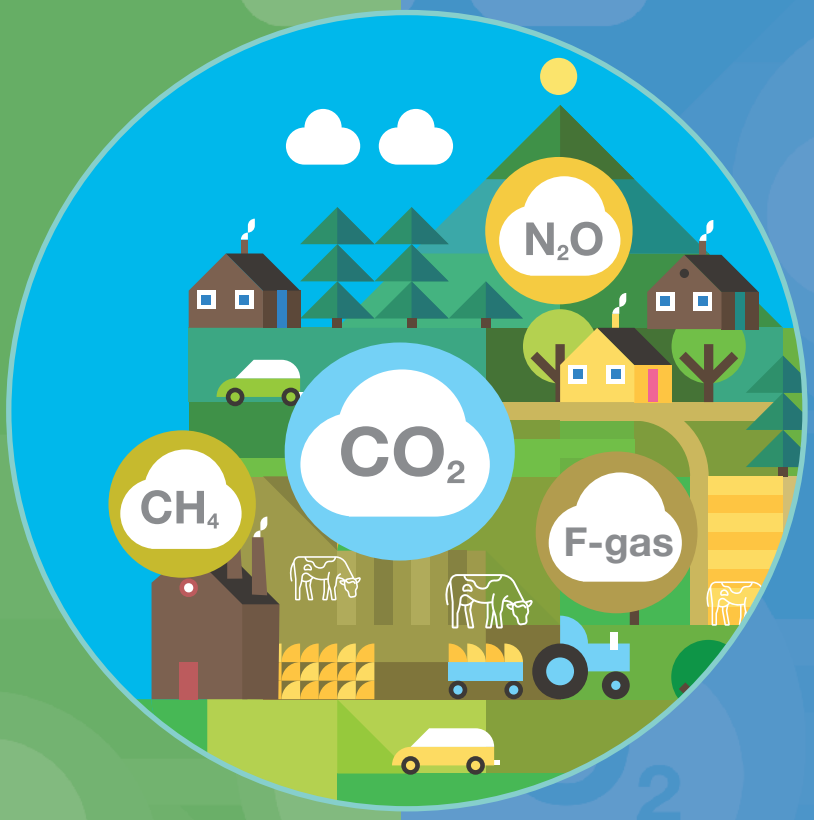
Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

Ireland's Provisional Greenhouse Gas Emissions

1990-2024

July 2025




epa
Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

Table of Contents

Key Findings

Reduction in overall GHG emissions driven by decreases in all key sectors except Buildings	For the second year in succession, Ireland's emissions are below the 1990 baseline. 2024 total national greenhouse gas emissions (excluding LULUCF) are estimated to have decreased by 2.0% on 2023 levels to 53.75 million tonnes carbon dioxide equivalent (Mt CO_2eq). Emissions per capita decreased from 10.4 t CO_2eq to 10.0 t CO_2eq in 2024.
Emissions from electricity generation hit a 35-year low, marking three consecutive years of reductions in emissions	Emissions from the Energy Industries sector decreased for the third consecutive year by 8.9% in 2024 to an all-time low of 7.2 Mt CO_2eq. Electricity supply from renewables grew by 1.3% in 2024 but, due to increased demand, the share in renewable energy generation decreased slightly from 40.7% in 2023 to 39.6% in 2024. Imported electricity was 14.0% of electricity supply in 2024 compared to 9.5% in 2023. The emissions intensity of power generation decreased from 254 g CO_2/kWh in 2023 to a historic low of 226 g CO_2/kWh in 2024.
Declines in cattle numbers reduce Agriculture emissions	Agriculture emissions decreased by 1.7% or 0.35 Mt CO_2eq in 2024. This was primarily due to a 2.9% reduction in the cattle herd. A 10.6% increase in fertiliser nitrogen use partially diminished the impact of reduced cattle numbers on emissions.
First post-COVID decrease in Transport emissions	Greenhouse gas emissions from the Transport sector decreased by 1.2% or 0.14 Mt CO_2eq in 2024, having increased by ca. 6% in both 2021 and 2022, and by 0.3% in 2023. Emissions in 2024 are 5.4% below 2019 pre-COVID levels. In 2024, the 16% increase in use of biofuels contributed to the majority of this emission reduction. In addition, the increasing number of electric vehicles on Irish roads curtailed emissions growth that might otherwise have resulted from a growing workforce and 4.1% increase in the national vehicle fleet.
Residential emissions increase after two consecutive years of all-time lows	Greenhouse gas emissions from the Residential sector increased by 4.9% or 0.26 Mt CO_2eq in 2024 after two consecutive years of all-time lows, with 2023 being the lowest point in emissions since 1990. Residential usage of peat declined by 8.6% on 2023, while the consumption of all other fossil fuels increased. This can be attributed to 2024 having 6.3% more heating degree days than 2023.
Decrease in emissions from cement sector	Manufacturing Combustion and Industrial Processes emissions decreased by 4.6% to 6.0 Mt CO_2eq in 2024 due to declines in coal and oil usage. Total emissions (combustion and process) from the cement sector decreased by 15.6% or 0.42 Mt CO_2eq in line with a reduction in clinker production.
EU Effort Sharing limits exceeded	Ireland is not in compliance with the EU's Effort Sharing Regulation (ESR) in 2024 or cumulatively from 2021-2024. Since 2005 ESR emissions have decreased by 10.9% or 5.2 Mt CO_2eq, considerably short of Ireland's 42% reduction commitment by 2030.

National Compliance and First Carbon Budget 2021-2025	Provisional estimates of national greenhouse gas emissions (including LULUCF) in 2024 are 12.0% below 2018, well off the National Climate objective of a 51% reduction by 2030. The data indicate that from 2021-2024 Ireland has used 82.5% (243.3 Mt CO_2eq) of the 295 Mt CO_2eq Carbon Budget for the five-year period 2021-2025. A reduction of 10.3% in national emissions is now required in 2025 to stay within budget.
Sectoral Emissions Ceilings 2021-2025	Annual emissions reductions of 15%, 34%, 34%, and 16% are required in 2025 for the Electricity, Industry, Transport and Buildings (Commercial and Public) sectors to achieve respective Sectoral Emissions Ceilings (SEC). Data indicate Agricultural and 'Other' sectors can meet their SEC. For Agriculture this was largely driven by refinements to the Agricultural inventory. The National Climate objective of a 51% reduction by 2030 will be unattainable unless every sector meets its indicative percentage reduction target. Consequently, sectoral ceilings must be revised to account for updated science in emissions inventory data.

1. Introduction

The EPA is responsible for compiling the inventories of greenhouse gas emissions for Ireland and for reporting the data to the relevant European and international institutions. As such, Ireland's legal reporting obligations require that we submit preliminary and final data for the period 1990-2024 in January 2026, March 2026 to the European Commission and by April 2026 to the United Nations Framework Convention on Climate Change (UNFCCC).

The EPA is publishing the provisional inventory data in July 2025 to facilitate the early monitoring and reporting processes associated with the National Climate Objective and associated carbon budgets, annual review of the Climate Action Plan and greater level of sectoral reporting and more in-depth assessment and reporting of Policies and Measures.

The provisional estimates of Ireland's greenhouse gas figures for the years 1990-2024 are based on interim energy balances provided by the Sustainable Energy Authority of Ireland (SEAI) in June 2025 and the latest available data from other data providers such as the Central Statistics Office and the Department of Agriculture, Food and the Marine (DAFM). These are compiled using methodologies in accordance with UNFCCC reporting guidelines. Verified emissions data from installations within the EU's Emissions Trading Scheme (ETS) are included.

Ireland's Emissions Targets

Ireland's EU and National legislative commitments have different emissions reduction requirements and timeframes for achievement. Ireland's revised 2030 target under the EU's Effort Sharing Regulation[1] (ESR) is to deliver a 42% reduction of emissions compared to 2005 levels by 2030. There are also annual binding emission allocations over the 2021-2030 period to meet that target. Ireland's compliance status in 2030 can only be determined when the 2030 inventory is compiled. Under the ESR two flexibilities may be utilised (use of EU Emissions Trading Scheme allowances and credit from action undertaken in the Land Use, Land Use Change and Forestry (LULUCF) sector) to allow for a fair and cost-efficient achievement of the targets.

The revised Annex III of the LULUCF Regulation (2023)[2] sets out Member State LULUCF targets for 2030. Ireland's target is an emission reduction of 626 kt of CO_2eq by 2030 on an average baseline of 2016 to 2018. There is a high degree of uncertainty relating to the estimation of emission/removals from the LULUCF sector; however, significant research is currently underway to address this uncertainty.

Ireland's national emission reduction objectives as set in the Climate Action and Low Carbon Development (Amendment) Act 2021, are to achieve a 51% emissions reduction (including LULUCF) by 2030 compared to 2018 and achieve a climate neutral economy by no later than the end of 2050. The Act provides for the establishment of carbon budgets to support achievement of Ireland's climate ambition. The 51% target, relative to 2018, is the primary constraint on carbon budgets over the course of the first two budget periods ending on 31 December 2030; see Table 1. The Climate Action Plan 2025 (CAP 25), and previous CAPs, sets out a major programme of policies and measures that aim to achieve significant progress towards those objectives.

Ireland's emissions inventory has been compiled using Global Warming Potentials (GWPs) as specified in the 5th IPCC assessment report (AR5)[3]. Ireland's national emissions reduction objective, carbon budgets and European target under the ESR are estimated on an AR5 basis.

1 Regulation (EU) 2018/842 Annex I: http://data.europa.eu/eli/reg/2018/842/2023-05-16

2 Regulation (EU) 2023/839 Annex III: https://data.europa.eu/eli/reg/2023/839/oj

3 IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change https://www.ipcc.ch/report/ar5/wg1/

Table 1. European Union and National GHG Targets comparison

	Base Year	Reduction required by 2030	Scope	Other key points to note
European Union Target: Effort Sharing Regulation	2005	42% The 42% reduction defines the trajectory, but it is the annual limits that are binding	Sectors covered by the Effort Sharing Regulation (excludes ETS)	Annual binding emission limits (AEAs) define the permitted budget and some flexibilities are available.
European Union Target: LULUCF Regulation	Average 2016-2018	-626 kt CO_2 eq	LULUCF sector	Annex III Regulation (EU) 2023/839
National Targets	2018	51%	Economy-wide target (includes ETS)	Unlike the EU target, the national target includes LULUCF. Binding carbon budgets set the required reduction trajectory.

This report provides a summary of the 2024 provisional emission estimates accompanied by an assessment of annual changes relative to the 2023 emissions. The recent and long-term trends in greenhouse gas emissions across key sectors, and their significance in relation to Ireland's targets under the EU's Effort Sharing Regulation and Climate Action and Low Carbon Development (Amendment) Act 2021 are also presented.

2. Ireland's Provisional Greenhouse Gas Emissions in 2024

Total national greenhouse gas emissions in 2024 (excluding LULUCF) are estimated to be 53.75 million tonnes carbon dioxide equivalent (Mt CO_2eq) which is 2.0% lower (or 1.09 Mt CO_2eq) than emissions in 2023 (54.85 Mt CO_2eq) and follows a 6.8% decrease in emissions reported for 2023. Emissions in 2024 are 3.6% lower than the historical 1990 baseline. This marks the second successive year these emissions have been under this key international baseline.

National total emissions including Land Use Land Use Change and Forestry (LULUCF) decreased by 1.9% to 57.65 Mt CO_2eq. ETS[4] and ESR emissions decreased by 7.4% and 0.5% respectively. LULUCF emissions are discussed in more detail in section 4.7.

Emissions per capita decreased from 10.4 tonnes CO_2eq/person in 2023 to 10.0 tonnes CO_2eq/person in 2024. Over the past 10 years Ireland's average tonnes of CO_2eq/person is 11.9 tonnes. With recent CSO 2024 data showing a population of 5.38 million people and with population projected to increase to 5.7 million in 2030, 6.0 million in 2040 and 6.3 million by 2050, per capita emissions need to reduce significantly in order to meet reduction targets. At current per capita emission levels, each additional 500,000 people would contribute an additional five million tonnes of CO_2eq annually.

The inter-annual change in total greenhouse gas emissions is presented in Figure 1 and sectoral share of emissions (excluding LULUCF) in Figure 2 and Table 4. The annual reduction in 2024 at 1.09 Mt CO_2eq follows a 4.02 Mt CO_2eq reduction in 2023, the largest annual reduction since the economic recession in 2009-2011. Detailed sectoral data are shown in Table A.1 in the Appendix.

Agriculture is the largest contributor to the overall emissions at 38.0% of the total (excluding LULUCF). *Transport* and *Energy Industries* are the second and third largest contributors at 21.7% and 13.3%, respectively. *Residential* and *Manufacturing Combustion* emissions account for 10.4% and 7.7%, respectively. These five sectors accounted for 91.1% of national total emissions in 2024. The remainder is made up by the *Industrial Processes* sector at 3.5%, *F-Gases* at 1.1%, *Commercial Services* at 1.4%, *Public Services* at 1.3% and *Waste* at 1.6%. Figure 2 shows the contributions from each of the sectors in 1990 and 2024.

4 ETS emissions in this report refers to CO_2 emissions from stationary installations and from domestic aviation. It does not include emissions from intra-EU aviation as those are not considered part of Ireland's total reportable greenhouse gas emissions.

