.

[18] This figure presents two snapshots of an animation for emissions for all years from 2005 to 2023 https://bit.ly/3zcSFr5.

More specifically, in 2023, the top spot was once more occupied by the Agios Dimitrios lignite plant with 3.35 million tons of emissions. Moreover, with emissions amounting to 1.74 million tons, Ptolemaida 5 -PPC's new lignite plant- also joined the top five, ranking fourth. Motor Oil-Corinth remained in second place (2.05 million tons), followed by Hellenic Petroleum (ELPE) - Elefsina (2 million tons); Hellenic Petroleum (ELPE) - Aspropyrgos (1.52 million tons) ranked fifth.

Two cement production plants (TITAN-Viotia and AGET Heraklis) and three fossil gas plants (Aluminion, Megalopolis 5 TPP and Lavrio TPP) complete the bottom five of the top 10 polluters' list.

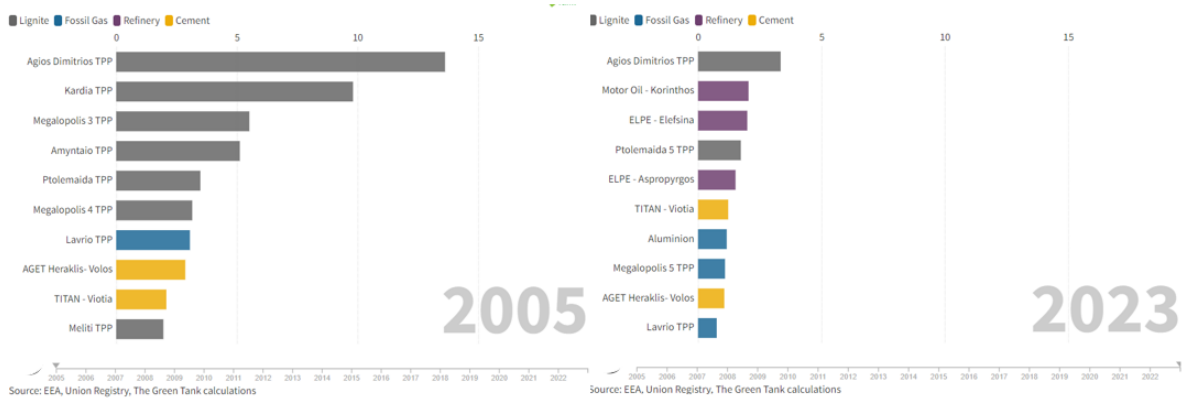

***Figure 10**: Annual emissions per plant in Greece in 2005 (left) and 2023 (right)[19]. Source: EEA, Union Registry, The Green Tank calculations.*

Future prospects

Focusing on the electricity and heat production sector, we observe that the use of fossil gas in electricity production has surged in the first five months of 2024 compared to the same period in 2023 (+48%). This trend is troubling; if it continues, it may hinder Greece's continued progress in reducing this sector's carbon footprint. These concerns are amplified, considering the cuts in production from RES, as well as the ongoing construction of new fossil gas plants without the parallel withdrawal of older ones, as reflected in the most recent version of the National Energy and Climate Plan (NECP)[20].

On the other hand, the two carbon capture and storage (CCS) projects -financed by the ETS Innovation Fund- to be respectively implemented in the TITAN and AGET Heracles cement production plants in Greece offer hope for a significant reduction in emissions from the industrial sector. According to the European Commission's relevant announcements[21,22],

[19] This figure presents two snapshots of an animation for emissions for all years from 2005 to 2023, https://bit.ly/3RK5ZK8 .
[20] Article by Machi Tratsa, Economikos Tachydromos, 5 April 2024, https://bit.ly/4cqMwpK.
[21] European Commission, Innovation Fund, May 21, 2024. *IFESTOS: IFESTOS – one of the largest carbon capture projects in Europe to enable the production of zero carbon cement concrete and create decarbonization synergies with regional industries*, https://bit.ly/4b2ick4.
[22] European Commission, Innovation Fund, May 21, 2024. *OLYMPUS: Ascending to the top of CO2 avoidance in the EU cement sector through the innovative OxyCalciner technology*, https://bit.ly/4elEgsV.

these two projects are expected to reduce the companies' emissions by 2.9 million tons per year; this cut corresponds to 61.8% of the cement production sub-sector's emissions in Greece in 2023. The same Fund is also financing a carbon capture, storage and utilization (CCUS) project at Motor Oil's refineries[23], which is projected to reduce the company's respective emissions by an average of 0.858 million tons per year during its first decade of operation, or 41.9% of its emissions in 2023. Therefore, Greek industries are already on track to take advantage of ETS resources in order to enhance their competitiveness in view of the phasing out of free emission allowances by 2034, as provided by the latest revision of the relevant directive. A prerequisite for the success of these ambitious targets is the readiness of the carbon storage project in Prinos, which, when fully operational, will have the capacity to store 3 million tons of CO_2 per year. According to Energean, which runs the Prinos project, reaching a commercial scale of 2.5-3 million tons per year will be feasible by late 2027 - early 2028[24].

Another major challenge to be faced in the coming years lies in the integration of the buildings and road transport sectors into a separate Emissions Trading Scheme from 2027 onwards -or 2028 at the latest. Addressing the related consequences and the social impact of rising fossil fuel supply prices requires a national plan and resources. The European resources allocated to Greece for this purpose from the Social Fund for Climate over the seven-year period 2026-2032 are limited (€3.59 billion) and will be made available only one year before the start of the ETS-2. Therefore, in order to shield itself, Greece should immediately make good use of resources that are already available, such as the public revenues from the auctioning of emission allowances under the existing ETS that are allocated to the country each year. Priority should be given to the most vulnerable households and businesses by financing projects that permanently reduce their carbon footprint and, in turn, their energy bills.

[23] European Commission, Innovation Fund, May 21, 2024. *IRIS: Innovative low carbon hydrogen and methanol production by large Scale carbon capture*, https://bit.ly/45wfPok.
[24] Article by Katerina Sardis, Country Manager and CEO of Energean in Greece, Energypress, 3 July 2023, https://bit.ly/4bajjyj.


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