Figure 1. Inter Annual Changes in GHG Emissions 1990-2024

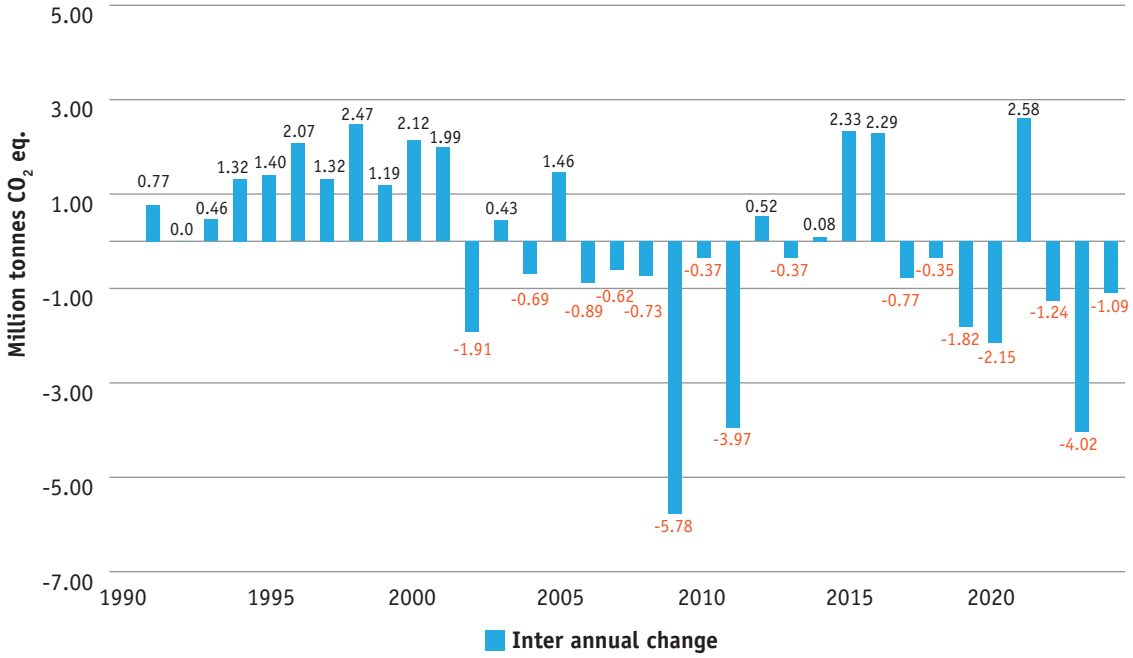
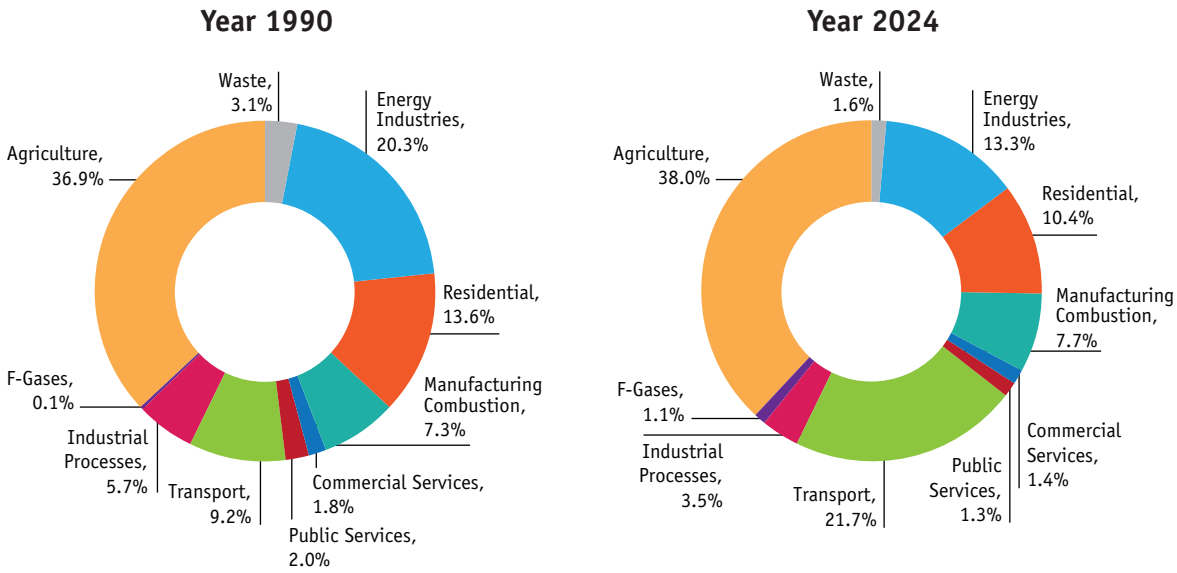


Figure 2. Profile of GHG Emissions (excluding LULUCF) in 1990 and 2024 by Sector



3. Compliance with National and EU Commitments

Ireland has several greenhouse gas emission reduction commitments, both set out in national legislation and by virtue of its EU membership and commitment to UN goals under the Framework Convention on Climate Change (UNFCCC). These various commitments have different scopes and interim targets associated with them, but all ultimately require Ireland playing its part in achieving the global goal of limiting global temperature rise.

3.1 National Climate Objective

The Climate Action and Low Carbon Development (Amendment) Act 2021[5] sets a national climate objective of achieving a climate resilient and climate neutral economy by 2050. A key milestone in achieving this aim is the 2030 reduction target of 51% of total emissions (including LULUCF) over the period 2018 to 2030.

Climate Action Plan (CAP) 2025, submitted for Government approval in December 2024, approved by Government and published in April 2025, outlines many of the policies and measures to be implemented to achieve the objective. The CAP 2025 largely reiterates the policies and measures in the CAP 2024. Progress towards Ireland's climate objective is shown in Table 2.

Carbon Budgets

The Climate Action and Low Carbon Development (Amendment) Act 2021 provides for the establishment of carbon budgets in support of achieving Ireland's climate ambition. The 51% target is the primary constraint on carbon budgets over the course of the first two budget periods ending on 31 December 2030, relative to 2018. The provisional carbon budget proposed for 2031 to 2035 continues the trajectory towards climate neutrality by 2050.

Three carbon budgets for the period up to 2035 have been approved[6] by the Oireachtas and came into force on 6th April 2022. Figure 3 illustrates a linear emissions reduction trajectory towards achieving the 51% reduction target, along with the extent to which the first carbon budget (for the period 2021-2025) has been 'used up' based on emissions from 2021 to 2024.

- Budget 1 from 2021-2025 has been set at 295 Mt CO_2eq.
- Budget 2 from 2026-2030 has been set at 200 Mt CO_2eq.
- Budget 3 from 2031-2035 has been set at 151 Mt CO_2eq.

In December 2024, the Climate Change Advisory Council published a final proposed Budget 3 from 2031-2035 of 160 Mt CO_2eq and provisional Budget 4 from 2036-2040 of 120 Mt CO_2eq.[7] At time of publication of this report, the final proposed Budget 3 and provisional Budget 4 were not adopted by Government.

Latest emission estimates for the years 2021 to 2023, in addition to provisional national total emissions including LULUCF for 2024 in this report, represent 243.31 Mt CO_2eq or 82.5% of the first five-year carbon budget of 295 Mt CO_2eq. This leaves 17.5% of the budget available for the remaining year. To stay within budget for the first carbon budget period will now require a 10.3% annual emissions reduction, or 5.96 Mt CO_2eq emission reduction, in 2025.

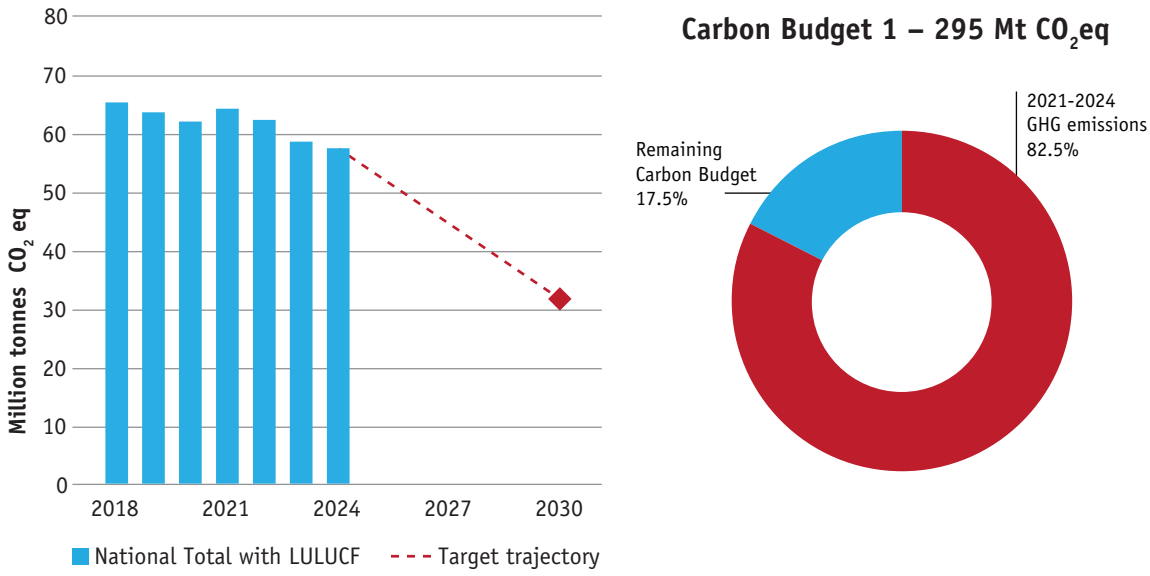
5 Climate Action and Low Carbon Development (Amendment) Act 2021 (irishstatutebook.ie)

6 https://www.gov.ie/en/publication/9af1b-carbon-budgets/

7 2024 Carbon Budget Proposal Report: https://www.climatecouncil.ie/media/CCAC%20Carbon-Budget%20Proposal%202024-final.pdf

Figure 3 below highlights the amount of the first carbon budget that has now been used with four years already passed. Section 6D, paragraph 5 of the Climate Action and Low Carbon Development (Amendment) Act 2021 states that non-achievement of the first carbon budget would see the excess emissions carried forward into the second budget period and the second carbon budget would be reduced by that amount. If this occurs this would make achievement of the second budget substantially more difficult.

Figure 3. Climate Act Target and Carbon Budgets

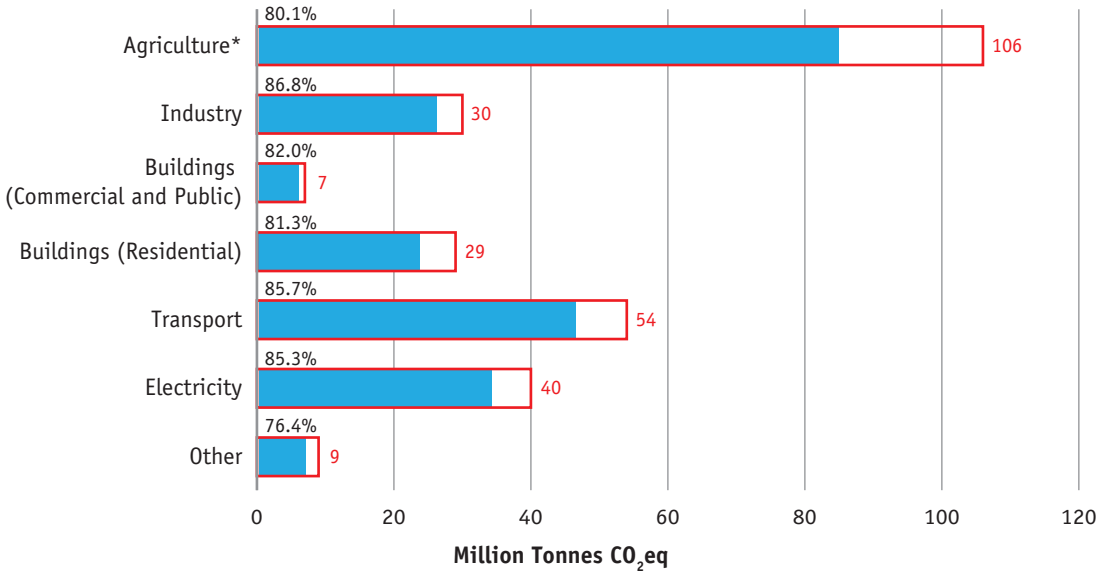


Sectoral Emissions Ceilings

Sectoral Emissions Ceilings (SECs) for the two carbon budget periods (2021-25 and 2026-30) have been approved by government to divide up the responsibility of carbon budget achievement across the key greenhouse gas emitting sectors[8]. The sectors (Electricity, Transport, Built Environment (Residential and Commercial and Public), Industry, Agriculture and Other) do not correspond directly to the sectors defined in the inventory as they take consideration of the division of Departmental responsibility. However, it has been possible to map the Inventory data onto the SEC sectors to assess usage of the budgets to date and what is required to achieve ceiling compliance. Figure 4 below presents the Sectoral ceilings along with the amount used to date by sector.

8 https://www.gov.ie/en/department-of-climate-energy-and-the-environment/publications/sectoral-emissions-ceilings/

Figure 4. First Sectoral Ceilings 2021-2025 and usage



* Due to the impact of updated science to the agricultural inventory in 2023, the Sectoral Emissions Ceilings for Agriculture is no longer aligned with the reduction target for the sector.[9]

The amount of the sectoral budget already used up ranges from 76.4% in the case of the *Other* sector to 86.8% in the case of the *Industry* sector. The sectoral ceilings for each sector were set with the expectation of achievement of specific emission reductions in 2030 relative to 2018 with indicative percentage reduction by 2025. Sectoral emissions indicative percentage reductions and 2024 reductions relative to 2018 are set out in Table 2, these range from a 75% reduction for the *Electricity* sector to 25% reduction for the *Agriculture* sector by 2030.

9 https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/irelands-provisional-greenhouse-gas-emissions-1990-2023.php

Table 2. Sectoral Emissions reduction targets and progress

Sector	2018 (Mt CO_2eq)	2024 (Mt CO_2eq)	% change 2018-2024	Indicative % reduction by 2025	Indicative % reduction by 2030
Electricity	10.24	6.95	-32.1%	~40%	~75%
Transport	12.31	11.65	-5.3%	~20%	~50%
Buildings (Residential)	7.00	5.61	-19.8%	~20%	~40%
Buildings (Commercial and Public)	1.55	1.49	-3.6%	~20%	~45%
Industry	6.95	6.01	-13.6%	~20%	~35%
Agriculture	21.40	20.41	-4.6%	~10%	~25%
Other	2.04	1.63	-20.4%	~25%	~50%
LULUCF	4.00	3.89	-2.5%	NA	NA
National Total (incl LULUCF)	**65.49**	**57.65**	**-12.0%**		**51%**

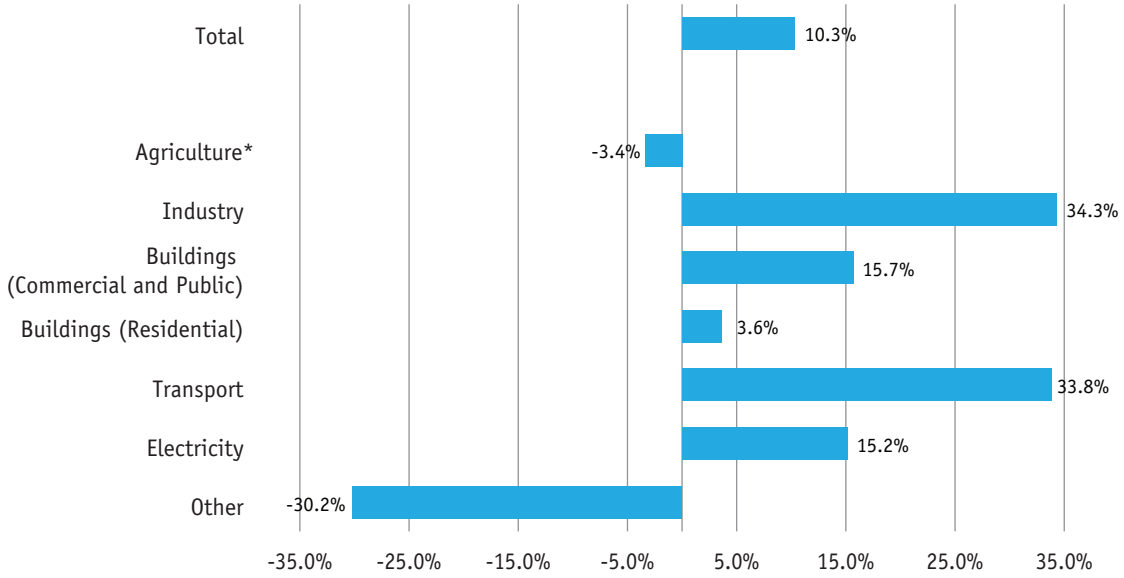
The amount of each budget already used makes a significant difference to the level of emissions reduction required next year to stay within budget. The two largest sectors with budgets, *Agriculture* and *Transport*, have reduced emissions by the lowest amounts, 4.6% and 5.3% since 2018 and have a long way to go to achieve their indicative percentage reduction targets.

Across all sectors, a national emission reduction of 10.3% in 2025 is required. For example, in the *Electricity* sector, with 85.3% of the budget already used, an emissions reduction of 15.2% is now required for 2025 to stay within the first 2021-25 budget. Required emissions reductions in 2025 for the *Industry* and *Transport* sectors are 34.3% and 33.8%, respectively. For the *Commercial and Public* buildings, the corresponding required emissions reduction is 15.7% as that sector saw an increase of emissions in 2024 compared to 2023, which brought it further away from the target.

The *Residential* sector is on track and needs a 3.6% reduction in 2025 to meet its SEC. The *Other* sector is ahead of its 2025 indicative reduction target of -25% and could potentially increase emissions in the next year by 30.2% and still meet its SEC. *Agriculture* is also on track to meet its 2025 SEC following the significant methodological changes as outlined in Section 2 of the 1990-2023 Provisional Inventory Report. This has reduced overall emissions from the sector across the timeseries including the 2018 baseline. However, the overall National Climate objective of a 51% reduction by 2030 will not be achieved unless all sectors meet the indicative percentage reduction targets for 2025 and 2030 as set out in Table 2 above.

Figure 5 below highlights the emission reductions required for each sector with a defined emissions ceiling to stay within the 2021 to 2025 budget.

Figure 5. Annual emission reductions required in 2025 to achieve SEC compliance



* Change in distance to SEC is largely a result of refinements to the Agricultural inventory as outlined in the Final 1990-2023 Greenhouse Gas Inventory Report. The indicative percentage reduction for Agriculture is ~10% by 2025 and ~25% by 2030 to support the achievement of the national target of a 51% reduction by 2030 on 2018 levels.

3.2 European Targets

The greenhouse gas emission inventory for 2024 is the fourth of ten years over which compliance with targets set in the European Union's Effort Sharing Regulation (EU 2018/842) will be assessed. This Regulation sets 2030 targets for emission reductions outside of the Emissions Trading Scheme (known as ESR emissions) and annual binding national limits for the period 2021-2030. Ireland's target is to reduce ESR emissions by 42% by 2030 compared with 2005 levels, with a number of flexibilities available to assist in achieving this.

Compliance Assessment

Annual Emissions Allocation

Ireland's ESR emissions annual limit for 2024 is 38.68 Mt CO_2eq. Ireland's provisional 2024 greenhouse gas ESR emissions are 42.42 Mt CO_2eq; this is 3.74 Mt CO_2eq more than the annual limit for 2024, see Table 3 and Figure 6. This value is the national total emissions less emissions generated by stationary combustion, i.e., power plants, cement plant, and domestic aviation operations that are within the EU's emissions trading scheme. Cumulatively from 2021-2024 and after using the ETS flexibility, Ireland is not in compliance with the ESR by a net distance to target of -1.30 Mt CO_2eq. In 2024, there is an exceedance of 1.83 Mt CO_2eq above its Annual Emissions Allocation with the ETS flexibility. Agriculture and Transport accounted for 75.4% of total ESR emissions in 2024.

The revised LULUCF Regulation (2023)[10] incorporates new rules around LULUCF flexibilities for the period 2021-2025 and 2026-2030. There is a high degree of uncertainty relating to the availability of the LULUCF flexibility and, if available, the quantity of flexibility in each budgetary period.

10 Article 14, https://data.europa.eu/eli/reg/2018/841/oj

Emissions Trading Scheme

Since 2005, emissions in the ETS sector have decreased by 49.7% or 11.14 Mt CO_2eq whereas emissions under the ESR decreased by 10.9% or 5.18 Mt CO_2eq, considerably short of Ireland's 42% reduction commitment by 2030. Within the ETS sector, electricity generation and the cement sectors are responsible for most of the decrease. Since 2005, emissions under the ESR decreased in the *Transport*, *Residential*, *Commercial Services*, *F-Gases* and *Waste* sectors, with the *Public Services* and *Agriculture* sectors increasing.

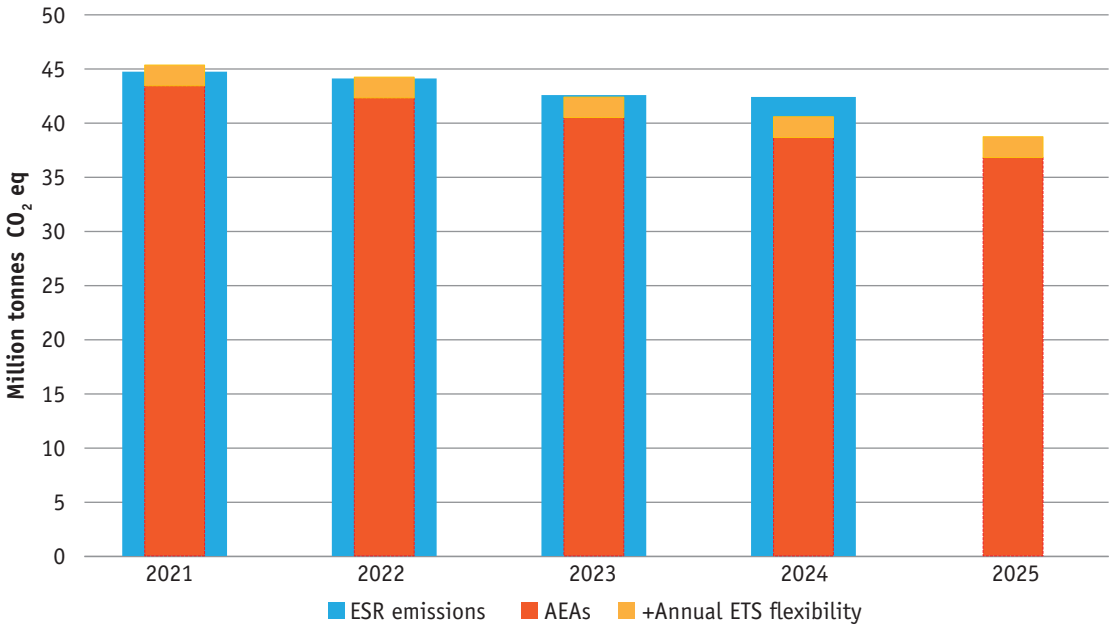
Table 3. Compliance with EU ESR Targets 2021-2025 (all numbers in the table are rounded to the nearest kt CO_2eq)

	2021	2022	2023	2024	2025
Total greenhouse gas emissions without LULUCF	60,104	58,863	54,845	53,752	–
– Total verified emissions from stationary installations under Directive 2003/87/EC	15,320	14,686	12,194	11,297	–
– CO_2 emissions from domestic aviation	20	22	23	31	–
Total ESR emissions	44,764	44,155	42,628	42,423	–
EU ESR Targets†	43,479	42,357	40,520	38,683	36,845
Gross distance to target	-1,285	-1,798	-2,108	-3,741	–
+ annualised ETS flexibility †	1,908	1,908	1,908	1,908	1,908
Net distance to target	623	110	-200	-1,833	–

† Set out in Annex II and Annex III of Commission Implementing Decision (EU) 2020/21268 with additional potential flexibilities arising from LULUCF[11]

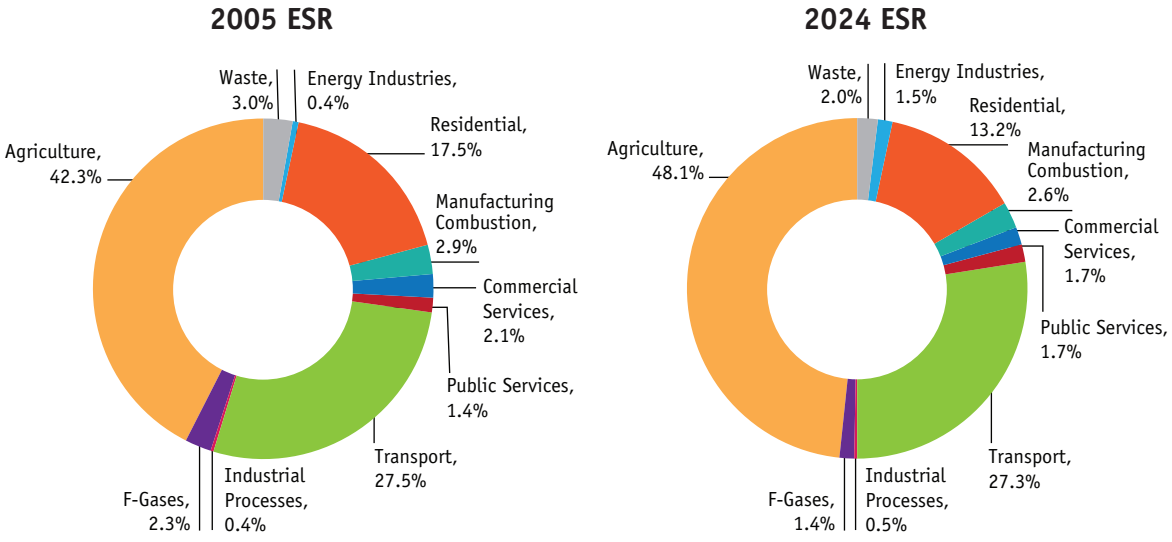
11 Implementing decision – 2020/2126 – EN – EUR-Lex

Figure 6. Compliance with ESR Targets 2021-2025



The data presented in Figure 7 shows the sectoral shares of emissions covered by the Effort Sharing Regulation in 2005 and 2024.

Figure 7. Profile of Effort Sharing Regulation relevant GHG Emissions in 2005 and 2024 by Sector



4. Greenhouse Gas Emissions by Sector

For the purposes of this report emissions are classified into ten key sectors and fluorinated gases (F-gases). Although F-gases can be emitted from any sector it is helpful to group them collectively as the emissions from any one sub-sector are seldom significant, and measures to reduce them are often cross-sectoral in nature. The sectoral breakdown used in this report, and changes in emissions for those sectors between 2023 and 2024, are presented in Table 4 below and described in more detail in the Appendix.

This sectoral breakdown is produced for national reporting purposes and is generally in alignment with the classification used for UNFCCC reporting. Key energy subcategories: *Energy Industries* (largely electricity generation), *Residential*, *Manufacturing Combustion*, *Transport*, *Commercial Services* and *Public Services* are also shown separately rather than as part of an overarching Energy category as reported to the UNFCCC.

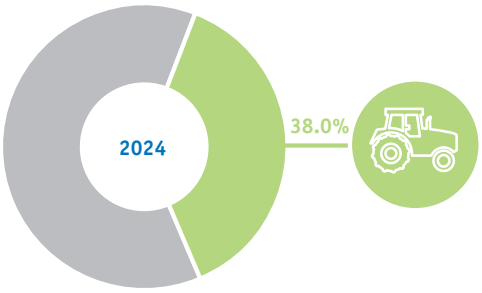
In this section, the time series since 1990 is graphically presented, as 1990 is the historical base year used for UNFCCC reporting.

Table 4. Ireland's Provisional Greenhouse Gas Emissions for 2023 and 2024 by Sector

Million tonnes CO_2eq	2023	2024	% Change
Agriculture	20.754	20.408	-1.7%
Transport	11.791	11.652	-1.2%
Energy Industries (including electricity generation)	7.860	7.157	-8.9%
Residential	5.350	5.615	4.9%
Manufacturing Combustion	4.143	4.130	-0.3%
Industrial Processes	2.155	1.880	-12.8%
F-Gases	0.566	0.581	2.7%
Commercial Services	0.713	0.771	8.2%
Public Services	0.669	0.721	7.7%
Waste	0.843	0.837	-0.7%
LULUCF	3.895	3.895*	0.0%
Total excluding LULUCF	**54.845**	**53.752**	**-2.0%**
Total including LULUCF	**58.740**	**57.646**	**-1.9%**

* LULUCF data for 2024 Provisional Inventory are 2023 Final Inventory estimates; these will be updated for the 1990-2024 Final Inventory published in 2026

4.1 Agriculture



Total emissions from the *Agriculture* sector in 2024 were 20.4 Mt CO_2eq, a decrease of 1.7% on 2023. The most significant driver for the reduction in emissions in 2024 was a decrease in total cattle numbers of 2.9%. Livestock numbers decreased in general, non-dairy cattle by 3.2%, sheep by 7.9%. Dairy cow numbers decreased by 1.7%; however, milk output per cow increased by 1.3% and overall production decreased by 0.4%. Pig and poultry numbers increased by 2.8% and 2.6%, respectively.

Methane (CH_4) emissions originate from Enteric Fermentation, Manure Management and fuel combustion.

In 2024, CH_4 emissions contribute 71.1% to the *Agriculture* sector and decreased 2.9% since 2023.

Nitrous Oxide (N_2O) emissions originate from Manure Management, Agricultural Soils and fuel combustion.

In 2024, N_2O emissions contribute 22.1% to the *Agriculture* sector and increased 1.2% since 2023, reflecting the 10.6% increase in fertiliser nitrogen use to 310.4 kilotonnes in 2024.

Carbon dioxide (CO_2) emissions originate from Liming, Urea Application and fuel combustion. In 2024, CO_2 emissions contribute 6.8% to the *Agriculture* sector and have increased by 2.8% since 2023. In 2024, liming application to soils decreased by 0.9%, using 1.03 million tonnes of lime, similar to the quantity applied in 2023. It should be noted that as a mitigation measure, elevated levels of lime application improve soil fertility, leading to sustained reductions in fertiliser nitrogen usage and a net reduction in greenhouse gas emissions.

Agriculture emissions by source category and by gas are presented in Figures 8 and 9. Increasing methane emissions are evident in the gas share trend, 14.5 Mt CO_2eq (71.1% share) in 2024 compared to 14.3 Mt CO_2eq (69.5% share) in 1990, increasing in level by 4.4%.

This is the first annual decrease (after 13 consecutive years of increases) in dairy cow numbers. Milk output per cow increased in 2024 (1.3%).

Total fossil fuel consumption in agriculture/forestry/fishing activities in 2024 increased by 1.0%.

Figure 8. Trend in Agriculture 1990-2024

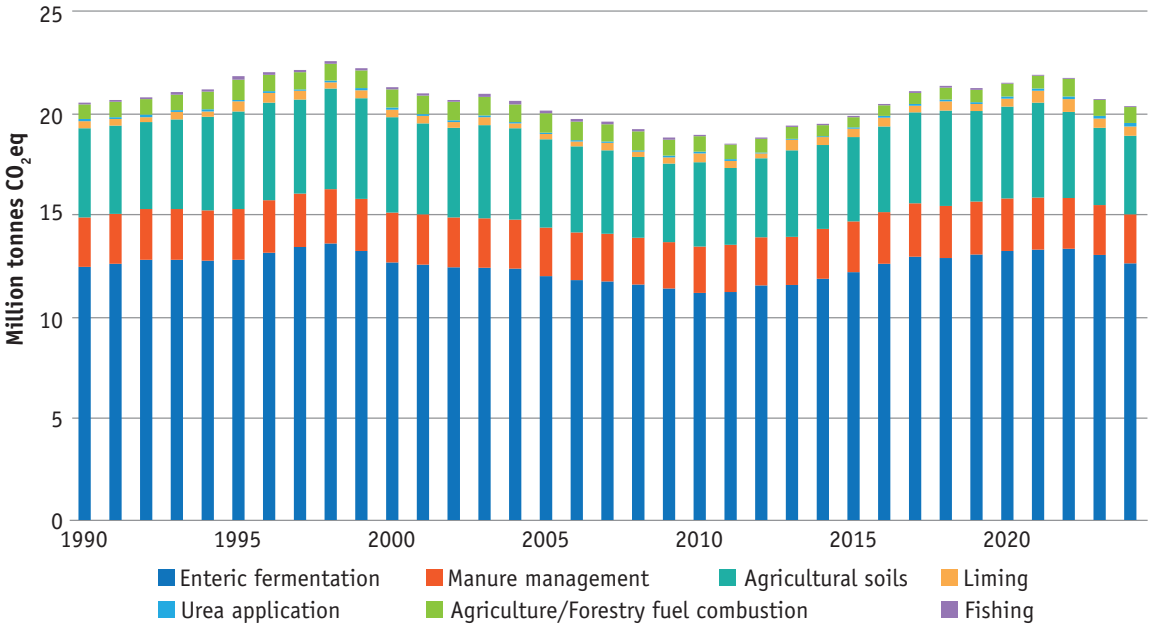
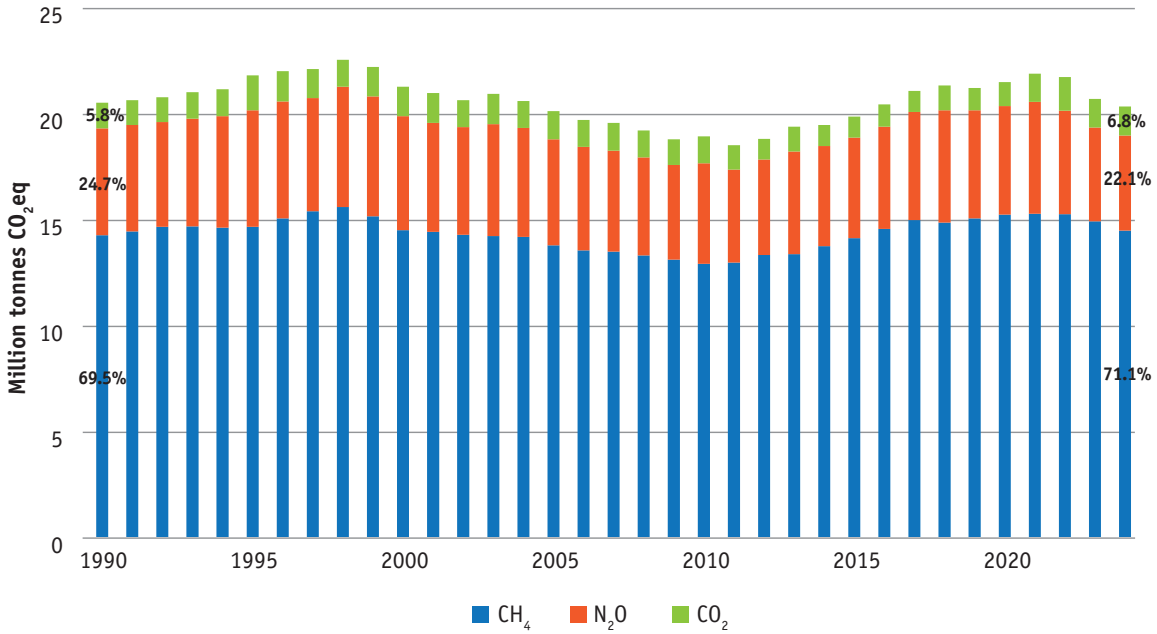
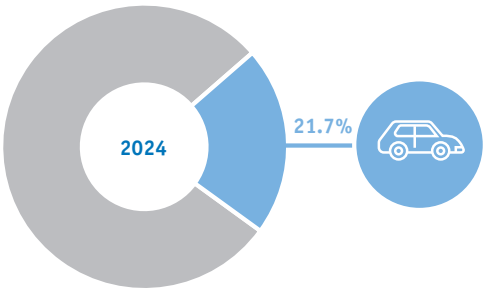


Figure 9. Trend in Agriculture, by Gas 1990-2024



4.2 Transport

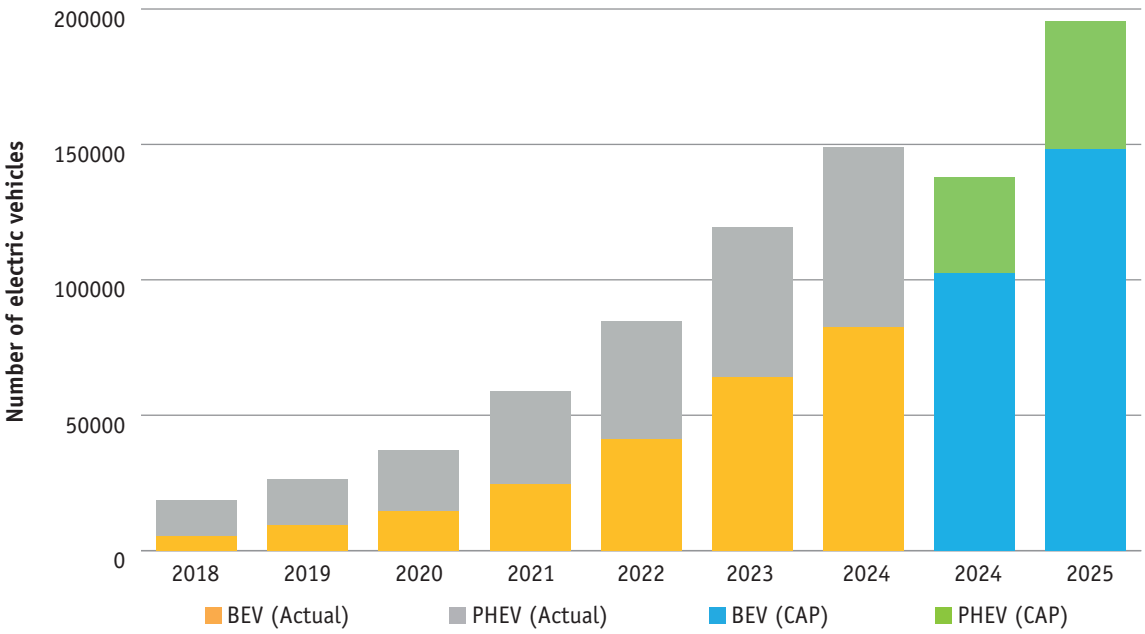


In 2024, *Transport* emissions decreased slightly by 1.2% on 2023 and, at 11.7 Mt CO_2eq, represent 21.7% of national total emissions. Despite the post-COVID rebound, *Transport* emissions in 2024 are 5.4% below pre-COVID levels. Following the ending of COVID travel restrictions, emissions increased by approximately 6% in both 2021 and 2022, while there was a slight increase in emissions by 0.3% in 2023. 2024 is the first year since 2020 which has reported a decrease in emissions in this sector; however, emissions have remained relatively stable at 11.6 Mt CO_2eq for the period 2021-2024.

Emissions from road transport were relatively stable for the period 2015-2019, at an average 11.6 Mt CO_2eq but reduced to 9.8 Mt CO_2eq in 2020. However, with the easing and ending of travel restrictions in 2021 and 2022, road transport emissions rebounded to a relatively stable average of 11.0 Mt CO_2eq for the period 2021-2024. In 2024, road transport emissions decreased for the first time since 2020 by 1.5% on 2023. While the fleet increased by 4.1% in 2024, the total energy consumption increased by 0.1%, with increases in biofuel and electricity use. With regards to biofuel, bioethanol and biodiesel consumption increased by 48.5% and 11.6%, respectively; whereas petrol consumption increased by 3.0% and diesel consumption decreased by 2.5%. Electricity consumption for transport in 2024 increased by 35.6%.

At the end of 2024, there were just over 82,400 battery electric (BEVs) and over 66,500 plug-in hybrid electric (PHEVs) vehicles in Ireland, approximately 76% of the Climate Action Plan target for 2025 of 195,300 or 16% of the 2030 policy target of 941,500 vehicles. As a result, the continued uptake of electric vehicles has meant the annual target in 2024 was exceeded; see Figure 10.

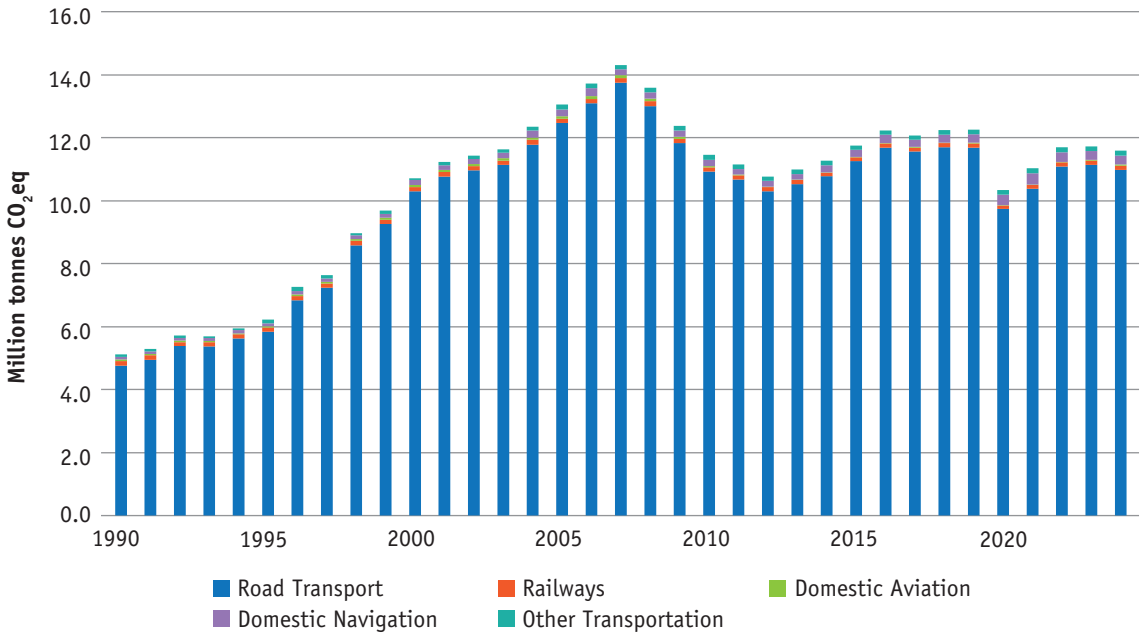
Figure 10. Total Electric Vehicles and Climate Action Plan target 2025



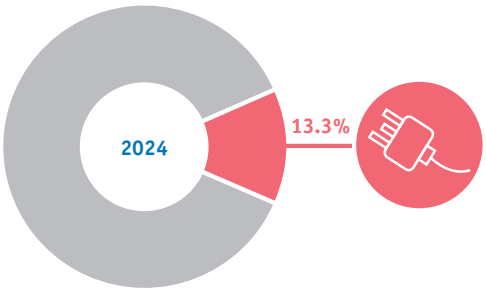
The impact of electric vehicles in reducing Transport emissions is still very small due to the low number in the vehicle fleet but they are projected to contribute substantially to emissions reductions towards the latter half of the 2020s. Evidence of this shift is notable in 2021, with new registrations of fully electric and plug-in hybrid electric cars increasing by almost double to a 19% share of all new registrations. This led to a 24% share of new registrations in 2022, a peak 29% share in 2023 and a 25% share in 2024.

Passenger cars were responsible for 49% of road transport emissions in 2024, with heavy goods vehicles and buses responsible for 31% and light goods vehicles for 20%.

Figure 11. Trend in Transport 1990-2024



4.3 Energy Industries



Sectoral emissions in the *Energy Industries* sector decreased for the third consecutive year by 8.9% in 2024, now at an all-time low across the 1990 to 2024 timeseries at 7.2 Mt CO_2eq. This reduction in emissions is partly due to an increase in the amount of imported electricity, accounting for 14.0% of electricity supply in 2024 compared to 9.5% in 2023. Imported electricity amounted to 5,062 GWh, which would have resulted in additional emissions of over 1.5 Mt of CO_2eq if generated in Ireland.

Renewables provided 1.3% more electricity in 2024 but, due to increasing demand, there was a decrease in the renewable share in electricity generation from 40.7% in 2023 to 39.6% in 2024, with wind accounting for 31.7% of electricity supply (down from 33.7%). Natural gas accounted for 42.1% of electricity generated in 2024, with coal and oil together accounting for 3.4% of electricity generated (see Figures 12 and 13). Solar now accounts for 3.0% of electricity generated in Ireland, increasing by 66.5% in 2024.

There was an annual reduction of 2.3% in total fuel used for electricity generation with a reduction of 49.0% in coal, an increase of 165.7% in oil and no change in natural gas use in 2024. The large share of renewables combined with the increase in imported electricity from interconnectors caused emissions intensity of power generation to decrease by 11.0%, from 254 g CO_2/kWh in 2023 to a historic low of 226 g CO_2/kWh in 2024.

Emissions from electricity generation had decreased year-on-year from 2016 to 2020, but 2021 and 2022 had seen increases in emissions of 1.4-1.6 Mt CO_2eq when compared to 2020 due to the return to using more carbon intensive fuel along with less renewables. In 2023, this trend reversed with a 2.1 Mt CO_2eq reduction on 2022 despite electricity demand increasing by 3.0%. Emissions continued to decrease by 0.6 Mt CO_2eq in 2024, with electricity demand increasing by 4.2%.

The emission categories relevant under the *Energy Industries* sector are: Public electricity and heat production, Petroleum refining, Manufacture of solid fuels and other energy industries, and Fugitive emissions (Figure 14).

Figure 12. Emissions Intensity of Electricity Generation 1990-2024

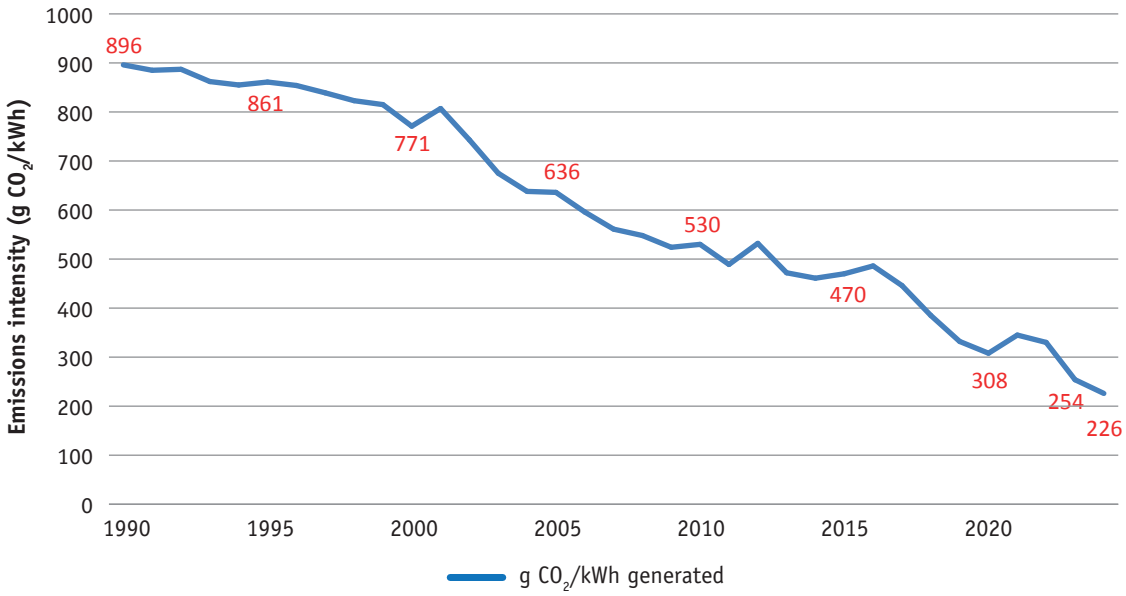


Figure 13. Electricity Generated by Fuel 1990-2024

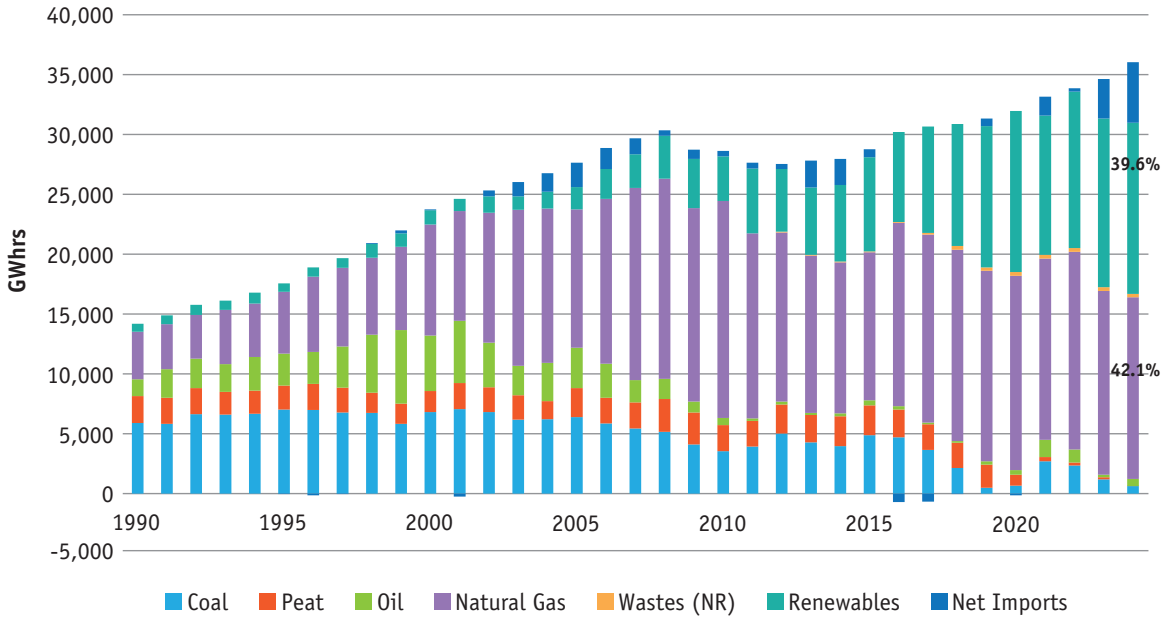
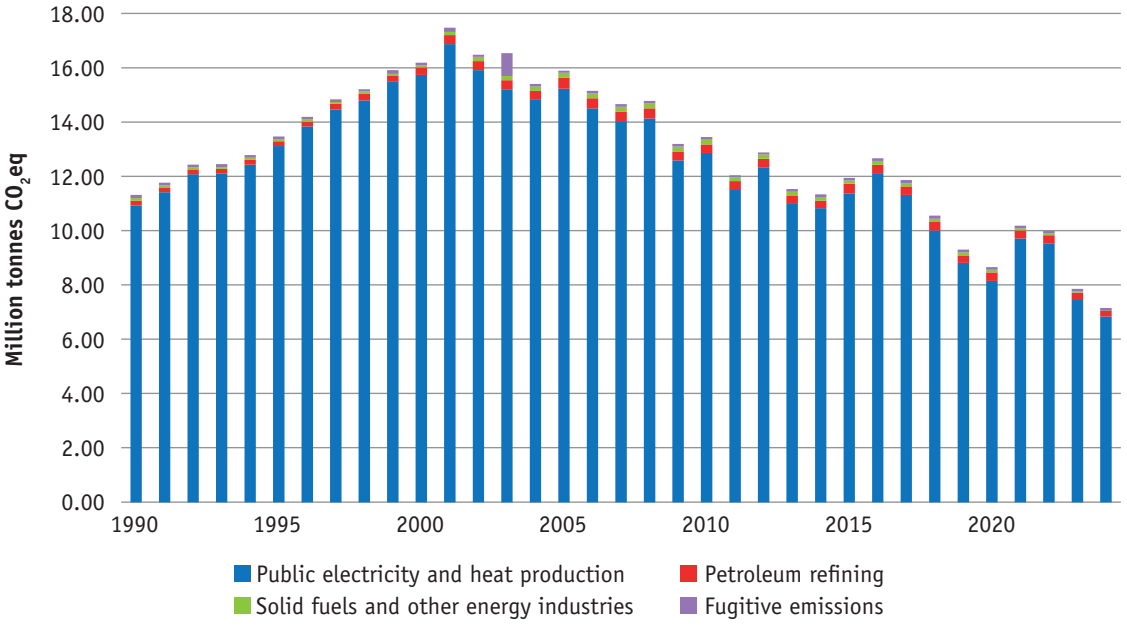
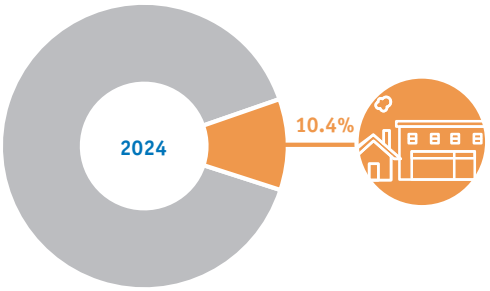


Figure 14. Trend in Energy Industries 1990-2024



4.4 Residential



Emissions in the *Residential* sector are 5.61 Mt CO_2eq or 10.4% of national total emissions in 2024 and increased by 4.9% or 0.26 Mt CO_2eq since 2023. 2024 marks the first year of emissions increasing after three continuous years of reductions since the start of the COVID-19 pandemic in 2020 which saw emissions of 7.3 Mt of CO_2eq, the highest for the sector since 2011. Within the different fuels used in household space and water heating, increases were seen in 2024 for all fossil fuels except peat; coal, kerosene and natural gas usage increased by 6.6%, 8.5% and 3.3% respectively, while peat usage decreased by 8.6%.

There were 6.3% more heating degree days[12] in 2024 than in 2023, underpinning the increase in emissions in 2024 and reinforcing that weather continues to be a key driver of residential emissions from year to year. Emissions per household, in Figure 16, shows the need for increased retrofit activity and heat pump use in order to achieve future emissions reduction commitments. 35,000 heat pumps were installed in Irish homes in 2024, bringing the total to over 173,000 with renewable ambient heat increasing by almost 19%.

Fuel switching, from coal and peat to oil and natural gas use, as well as improvements in buildings regulations helped reduce emissions per household from 7.5 t CO_2eq per year in 1990 to a low of 3.6 t CO_2eq per year in 2014. From 2015 to 2021, CO_2eq emissions per household averaged 3.8 t per annum. 2023 had 2.8 t CO_2eq of emissions per household, an all-time low since 1990, driven by further fuel switching away from fossil fuels, increased uptake in heat pumps, and expansion of energy efficiency programmes (see Figures 15 and 16). Emissions per household increased slightly by 0.1 t CO_2eq to 2.9 t CO_2eq in 2024, which can be attributed to increased fossil fuel usage compared to 2023.

12 Degree days are a measure of the heating or cooling requirement on a given day with reference to a level where neither is required (typically 15.5°C). The number of degree days in a year is a strong indicator of the annual Residential energy demand.

Figure 15. Trend in Residential 1990-2024

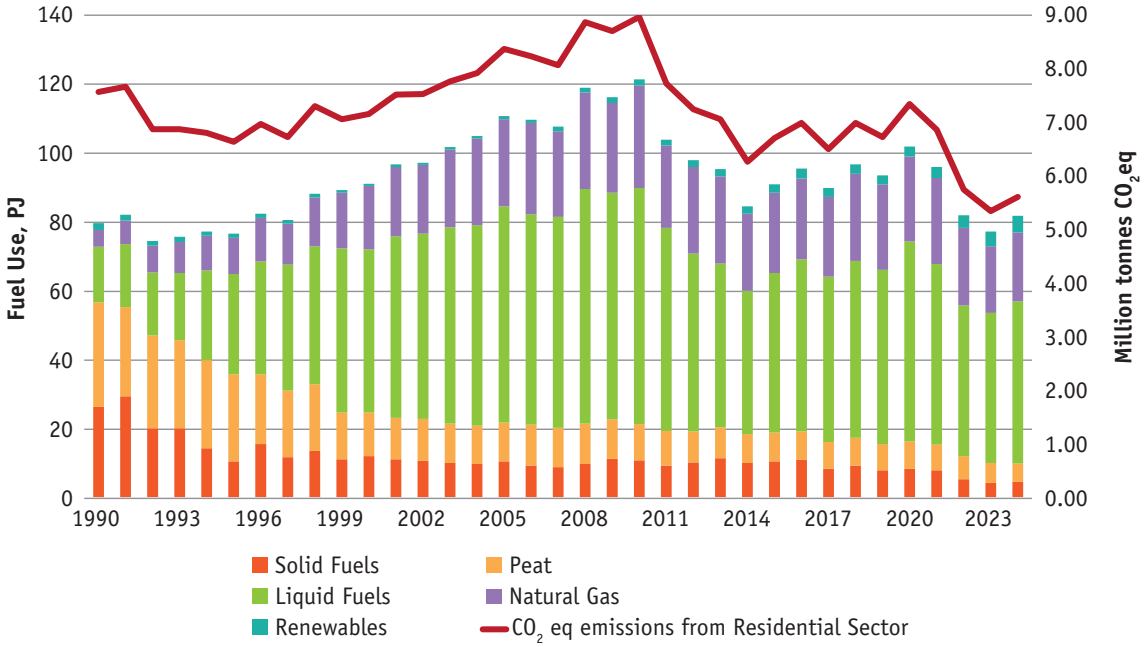
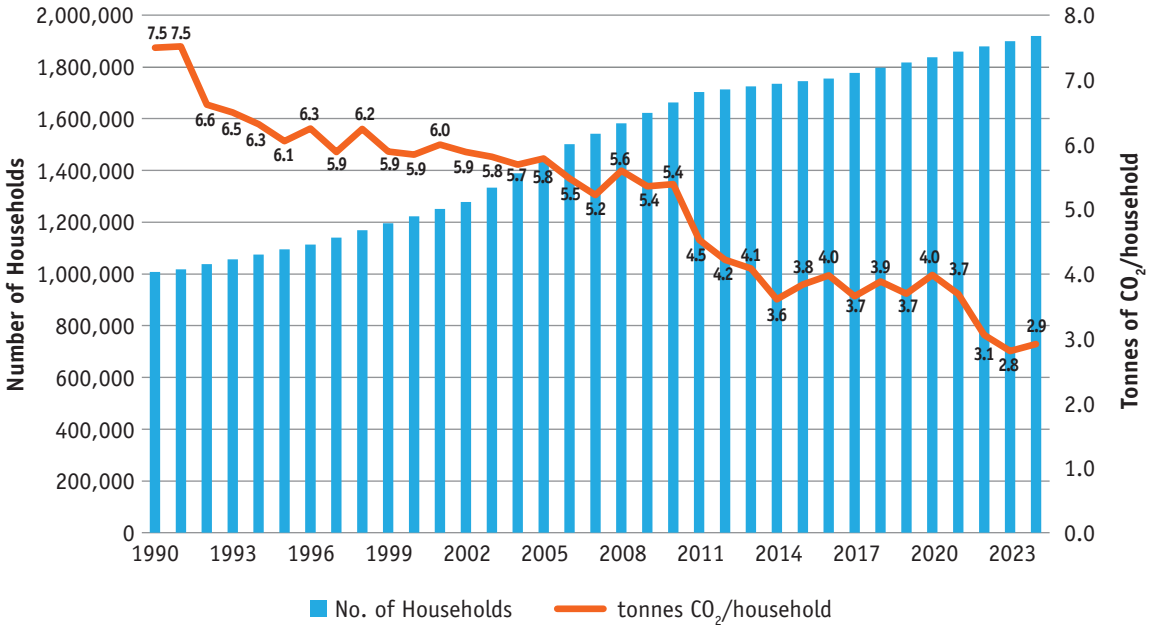
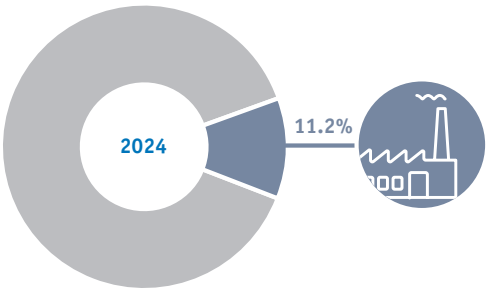


Figure 16. CO_2 emissions per Household 1990-2024



4.5 Manufacturing and Industry

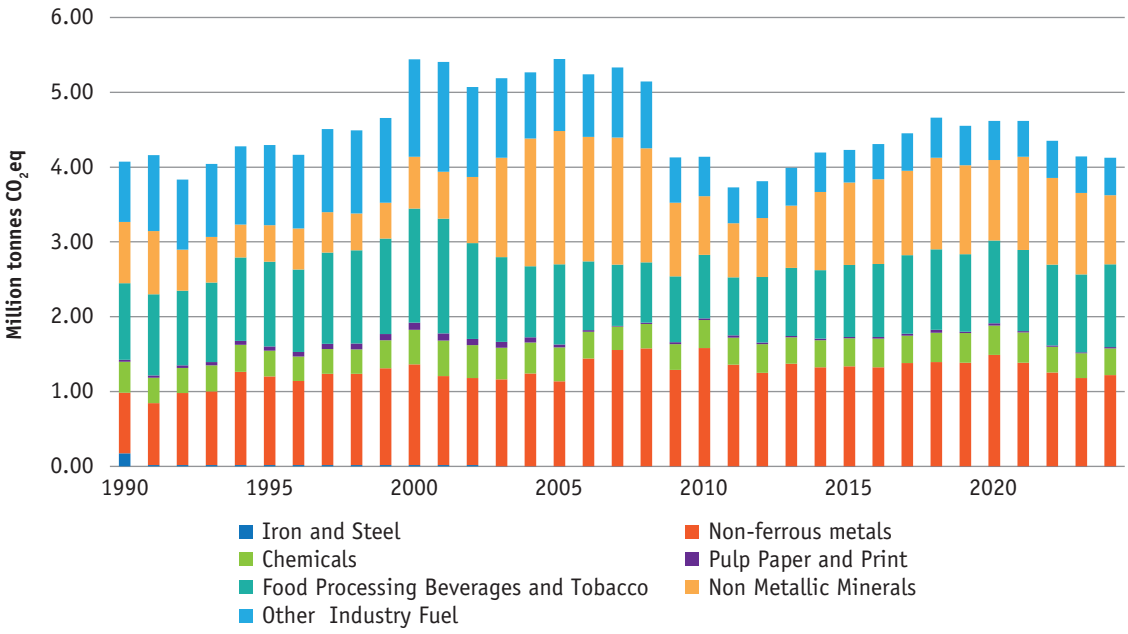


Emissions relating to *Manufacturing Combustion* and *Industrial Processes* combined accounted for 11.2% of Ireland's total emissions in 2024, or 6.01 Mt CO_2eq.

Emissions from the *Manufacturing Combustion* sector decreased by 0.3% or 0.01 Mt CO_2eq in 2024. There was a 15.4% decrease in combustion emissions from the non-metallic minerals and emissions increased from the major sub-sectors, including non-ferrous metals, chemicals and food processing, beverages and tobacco sector, i.e. 3.3%, 8.1% and 6.8%, respectively (see Figure 17).

In 2024, significant fuel reductions occurred in this sector with coal, petroleum coke and fuel oil use all decreasing by 14.4%, 31.8% and 53.7%, respectively.

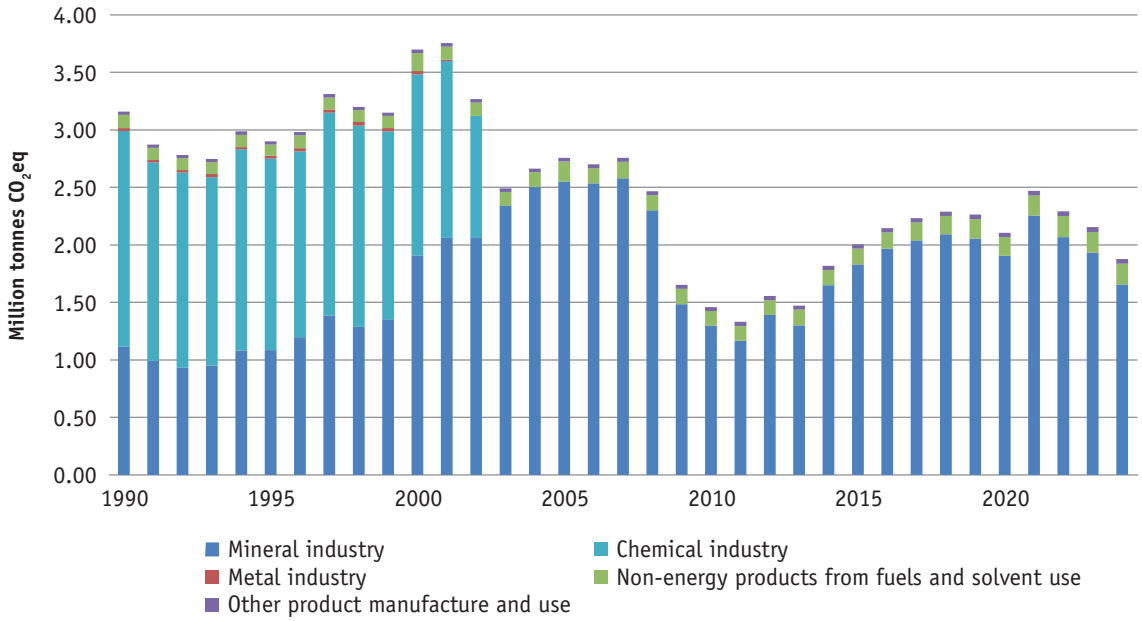
Figure 17. Trend in Manufacturing Combustion 1990-2024



Emissions from the *Industrial Processes* sector decreased by 12.8% (0.28 Mt CO_2eq) in 2024 from 2.16 Mt of CO_2eq to 1.88 Mt CO_2eq, following a 6.1% decrease in 2023. Total process emissions from the mineral products subsector (including cement) decreased by 14.3% in line with a reduction in production.

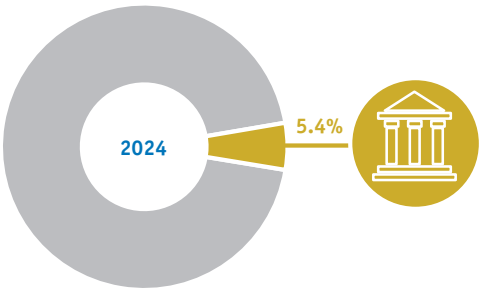
In 2024, total emissions (combustion and process) from the cement sector decreased by 15.2% and amounted to 2.48 Mt CO_2eq, or 4.6% of national total emissions. Cement sector emissions are now 46.8% higher than in 2011 during the economic recession (see Figure 18).

Figure 18. Trend in Industrial Processes 1990-2024



4.6 Other Sectors

Emissions from *F-Gases*, *Commercial Services*, *Public Services* and *Waste* account for 5.4% of total national emissions in 2024.



Commercial and Public Services

Emissions from *Commercial Services* and *Public Services* increased by 8.2% and 7.7%, respectively, in 2024. Natural gas and oil usage increased by 8.9% and 6.8%, respectively, within these sectors.

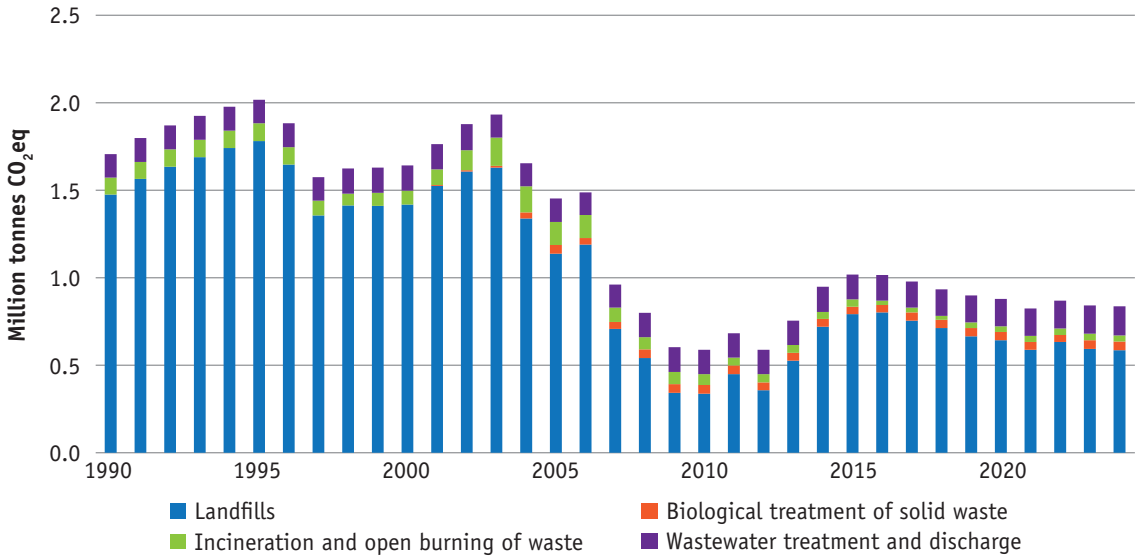
Waste

Emissions from the *Waste* sector, which account for 1.6% of total national emissions, decreased by 0.7% in 2024 because of a reduction in emissions of methane from landfills by 1.4%. Actual generation of methane at landfills fell 3.7% in 2024, with methane flared and utilised for electricity generation decreasing by 5.5% with a net overall decrease in emissions. See Figure 19.

Long-term decreases are a result of decreased quantities of municipal solid wastes (MSW) disposed of at landfills which now are combusted in Waste to Energy (WtE) plants. In addition, a decrease in the proportion of organic materials (food and garden waste) in MSW as well as a diversion of paper products from landfills. A large proportion of organic food and garden waste is now treated in composting and anaerobic digestion facilities, which have significantly lower emissions than landfills.

The emissions associated from combustion at WtE plants are estimated under electricity generation in *Energy Industries*. Improved management of landfill facilities, including increased recovery of landfill gas utilised for electricity generation and flaring is also a big driver in decreased emissions from the waste sector.

Figure 19. Trend in Waste 1990-2024

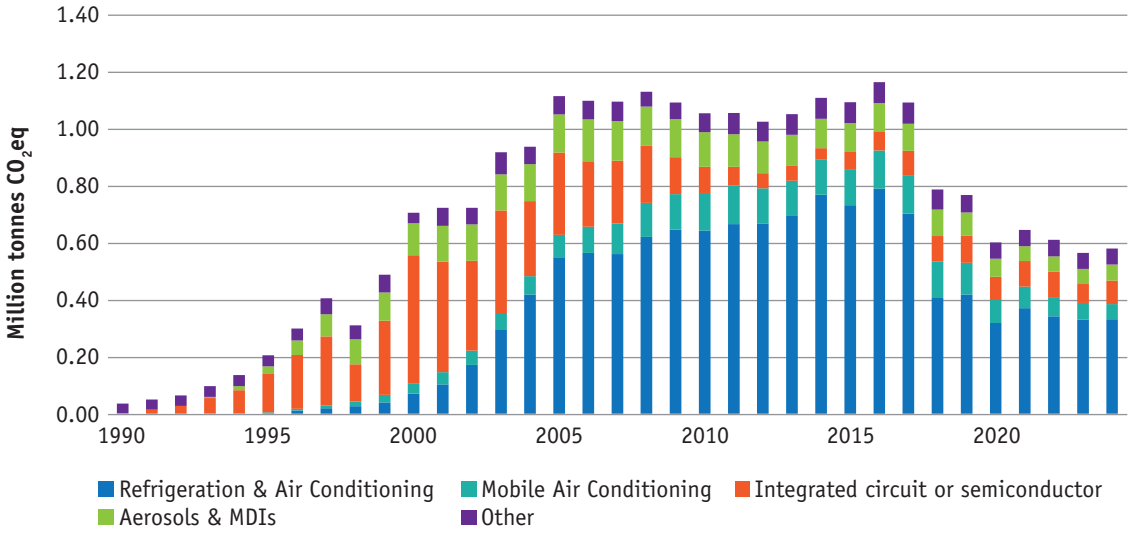


Fluorinated Gas Emissions

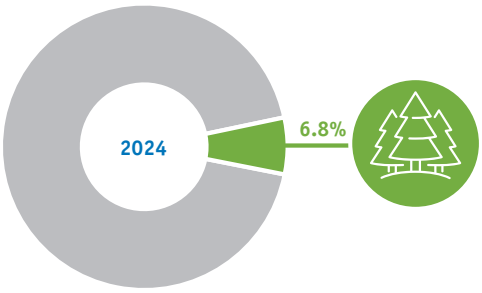
F-Gas emissions in 2024 are 2.7% higher than in 2023, following a decrease of 7.5% in the previous year. The change is based on an increase in PFCs and NF_3 use in the semiconductor industry. Emissions of F-gases (HFCs, PFCs, SF_6 and NF_3) were 0.58 Mt CO_2eq in 2024 compared to 0.04 Mt CO_2eq in 1990, a 16-fold increase over the time series; see Figure 20. However, F-gas emissions have risen from a very low base and only accounted for 1.1% of the national total in 2024. F-gases include a wide range of substances that are used in a diverse range of products and manufacturing processes.

The main reason behind the more recent decreases in F-gas emissions has been the phasing out of refrigerant and air conditioning (AC) gases with high global warming potentials (GWPs), due to the implementation of the F-Gas Regulation (EU) No. 517/2014. These refrigerant gases are being replaced with products containing a blend of HFCs and hydrofluoroolefins (HFOs) with low GWPs in this subcategory, Refrigeration and Air Conditioning.

Figure 20. Composition and Trend in F-Gas Emissions 1990-2024



4.7 LULUCF



The *LULUCF* sector is made up of six land use categories (Forest Land, Cropland, Grassland, Wetlands, Settlements, and Other Land) and Harvested Wood Products. This sector accounts for 6.8% of national total emissions (including LULUCF). See Figure 21.

These categories are sub-divided into land remaining in the same category (e.g., Forest land remaining forestland) and land converted from one category into another (e.g., grassland converted to forest land).

The provisional LULUCF emissions data are based on 1990-2023 final inventory data. The volume of timber harvested in recent years has not reached projected levels. Thus a conservative approach is undertaken for this report. Based on an initial assessment, total emissions from the sector are likely to be similar to recent years. This is prior to any improvements in emission and removal estimates that may be taken on board in the coming months. The sector is a net source of CO_2eq emissions in all years 1990-2023. The net CO_2 emissions to, or removals from, the atmosphere are estimated with respect to overall carbon gain or loss for relevant carbon pools for the defined land categories. These pools[13] are above-ground biomass, below-ground biomass, litter, dead wood, soils and harvested wood products. Emissions from biomass burning (wildfires), drainage of organic soils and emissions from mineralisation in soils are also estimated.

The main sources of emissions are the drainage of grasslands on organic soils and the exploitation of wetlands for peat extraction. Forest land and Harvested wood products are a carbon sink (CO_2 removal) for all years 1990-2024. See Figure 22. The carbon sink associated with Forest land is on a declining trend.

A complex dynamic exists between land use categories and the relative contributions between the carbon pools in biomass and soils lead to fluctuations in emissions and removals over the period 1990-2024. In any one year the Croplands land use can act as either a small sink (removal) or a small source of emissions. This results from the dynamic of using temporary grassland as part of cropping rotations. The Settlements and Other Land uses are comparatively less important and do not affect the absolute level of emissions or the trend over time to a significant extent.

Emissions from the *LULUCF* sector in 2023 (reported here as provisional 2024) were 23.6% lower than those in 1990. There has been a considerable long-term decline in the area of land afforested annually. Afforestation rates have declined from c. 17,000 ha per annum in the 1990s to c. 1,573 ha in 2024 resulting in a decreasing carbon sink in land converted to forest land. Afforestation rates are well below those suggested in the CAP25.

13 A carbon pool is a reservoir of carbon that has the capacity to both take in and release carbon

Figure 21. Profile of GHG Emissions (including LULUCF) in 1990 and 2024 by Sector

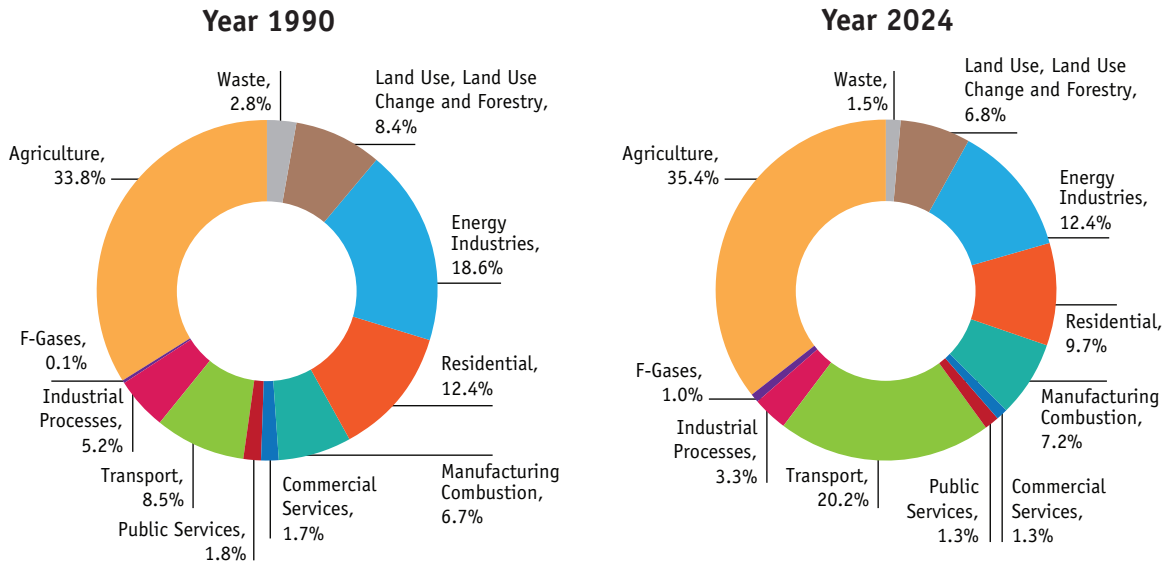
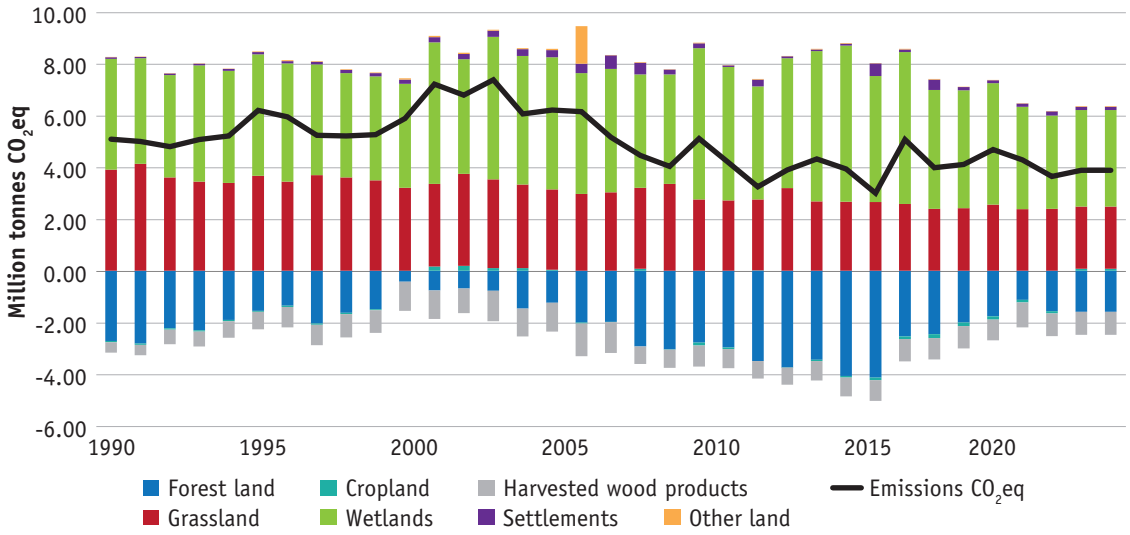


Figure 22. Trend in LULUCF 1990-2024



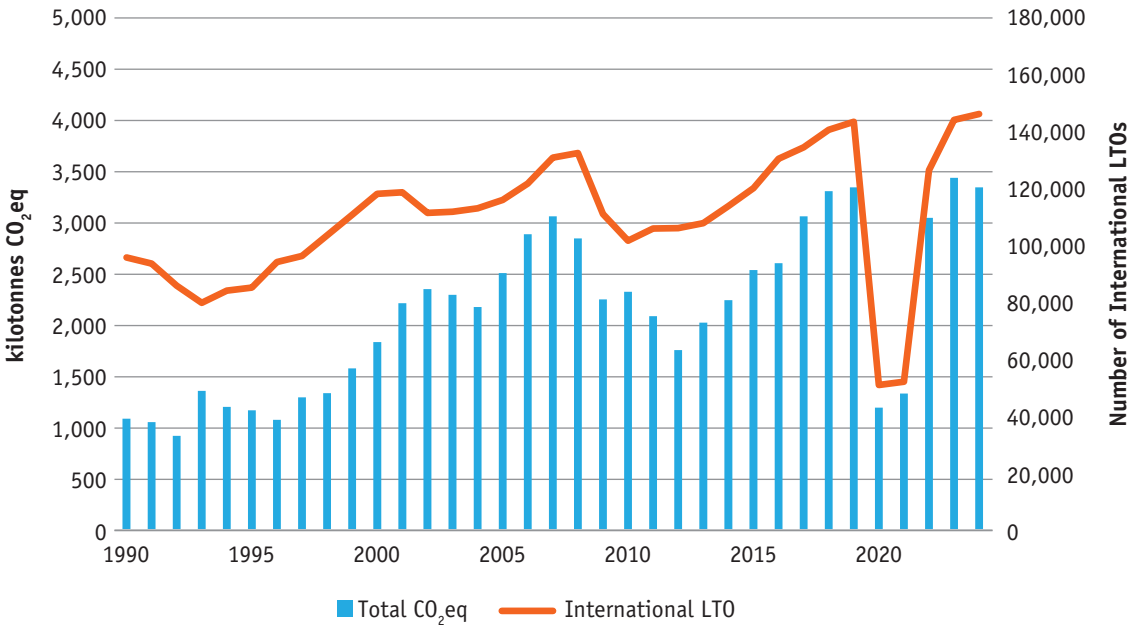
5. International Aviation and Maritime Emissions

Emissions from international aviation and maritime navigation are reported as "memo items" in the national emission inventory. This means they are not counted as part of Ireland's national total emissions but are reported by Ireland to the UNFCCC and EU for information purposes. A substantial proportion of Ireland's international aviation emissions is included in the EU ETS, such as all intra EU flights and flights within the European Economic Area (EEA) including Iceland, Norway and Liechtenstein. In 2024, total international aviation contributed 3.34 Mt CO_2eq from over 146,000 return flights from Irish airports (see Figure 23), a slight decrease of 0.09 Mt CO_2 since 2023 despite an increase in the number of landings and take-offs (LTOs) by 1.4%.

In recent years, CO_2 emissions from international aviation have increased very rapidly and it is therefore important that they are closely monitored for comparison with other emission sources and for the benefit of the international organisations that will have to develop control strategies for them in the future.

International marine navigation is another important source of emissions that is also excluded from Ireland's national total emissions and any EU or UN reduction commitments. In 2024, emissions from this source amounted to 0.36 Mt CO_2eq, which is a decrease of 13.1% on 2023.

Figure 23. Trend in International Aviation 1990-2024



6. Long-term Changes in Sectoral Emissions 1990-2024

As 1990 is the historical base year used by most countries in relation to UNFCCC reporting, it is instructive to look at how emissions have evolved over the longer timeframe from 1990 to the present. The share of CO_2 in total greenhouse gas emissions has increased to 61.1% of total greenhouse gas emissions in 2024 compared to 59.1% in 1990. The share of CH_4 and N_2O emissions, primarily from the agriculture sector, have fallen from 40.8% of total greenhouse gas emissions in 1990 to 37.9% in 2024 as emissions (primarily CO_2) from other sectors grew at a faster rate. Emissions from F-gases account for 1.1% of the total in 2024. The trend in national total emissions (excluding LULUCF) from 1990 to 2024 is -3.6%. See Figures 24 and 25 and Table A.1 in the Appendix.

Between 1990 and 2024, ***Transport*** shows the greatest overall increase of GHG emissions at 126.6%, from 5,143.3 kt CO_2eq in 1990 to 11,652.2 kt CO_2eq in 2024, with road transport increasing by 130.4%. Fuel combustion emissions from Transport accounted for 9.2% and 21.7% of total national greenhouse gas emissions in 1990 and 2024, respectively. The increase in emissions up to 2007 can be attributed to general economic prosperity and increasing population, with a high reliance on private car travel as well as rapidly increasing road freight transport. Over the time series passenger car numbers increased by 205% and commercial vehicles increased by 189%. Both the increase in transport emissions up to 2007 and the subsequent fall during the financial crisis highlight that transport emissions have not yet been effectively decoupled from economic activity through sustainable planning or electrification.

Energy Industries show a decrease in emissions of 36.9% over the period 1990 to 2024. Over the time series, emissions from electricity generation have decreased by 37.5% whereas total electricity consumption has increased by 175%. Emissions from electricity generation increased from 1990 to 2001 by 54.3% and have decreased by 59.5% between 2001 and 2024. This decrease reflects the improvement in efficiency of modern gas fired power plants replacing older peat and oil-fired plants and the increased share of renewables, primarily wind power, along with increased interconnectivity. 2024 was the first year with no peat fired electricity generation in the time series. Emissions from electricity generation had decreased year-on-year from 2016 to 2020 but increased in 2021 by 19.0% compared to 2020 due to an increase in coal and oil use, driven by a number of factors including the war in Ukraine. Coal in electricity generation decreased by 49.0% in 2024 compared to 2023.

The latest estimates show that total emissions in the ***Agriculture*** sector have decreased by 0.8% from 1990 to 2024 mainly driven by a 11.5% decrease in emissions from agricultural soils and a 1.2% decrease in emissions from manure management. Long term changes in the use of liming and urea show increases of 27.7% and 78.0% over the time series.

After initially showing a rising trend in emissions in the 1990s, the ***Agriculture*** sectoral emissions began to decrease steadily between 1998 until 2011. However, since 2011, emissions have trended upwards again with an overall peak in emissions reported in 2021. Fossil fuel combustion emissions from agriculture/forestry/fishing activities have increased by 7.0% since 1990. In the last 10 years, dairy cow numbers have increased by 22.5% with a corresponding milk production increase of 31.8%. This reflects national plans to expand milk production under Food Wise 2025 and the removal of the milk quota in 2015. In the same 10-year period sheep numbers increased by 4.7%, pigs by 4.7% and poultry by 16.8%.

Emissions in 2024 from the ***Residential*** sector were 25.8% below the 1990 level and 4.9% above the 2023 level. Increased housing stock and a growing population had driven a gradual upward trend in the emissions after 1997 following emission reductions in the early 1990s due to fuel switching. The latest three years are the lowest three years for the ***Residential*** sector emissions across the entire Inventory time series since 1990.

The number of households has increased by 90.6% and population by 53.5% between 1990 and 2024 with winter heating demand remaining an important annual variable driving emissions from this sector.

Figure 24. GHG Emissions by Gas 1990-2024

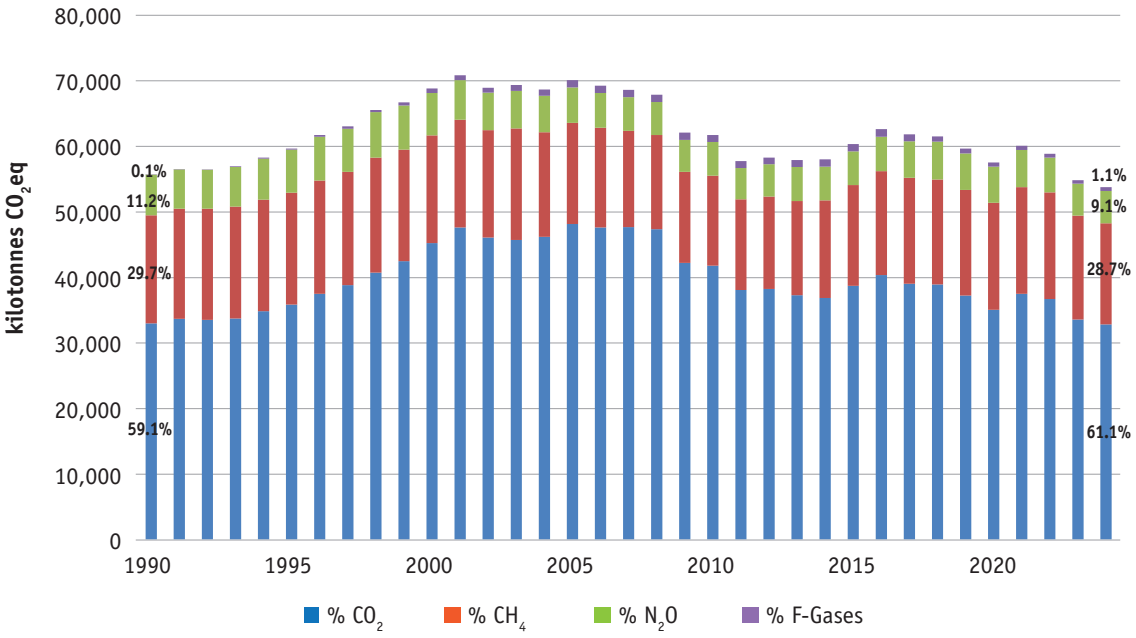
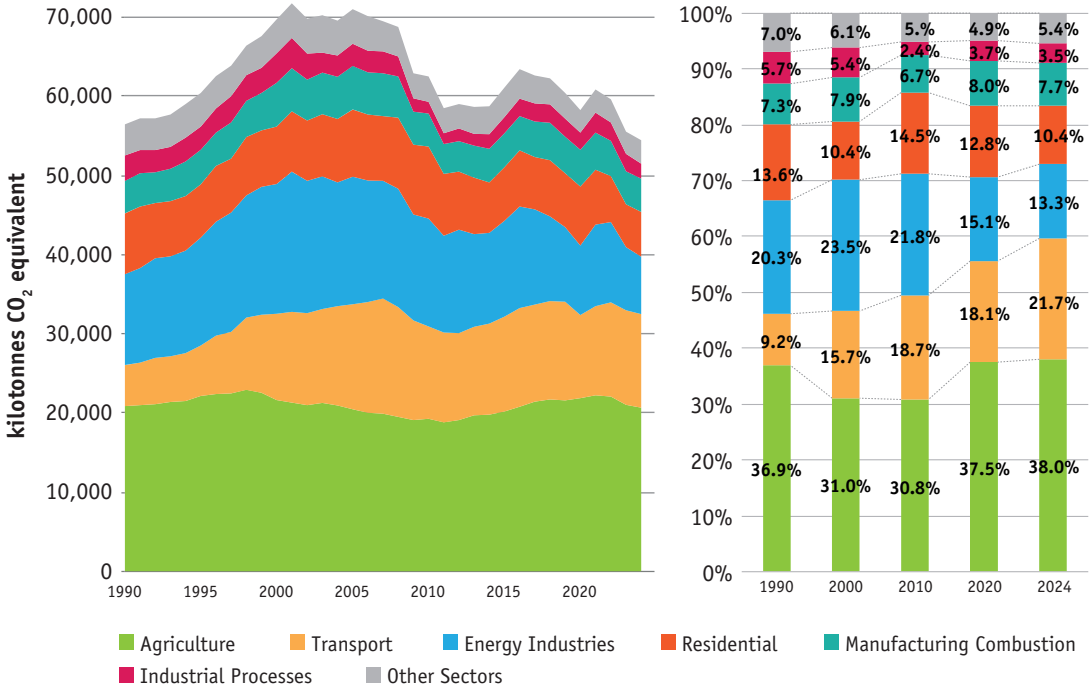


Figure 25. Trend in Emissions for Largest Sectors 1990-2024



Appendix

Additional Tables

Table A.1 Ireland's Provisional GHG Emissions by Sector 1990-2024 (kilotonnes CO_2 equivalent)

1990-2024 Submission 2025 Provisional	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	% Share 2024	% Share 2024 incl LULUCF	Annual change
Energy Industries	11335	13482	16202	15901	13461	11953	12675	11873	10559	9310	8665	10187	10003	7860	7157	13.3%	12.4%	-8.9%
Public electricity and heat production	10947	13126	15747	15235	12880	11380	12136	11327	10012	8826	8170	9721	9538	7450	6846	12.7%	11.9%	-8.1%
Petroleum refining	169	181	275	412	310	359	314	311	322	275	301	294	308	287	210	0.4%	0.4%	-26.9%
Solid fuels and other energy industries	101	69	87	171	173	114	125	129	118	107	92	81	67	34	4	0.0%	0.0%	-86.8%
Fugitive emissions	119	106	93	83	97	99	100	106	107	102	102	91	90	89	97	0.2%	0.2%	8.7%
Residential	7571	6642	7166	8382	8977	6713	6998	6509	7000	6730	7344	6868	5753	5350	5615	10.4%	9.7%	4.9%
Manufacturing Combustion	4075	4299	5444	5447	4141	4233	4312	4453	4662	4554	4620	4622	4356	4143	4130	7.7%	7.2%	-0.3%
Commercial Services	1010	1078	1026	1079	983	964	861	797	868	838	673	761	734	713	771	1.4%	1.3%	8.2%
Public Services	1123	914	856	683	549	608	634	635	678	697	670	683	690	669	721	1.3%	1.3%	7.7%
Transport	5143	6264	10777	13122	11526	11814	12296	12133	12308	12322	10401	11089	11759	11791	11652	21.7%	20.2%	-1.2%
Domestic aviation	48	46	70	80	49	16	17	18	17	18	14	20	22	23	31	0.1%	0.1%	34.4%
Road transportation	4789	5878	10357	12543	10981	11319	11754	11626	11762	11750	9793	10438	11149	11196	11034	20.5%	19.1%	-1.5%
Railways	147	123	136	135	135	121	124	128	129	135	108	116	130	136	146	0.3%	0.3%	6.8%
Domestic navigation	86	92	153	211	200	222	266	235	260	277	339	362	306	287	287	0.5%	0.5%	0.0%
Other transportation	73	125	62	153	161	137	135	127	140	142	148	152	153	149	155	0.3%	0.3%	4.0%
Industrial Processes	3163	2902	3701	2759	1461	2005	2147	2236	2292	2264	2108	2472	2294	2155	1880	3.5%	3.3%	-12.8%
Mineral industry	1117	1084	1909	2553	1299	1830	1968	2040	2095	2058	1907	2257	2068	1934	1658	3.1%	2.9%	-14.3%
Chemical industry	1875	1668	1577	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO			
Metal industry	26	25	29	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO			
Non-energy products from fuels and solvent use	117	97	156	173	126	137	141	158	159	167	160	175	185	179	180	0.3%	0.3%	0.4%
Other product manufacture and use	28	29	30	33	36	37	38	38	39	39	40	40	41	42	42	0.1%	0.1%	0.1%
F-Gases	36	205	707	1117	1057	1096	1166	1094	788	769	602	646	611	566	581	1.1%	1.0%	2.7%
Agriculture	20571	21868	21335	20184	18988	19919	20507	21128	21400	21283	21559	21950	21792	20754	20408	38.0%	35.4%	-1.7%
Enteric fermentation	12480	12827	12685	12016	11205	12226	12628	12978	12917	13091	13260	13335	13368	13060	12652	23.5%	21.9%	-3.1%
Manure management	2435	2496	2463	2395	2280	2499	2547	2639	2567	2609	2594	2550	2511	2453	2406	4.5%	4.2%	-1.9%
Agricultural soils	4393	4808	4716	4356	4154	4154	4221	4470	4691	4459	4513	4683	4238	3819	3889	7.2%	6.7%	1.8%
Liming	355	495	366	267	428	401	434	333	461	344	399	597	624	458	454	0.8%	0.8%	-0.9%
Urea application	97	86	92	61	98	64	82	84	90	96	110	106	144	139	172	0.3%	0.3%	23.6%
Agriculture/Forestry fuel combustion	723	998	900	944	746	510	535	555	590	610	622	619	853	764	774	1.4%	1.3%	1.3%
Fishing	88	158	113	145	76	65	60	71	84	73	59	58	54	61	61	0.1%	0.1%	0.0%
Waste	1709	2020	1643	1454	589	1020	1016	979	934	899	879	825	870	843	837	1.6%	1.5%	-0.7%
Landfills	1476	1784	1420	1140	337	793	803	756	714	665	644	590	634	594	586	1.1%	1.0%	-1.4%
Biological treatment of solid waste	0	0	0	48	50	42	41	47	46	49	48	43	39	50	51	0.1%	0.1%	0.8%
Incineration and open burning of waste	98	101	80	133	62	42	25	27	24	33	31	35	36	36	36	0.1%	0.1%	0.0%
Wastewater treatment and discharge	135	135	143	134	140	144	147	149	150	152	156	157	161	164	165	0.3%	0.3%	1.0%
Land use, land-use change and forestry	5099	6229	5913	6238	5123	3952	3012	5091	3996	4126	4707	4303	3655	3895	3895		6.8%	0.0%
Forest land	-2723	-1554	-428	-1238	-2790	-4081	-4151	-2556	-2463	-2009	-1769	-1135	-1575	-1598	-1598		-2.8%	0.0%
Cropland	-48	-45	1	43	-113	-71	-93	-92	-155	-142	-125	-101	-83	82	82		0.1%	0.0%
Grassland	3928	3682	3217	3116	2763	2680	2670	2590	2397	2429	2565	2388	2396	2407	2407		4.2%	0.0%
Wetlands	4292	4720	4039	5123	5869	6060	4890	5893	4612	4576	4708	3977	3632	3746	3746		6.5%	0.0%
Settlements	62	84	166	274	196	75	482	108	413	123	121	120	154	132	132		0.2%	0.0%
Other land	1	21	42	49	19	18	17	17	17	17	16	16	15	14	14		0.0%	0.0%
Harvested wood products	-413	-680	-1123	-1130	-819	-729	-804	-869	-826	-866	-809	-963	-883	-887	-887		-1.5%	0.0%
Other	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–			
National Total	**55735**	**59675**	**68857**	**70127**	**61733**	**60326**	**62611**	**61838**	**61491**	**59666**	**57520**	**60104**	**58863**	**54845**	**53752**	**100.0%**	**100.0%**	**-2.0%**
National Total with LULUCF	**60834**	**65904**	**74770**	**76365**	**66857**	**64278**	**65623**	**66928**	**65487**	**63792**	**62227**	**64407**	**62518**	**58740**	**57646**	**100.0%**	**100.0%**	**-1.9%**

Background Notes

Units: 1 Mt = 1,000 kilotonnes

CO_2 Equivalent: greenhouse gases other than CO_2 (i.e., methane, nitrous oxide and F-gases) may be converted to CO_2 equivalent using their global warming potentials (GWPs).

F-gases: These gases comprise HFCs (Hydroflurocarbons), PFCs (Perfluorcarbons), SF_6 (Sulphur Hexafluoride) and NF_3 (Nitrogen Trifluoride). They are much more potent than the naturally occurring greenhouse gas emissions (carbon dioxide, methane and nitrous oxide).

Ireland's GHG Sectors: include the following eleven sectors for analysis:

1. Energy Industries (electricity generation, waste to energy incineration, oil refining, briquetting manufacture and fugitive emissions)
2. Residential (combustion for domestic space and hot water heating)
3. Manufacturing Combustion (combustion of fuels for heating, steam generation and powering machinery)
4. Commercial Services (combustion for Commercial Services space and hot water heating)
5. Public Services (combustion for Public Services space and hot water heating)
6. Transport (combustion of fuel used in road, rail, navigation, domestic aviation and pipeline gas transport)
7. Industrial Processes (process emissions from mineral, chemical, metal industries, non-energy products and solvents)
8. F-gases (gases used in refrigeration, air conditioning and semiconductor manufacture)
9. Agriculture (emissions from fertiliser application, ruminant digestion, manure management, agricultural soils and fuel used in agriculture/forestry/fishing)
10. Waste (emissions from solid waste disposal on land, solid waste treatment (composting and anaerobic digestion), wastewater treatment, waste incineration and open burning of waste).
11. Land Use Land-use Change and Forestry (LULUCF) covers the following categories: Forest Land, Cropland, Grassland, Wetlands, Settlements, Other Land and Harvested Wood Products.

GWPs

Industrial designation or common name	Chemical formula	GWP for 100-year time horizon IPCC 5th assessment report (AR5)
Carbon dioxide	CO_2	1
Methane	CH_4	28
Nitrous oxide	N_2O	265
Hydrofluorocarbons	HFCs	4 to 12,400
Perfluorinated compounds	PFCs	6,630 to 11,100
Sulphur hexafluoride	SF_6	23,500
Nitrogen trifluoride	NF_3	16,100

ISBN 978-1-80009-290-7

Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil