

Northern Ireland Greenhouse Gas Emissions

2022



Department of
**Agriculture, Environment
and Rural Affairs**

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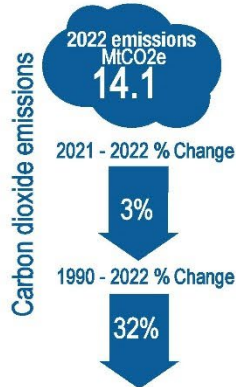
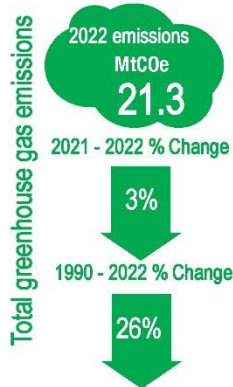
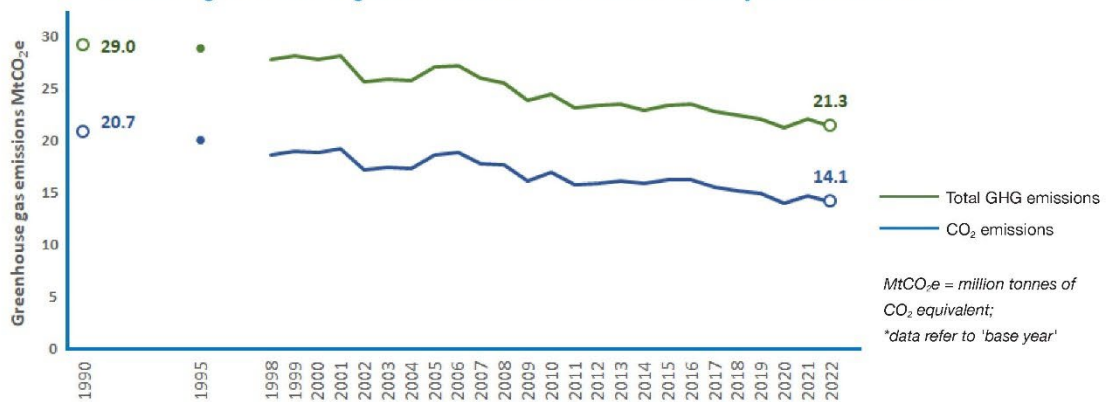
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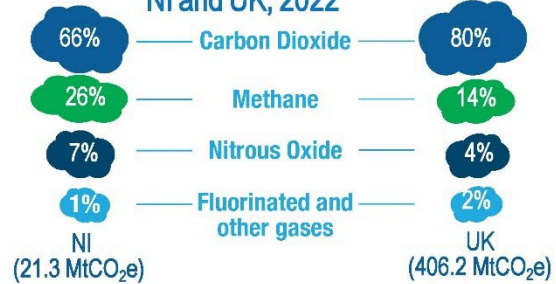
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NI Greenhouse Gas Statistics 1990-2022

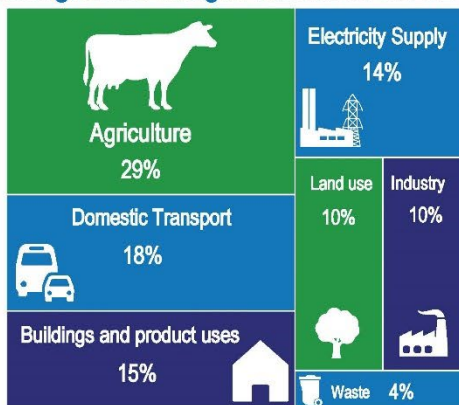
2022 NI greenhouse gas emissions have decreased by 26% since 1990*



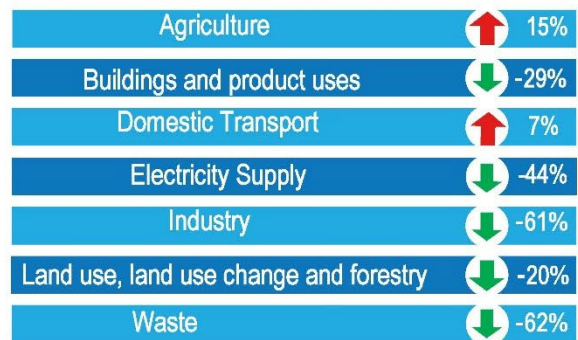
Composition of greenhouse gas emissions (%), NI and UK, 2022



Agriculture was the largest emitting sector of NI greenhouse gas emissions in 2022



Industry delivered the largest reduction in emissions from 1990 to 2022 (-3.2 MtCO₂e)



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Northern Ireland greenhouse gas statistics 1990-2022

Key points

- In 2022, Northern Ireland's net greenhouse gas emissions were estimated to be **21.3 million tonnes of carbon dioxide equivalent (MtCO_{2e})**. This net figure is a result of an estimated 23.2 MtCO_{2e} total emissions, offset by 1.9 MtCO_{2e} of emissions removed through sequestration.
- The net figure of 21.3 MtCO_{2e}, in 2022, represents a decrease of 3.0% compared with 2021. The longer-term trend showed a decrease of 26.4% compared with emissions in 1990.
- In 2022, Agriculture was the largest emitting sector, responsible for 29.1% of emissions. Domestic transport contributed 18.1% to overall emissions, whilst the Buildings and product uses and Electricity supply sectors contributed 15.3% and 14.0% respectively.
- Between 2021 and 2022 all sectors, with the exception of Domestic transport, showed a decrease in emissions. The largest decreases in terms of tonnes of carbon dioxide equivalent were in the Buildings and product uses (0.4 MtCO_{2e}), Agriculture (0.1 MtCO_{2e}) and Electricity Supply (0.1 MtCO_{2e}) sectors.
- In 2022, Northern Ireland contributed 5.3% of all UK greenhouse gas emissions, which stood at 406.2 MtCO_{2e}. In the UK there has been a 50.2% reduction in emissions between 1990 and 2022. During the same period, the reduction in emissions in Northern Ireland was 26.4%, compared to 52.6% in England, 51.2% in Scotland and 36.4% in Wales.

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Introduction

The purpose of this statistical bulletin is to summarise the latest published estimates of greenhouse gas emissions for Northern Ireland. The tables these estimates are sourced from is available from the National Atmospheric Emissions Inventory website [Devolved Administrations - Greenhouse Gas Reports](#).

The focus of this report is on 'by source' emissions, which are allocated to the source sector in which they occur. 'End user' emissions, where energy supply emissions are allocated to energy users, are also available.

Monitoring Progress

NI Climate Change Act

The Climate Change Act (Northern Ireland) 2022¹ came into operation on 7th June 2022. The Act sets a 2050 net zero greenhouse gas emissions account for Northern Ireland compared to baseline, along with interim targets of an at least 48% reduction in the net emissions account by 2030, and a 2040 target for emissions to be in line with the 2050 target. The Department of Agriculture, Environment and Rural Affairs (DAERA) must also review and potentially update both the 2030 and 2040 targets by June 2024.

As is the case for the UK as a whole, five-yearly carbon budgets will be set for Northern Ireland to limit emissions and keep progress on track towards meeting the targets set out in the Act. The first three carbon budgets, covering the periods 2023-2027, 2028-2032 and 2033-2037, have been consulted on and will be set through legislation brought forward for Executive and Assembly approval in 2024.

Northern Ireland is part way through its first carbon budget period (2023-2027). As required by the Act, detail on progress made in reducing emissions across the period will be published before the end of 2029.

UK Climate Change Act

At a UK level, the Climate Change Act 2008 sets a 2050 net zero target for the UK as a whole. To help meet these targets, the government has set five-yearly carbon budgets, which at this time run until 2037.

All administrations, including Northern Ireland, contribute to the UK carbon budgets. These legally binding carbon budgets act as stepping-stones towards the 2050 target and provide a pathway to meet the overall UK climate change target. The UK greenhouse gas inventory reports emissions on a 'by source basis', and it is these

¹ [Northern Ireland Climate Changes Act](#)

estimates that are used to assess the UK's progress against emissions reductions targets.

The first carbon budget ran from 2008 to 2012 and the second from 2013 to 2017. In 2014² and 2019³, respectively, it was confirmed that the UK had met these budgets. Over the first carbon budget period, on average emissions as measured by the net carbon account were 23.6% lower than 1990 base year and 40% lower over the second carbon budget period. The third carbon budget covers the period 2018 to 2022 and a final statement for this period will be published in May 2024.

The UK is currently in the fourth carbon budget period (2023 to 2027) which has a target to reduce emissions by 51% by 2025 (on 1990 baseline levels). The fifth and sixth carbon budgets have targets of 57% by 2030 and 78% by 2035⁴.

Programme for Government Indicator

Greenhouse gas emissions estimates were included in the draft Programme for Government 2016-2021 framework as an indicator under outcome 2: we live and work sustainably – protecting the environment. Monitoring of the 2016-21 Draft Programme for Government indicators ceased in May 2021, however greenhouse gas emissions estimates have been proposed as a population indicator in the forthcoming Programme for Government.

Replacement of National Communication sectors with Territorial Emissions Statistics sectors

Previous Northern Ireland greenhouse gas inventory statistical bulletins categorised emissions estimates into National Communication (NC) sectors. Following consultation with key stakeholders, it was proposed⁵ that the emissions estimates be categorised into Territorial Emissions Statistics (TES) sectors in order to better meet users' needs.

A detailed breakdown of how emissions sources from NC sectors have been reallocated to TES sectors is provided below.

² [Final statement for the first carbon budget period](#)

³ [Final statement for the second carbon budget period](#)

⁴ [The CCC - Carbon budgets and targets](#)

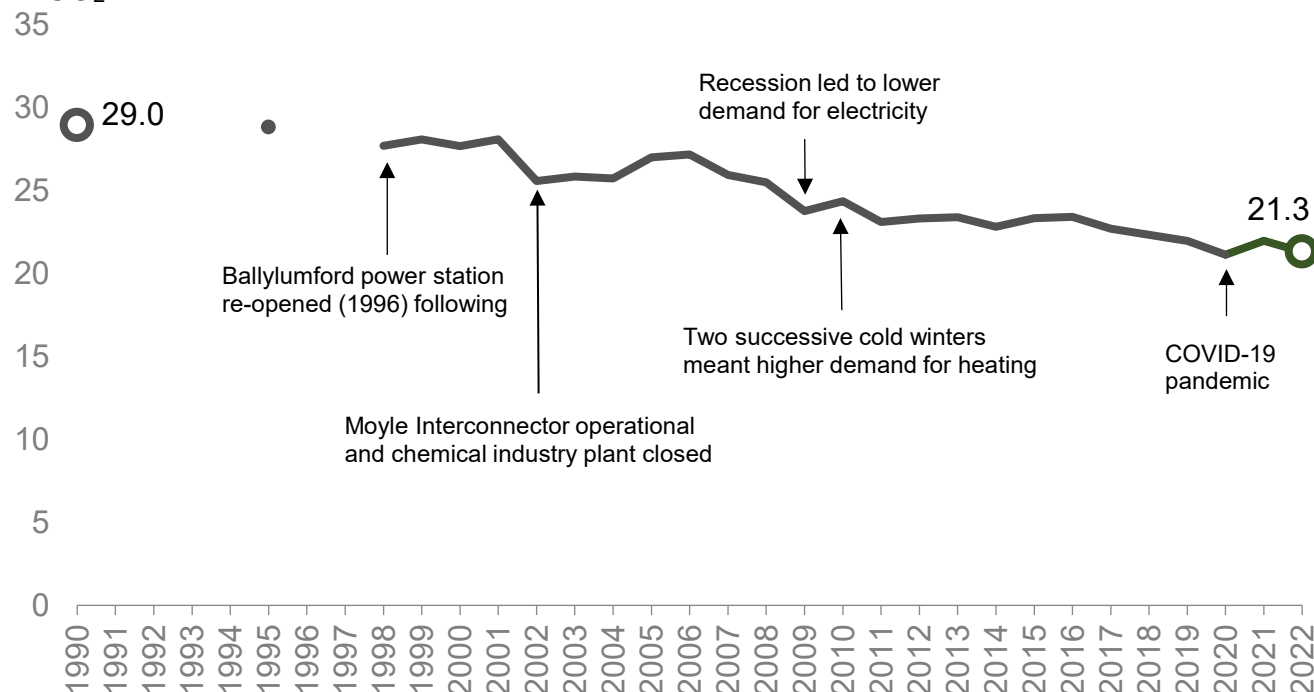
⁵ [National Communication sector replacement proposal](#)

TES sector	Emissions sources in scope according to their NC sector allocation
Agriculture	Agriculture – The coverage of the Agriculture sector is unchanged. However, there have been some changes to the categories within the Agriculture sector.
Buildings and Product Uses	<p>Business – Includes emissions from combustion on commercial sites previously allocated to the Business sector. Also includes emissions from product uses in Business such as nitrous oxide (N₂O) use as an anaesthetic, or stationary refrigeration and air conditioning.</p> <p>Public – Includes all emissions previously allocated to the Public sector.</p> <p>Residential – Includes emissions from residential fuel combustion and product uses such as recreational N₂O use, aerosols, and metered dose inhalers previously allocated to the Residential sector.</p> <p>Industrial Processes – Includes emissions from the use of N₂O in industry previously allocated to the Industrial Processes sector.</p>
Domestic Transport	<p>Transport – Includes all emissions previously allocated to the Transport sector.</p> <p>Business – Includes F-gas emissions from mobile air conditioning and transport refrigeration previously categorised as part of the Business sector.</p>
Electricity supply	Energy Supply – Includes emissions from power stations previously allocated to the Energy Supply sector.
Fuel Supply	Energy Supply – Includes emissions from fuel production and fuel supply activities such as mining, refining, manufacturing, and distributing fuels previously allocated to the Energy Supply sector.
Industry	<p>Business – Most Industry sector emissions carry over from the Business sector. These comprise of emissions from manufacturing and construction, as well as industrial refrigeration and air conditioning.</p> <p>Industrial Processes – Most emissions previously categorised as part of the Industrial processes sector have been reallocated to the Industry sector.</p> <p>Energy Supply – Emissions from coke production previously categorised as part of the Energy Supply sector are now included in the Industry sector as energy from coke production is primarily used in the iron and steel industry.</p>

<p>Land Use, Land Use Change and Forestry (LULUCF)</p>	<p>LULUCF – The coverage of the LULUCF sector is unchanged. However, there have been some substantial changes to the categories within the LULUCF sector to align better with land use policy. Key changes include the separation of forestry and peatlands related emissions into their own sub-sectors, as well as the creation of new categories within forestry and peatlands that better describe the emissions and removals.</p>
<p>Waste</p>	<p>Waste Management – Includes all emissions previously allocated to the Waste Management sector.</p> <p>Business – Includes emissions from accidental fires previously allocated to the Business sector.</p> <p>Residential – Includes emissions from household composting, small-scale waste burning, and accidental fires previously allocated to the Residential sector.</p>

Northern Ireland Summary

Figure 1: Greenhouse gas emissions
Northern Ireland, 1990, 1995, 1998-2022
MtCO_{2e}



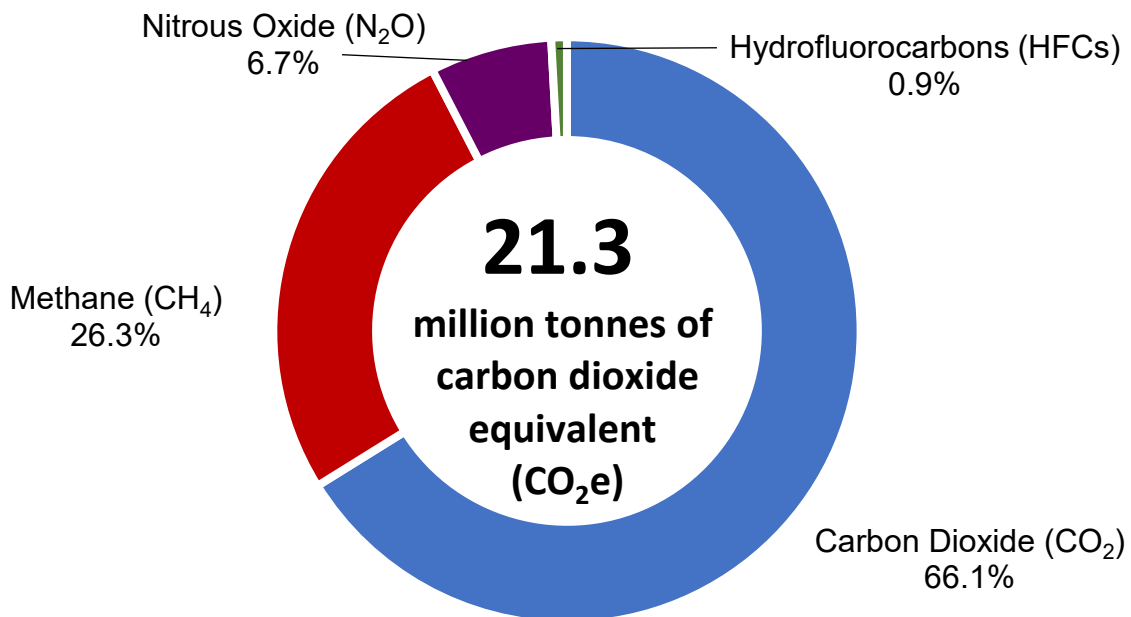
- In 2022, Northern Ireland's net greenhouse gas emissions⁶ were estimated to be 21.3 million tonnes of carbon dioxide equivalent (MtCO_{2e}). This was a decrease of 3.0% compared to 2021 (Figure 1). In absolute terms this is a fall of 0.7 MtCO_{2e}.
- The longer-term trend showed a decrease of 26.4% compared to the base year estimate of 29.0 MtCO_{2e} (Figure 1). The base year is 1990 for carbon dioxide, methane, and nitrous oxide, and 1995 for the fluorinated gases⁷.

⁶ Net emissions refer to total emissions minus removals of carbon dioxide from the atmosphere by carbon sinks in the land use change sector. The land use change sector is the only sector that consists of emissions and removals. Net emissions exclude emissions from international aviation and shipping.

⁷ Given the small differences involved, all references to '1990', within tables and figures, refer to 'base year' estimates as provided by the Greenhouse Gas Inventory. Please see 'Further Information' section for more details.

Figure 2: Greenhouse gas emissions by gas type⁸

Northern Ireland, 2022



- Carbon dioxide accounted for 66.1% of all greenhouse gas emissions in Northern Ireland (14.1 MtCO₂e) in 2022. The proportions of other greenhouse gases were methane 26.3%, nitrous oxide 6.7% and hydrofluorocarbons 0.9% (Figure 2).
- Northern Ireland contributed 5.3% of total UK greenhouse gas emissions, whilst accounting for 2.8% of the UK's population in 2022⁹. Latest estimates show Northern Ireland accounted for 2.2% of UK's economic output (Gross Value Added) in 2022¹⁰.
- In terms of emissions per capita, Northern Ireland produced the equivalent of 11.2 tonnes of CO₂ per person compared with a UK figure of 6.0 tonnes of CO₂ per person.
- Methane emissions, attributable to Northern Ireland, made up 9.9% of all UK methane emissions. Similarly, nitrous oxide emissions, attributable to Northern Ireland, made up 7.9% of all UK nitrous oxide emissions.

⁸ There are zero amounts of PFC and NF₃ and a minimal amount of SF₆ recorded in Northern Ireland and, as such, these gases are not included in the chart above.

⁹ [Population estimates for the UK, England and Wales, Scotland and Northern Ireland](#)

¹⁰ [Annual estimates of regional gross domestic product](#)

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- Agricultural sources (29.1%) accounted for a higher proportion of emissions in Northern Ireland than other parts of the UK due to the greater relative importance of agriculture to the Northern Ireland economy.
 - In England, the proportion stood at 9.4%; for Wales, it was 15.8% and for Scotland the proportion of emissions, due to Agriculture, was 19.8%.

Emissions by Sector

Figure 3: Greenhouse gas emissions by sector (%)
Northern Ireland, 2022

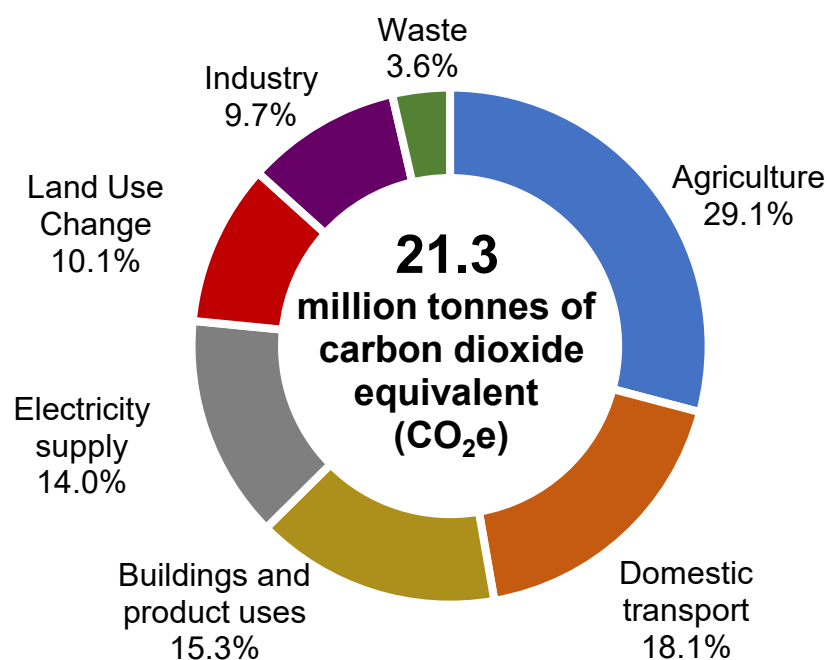


Table 1a: Greenhouse gas emissions by sector, change in MtCO₂e
Northern Ireland; Base year, 2021, 2022

Sector	Base year	2021	2022	Change base year to 2022	MtCO ₂ e
					Change 2021 to 2022
Agriculture	5.4	6.3	6.2	0.8	-0.1
Buildings and product uses	4.6	3.7	3.3	-1.3	-0.4
Domestic transport	3.6	3.8	3.9	0.3	0.1
Electricity supply	5.3	3.1	3.0	-2.3	-0.1
Fuel supply	0.0	0.0	0.0	0.0	0.0
Industry	5.3	2.1	2.1	-3.2	-0.1
Land Use Change	2.7	2.2	2.2	-0.6	0.0
Waste	2.0	0.8	0.8	-1.2	-0.1
Total	29.0	22.0	21.3	-7.7	-0.7

Table 2b: Greenhouse gas emissions by sector, % change
Northern Ireland; Base year, 2021, 2022

Sector	Base year	2021	2022	MtCO _{2e}	
				% change base year to 2022	% change 2021 to 2022
Agriculture	5.4	6.3	6.2	14.9	-1.7
Buildings and product uses	4.6	3.7	3.3	-29.1	-10.7
Domestic transport	3.6	3.8	3.9	7.1	2.7
Electricity supply	5.3	3.1	3.0	-43.9	-3.2
Fuel supply	0.000	0.005	0.004	** ¹¹	**
Industry	5.3	2.1	2.1	-61.1	-2.4
Land Use Change	2.7	2.2	2.2	-20.5	-1.9
Waste	2.0	0.8	0.8	-61.9	-8.2
Total	29.0	22.0	21.3	-26.4	-3.0

The largest sectors in terms of emissions in 2022 were Agriculture (29.1%), Domestic transport (18.1%), Buildings and product uses (15.3%) and Electricity supply (14.0%). The remaining emissions were produced by Land use change (10.1%), Industry (9.7%) and Waste (3.6%), with less than 0.0% of emissions from Fuel supply.

Between 2021 and 2022 all sectors, with the exception of Domestic transport, showed a decrease in emissions. The majority of sectors also showed a decreasing trend since the base year. The trends for each sector and the factors influencing them are as follows:

- **Agriculture**

The decrease in agricultural emissions (0.1 MtCO_{2e}) compared to 2021 was primarily due to reduced emissions from off-road machinery as a result of less favourable growing conditions for cereals and other crops compared to the previous year. A reduction in nitrogen fertiliser applications was also a significant contributory factor in this decrease.

The longer term trend, a 0.8 MtCO_{2e} increase (14.9%) compared to the base year, can be explained by increasing livestock and agricultural combustion emissions, partly offset by reduced nitrogen fertiliser application.

¹¹ ** Due to the small tonnages estimated for the Fuel supply sector, percentage change is not an appropriate measure to communicate the change between years.

- **Buildings and product uses**

Emissions in this sector decreased by 0.4 MtCO_{2e} compared to 2021 with reduced emissions from fuel combustion in residential buildings the main contributory factor.

Fuel combustion in residential buildings is also the main contributory factor for the long term 29.1% reduction in emissions in this sector (1.3 MtCO_{2e} decrease compared to the base year). This is primarily due to fuel-switching towards less carbon-intensive methods.

- **Domestic Transport**

Domestic Transport was the only sector to show an increase in emissions (0.1 MtCO_{2e}) compared to 2021. This is a decrease in the trend observed between 2020 and 2021 when there was a larger increase in transport emissions due to the lifting of travel restrictions imposed during the COVID-19 pandemic.

Since the base year, emissions have increased by 0.3 MtCO_{2e} (7.1%). Road transport emissions are the main reason for this increase despite improvements in the efficiency of vehicles, with increased demand for cars, light duty and heavy duty vehicles.

- **Electricity Supply**

Emissions decreased by 0.1 MtCO_{2e} compared to 2021 for production of electricity, continuing a trend where they have fallen 2.3 MtCO_{2e} (43.9%) since the base year. This is due to fuel-switching away from oil and coal-fired power-stations¹², and an increase in generation from renewable sources¹³.

- **Fuel Supply**

Northern Ireland does not have any significant fuel supply infrastructure such as oil refineries. Small emissions estimated for this sector relate to leakages from the distribution network.

- **Industry**

Industry emissions decreased by 0.1 MtCO_{2e} compared to 2021, with a reduction in emissions from food and drink industries and cement production primarily responsible.

¹² [Electricity generation and supply in Scotland, Wales, Northern Ireland, and England, 2018 to 2022](#)

¹³ [Electricity Consumption and Renewable Generation in Northern Ireland: Year Ending December 2022](#)

Compared to the base year, Industry emissions have decreased by 3.2 MtCO_{2e} (61.1%). Decreased emissions from the food and drinks industry, the chemical industry, cement and nitric acid production and construction industries contribute to the majority of this fall.

- **Land Use Change**

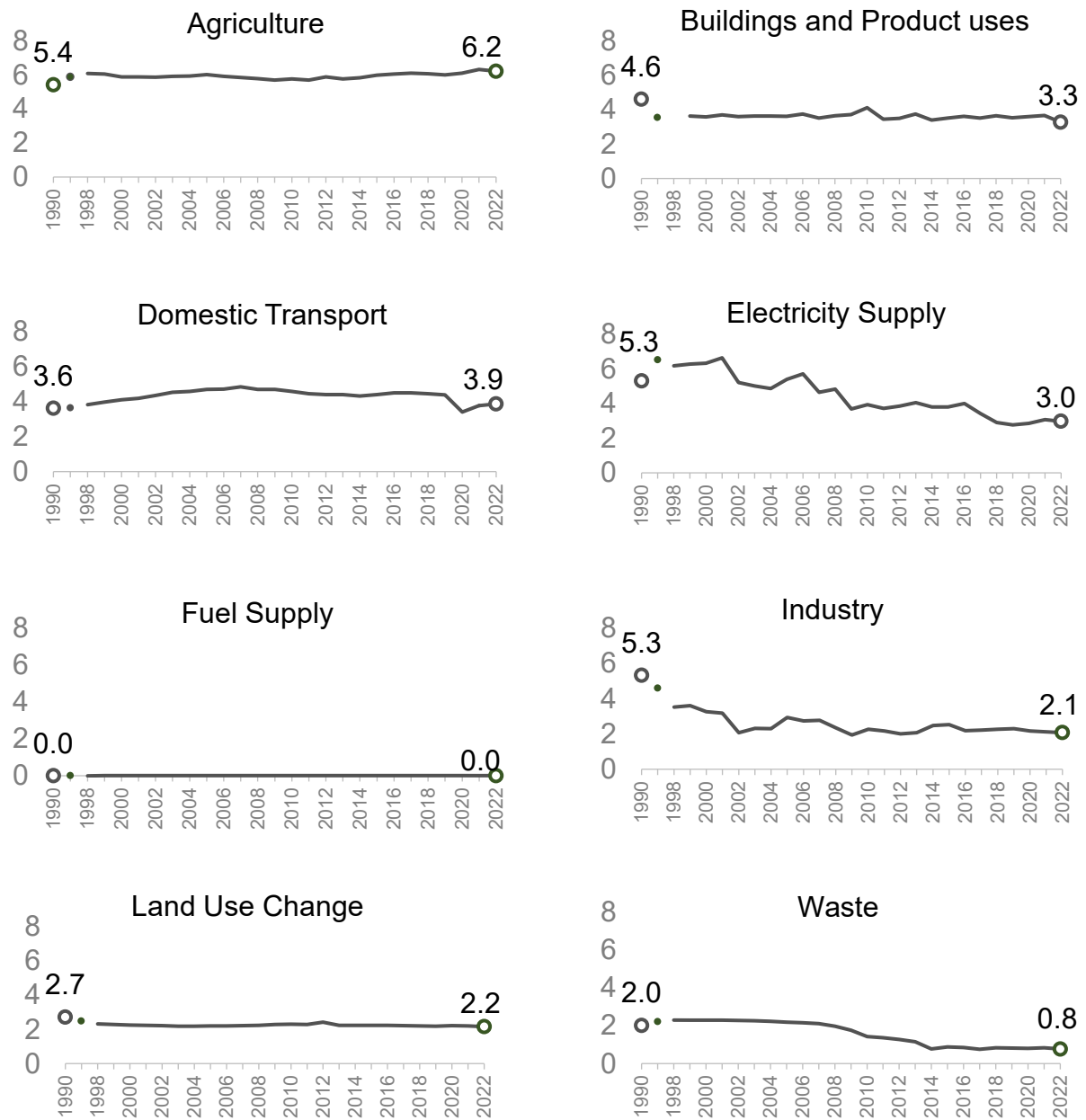
Northern Ireland is a net source of emissions from LULUCF activities despite some off-setting via forest land and grasslands. Total emissions fell by less than 0.1 MtCO_{2e} compared to 2021.

LULUCF emissions have decreased by 0.6 MtCO_{2e} (20.5%) compared to the base year. Increased sequestration from forest land contributed to this, along with a reduction in emissions from peatlands and settlements.

- **Waste**

Emissions from waste decreased by 0.1 MtCO_{2e} compared to 2021 and 1.2 MtCO_{2e} (61.9%) compared to the base year. A fall in emissions from landfill sites is primarily responsible for both.

Figure 4: Greenhouse gas emissions by sector
Northern Ireland, 1990, 1995, 1998-2022
MtCO₂



Emissions by Gas

Table 3a: Greenhouse gas emissions by gas, change in MtCO_{2e}

Northern Ireland, Base year, 2021, 2022

Sector	Base year	2021	2022	MtCO _{2e}	
				Change base year to 2022	Change 2021 to 2022
Carbon dioxide	20.7	14.6	14.1	-6.6	-0.5
Methane	6.4	5.7	5.6	-0.8	-0.1
Nitrous Oxide	1.9	1.5	1.4	-0.4	-0.1
'F-gases'	0.0	0.2	0.2	0.2	0.0
Total	29.0	22.0	21.3	-7.7	-0.7

Table 4b: Greenhouse gas emissions by gas, % change

Northern Ireland, Base year, 2021, 2022

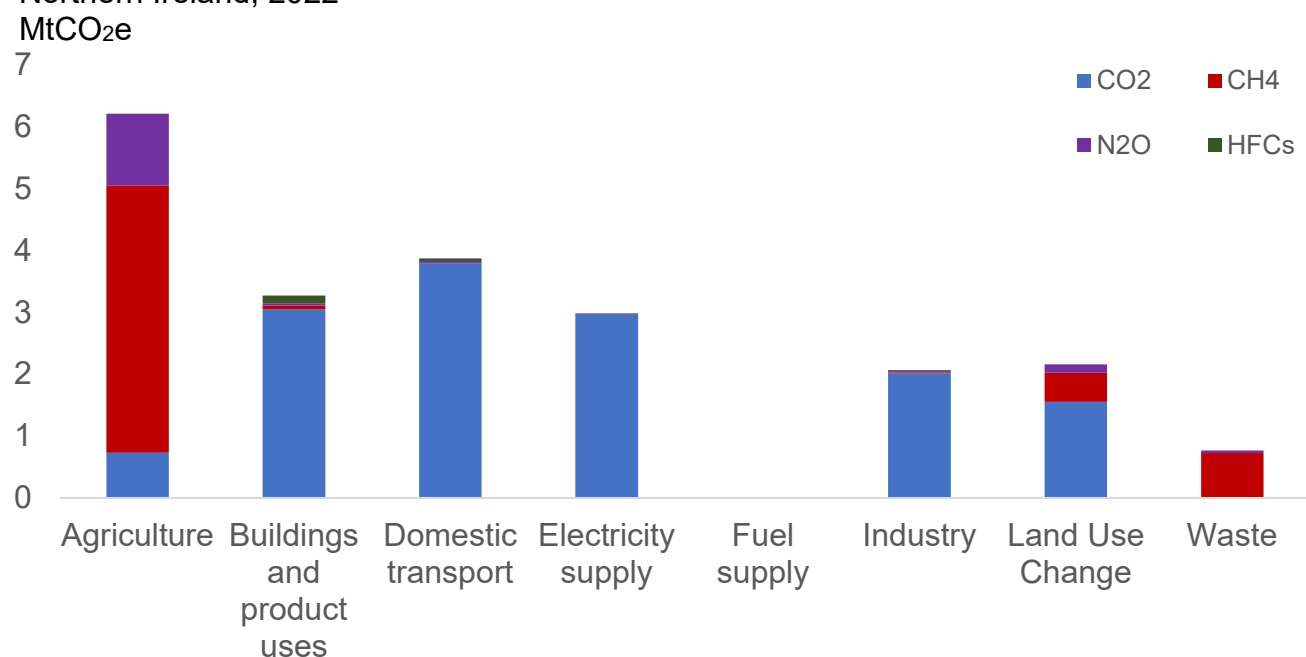
Sector	Base year	2021	2022	MtCO _{2e}	
				% change base year to 2022	% change 2021 to 2022
Carbon dioxide	20.7	14.6	14.1	-31.8%	-3.5%
Methane	6.4	5.7	5.6	-12.5%	-1.2%
Nitrous Oxide	1.9	1.5	1.4	-23.7%	-4.6%
'F-gases'	0.0	0.2	0.2	745.9%	-5.8%
Total	29.0	22.0	21.3	-26.4%	-3.0%

- Carbon dioxide has accounted for the largest share of greenhouse gas emissions emitted in Northern Ireland across the 1990 to 2022 time series. However, the volume of total CO₂ emissions has declined from 20.7 MtCO_{2e} (71.4% of total emissions), in the base year, to 14.1 MtCO_{2e} (66.1% of total emissions) in 2022.
- The volume of emissions associated with methane and nitrous oxide, which come mainly from the Agriculture sector, have also shown a decrease from the base year, but these reductions have come at a slower rate. Methane emissions have shown a decrease of 0.8 MtCO_{2e} (-12.5%) whilst emissions of nitrous oxide have reduced by 0.4 MtCO_{2e} (-23.7%).
- In the base year, methane made up 22.1% of total emissions and this proportion increased to 26.3% of all emissions in 2022. For nitrous oxide, the respective figures were 6.5% and 6.7%.
- Emissions from F-gases totalled 0.2 MtCO_{2e} in 2022 (0.9% of the total greenhouse gases in 2022). The total volume of F-gases increased by 0.2 MtCO_{2e}, since the base year, largely as a result of increased emissions of HFCs in the Industry sector.

Table 3: Greenhouse gas emissions by gas within sector
Northern Ireland, 2022

Sector	MtCO ₂ e							All gases
	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	
Agriculture	0.7	4.3	1.2	0.0	0.0	0.0	0.0	6.2
Buildings and product uses	3.0	0.1	0.0	0.1	0.0	0.0	0.0	3.3
Domestic transport	3.8	0.0	0.0	0.0	0.0	0.0	0.0	3.9
Electricity supply	3.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0
Fuel supply	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Industry	2.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1
Land Use Change	1.6	0.5	0.1	0.0	0.0	0.0	0.0	2.2
Waste	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.8
Total	14.1	5.6	1.4	0.2	0.0	0.0	0.0	21.3

Figure 5: Individual greenhouse gas emissions within sector¹⁴
Northern Ireland, 2022



- Carbon dioxide was the most abundant gas emitted across all sectors except for Agriculture and Waste. For the Agriculture sector, methane from livestock and nitrous oxide from soils were more significant greenhouse gases than carbon dioxide. Methane from landfill was the main greenhouse gas from the Waste sector.

¹⁴ There are zero amounts of PFC and NF₃ as well as a minimal amount of SF₆ recorded in Northern Ireland and, as such, these gases are not included in the chart above.

UK and Republic of Ireland Comparisons

- The trends in greenhouse gas emissions vary across the different parts of the UK between the base year and 2022. It should be noted that the regional estimates are less certain than the overall UK estimate. Estimates for the UK are available in Tables 6 and 7 of the data tables that accompany this report.
 - UK has reduced emissions by 50.2%
 - England has reduced emissions by 52.6%
 - Scotland has reduced emissions by 51.2%
 - Wales has reduced emissions by 36.4%
 - Northern Ireland has reduced emissions by 26.4%
- Note that the UK greenhouse gas emissions publication uses a 1990 base year for all gases (including fluorinated gases) which results in a reduction of 50.2% by 2022. In the above list, for consistency, the figure for Scotland and Wales, derived as part of the UK estimate, does not include international aviation and shipping. However, the Scottish and Welsh Government include international aviation and shipping in greenhouse gas statutory targets.
- Between 1990 and 2022, the Republic of Ireland trend in national total emissions (including LULUCF) showed an overall increase of greenhouse gas emissions of 7.2%, from 60.2 MtCO_{2e} in 1990 to 64.6 MtCO_{2e} in 2022¹⁵.

End user emissions

- The end user inventory reallocates the emissions by source depending on where the end user activity occurred. For example, when reporting on a by source basis, the carbon dioxide produced by a power station is allocated to the energy supply sector. On an end user basis, these emissions are reallocated to the users of the electricity, such as domestic homes and industry.
- In 2022, total greenhouse gas emissions for Northern Ireland in the end user inventory were 20.6 MtCO_{2e}. Agriculture accounted for 30.6% of these end user emissions. The Buildings and product uses, Domestic transport and Industry sectors were the next biggest contributors to end user emissions, at 22.4%, 20.7% and 12.0%, respectively.
- End user emissions do not take account of emissions “embedded” within manufactured goods and services which the UK imports and exports. Embedded emissions capture what is sometimes referred to as the “carbon footprint”. Such a calculation would be on a “consumption” basis, reporting on emissions embedded in goods and services across international borders, and is considerably more challenging.

¹⁵ [Ireland's Final Greenhouse Gas Emissions 1990 to 2022](#)

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- Statistics on the UK's Carbon Footprint are available from the Department for Environment, Food and Rural Affairs [UK's carbon footprint](#).

Global Warming Potentials

The emissions estimates in this report cover seven greenhouse gases: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF₆) and nitrogen trifluoride (NF₃). Depending on their molecular weights, radiative properties and residence times in the atmosphere, each greenhouse gas has a different capacity to cause global warming.

Global warming potentials (GWPs) are used to estimate the climate change impacts of various greenhouse gas emissions and express them in a single unit – carbon dioxide equivalents (CO₂e). As such the GWP for each gas is defined as its warming influence relative to that of CO₂ over a given time period, typically 100 years.

The GWPs commonly used in greenhouse gas reporting are defined by the Intergovernmental Panel on Climate Change (IPCC), a primary authority on climate change science. The values for GWPs have been revised on a number of occasions, with each update incorporating the results of advances in scientific knowledge. In November 2021 during the Conference of the Parties (COP26) of the United Nations Framework Convention on Climate Change (UNFCCC), the international community agreed that greenhouse gas emissions reporting, under the Paris Agreement transparency framework, should use the 100-year GWPs (without climate feedback¹⁶) that are set out in the IPCC's Fifth Assessment report (AR5). For that reason, estimates of greenhouse gas emissions in this year's publication are based on AR5 GWPs₁₀₀.

¹⁶ The AR5 report presents two sets of GWP values, one that takes into account climate feedbacks, which measures the indirect effects of changes in carbon storage due to changes in climate, and one that does not. ([IPCC, 2013. Climate Change 2013: The Physical Science Basis. Contribution of Working Group 1 to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Technical Summary](#))

Revisions to the Northern Ireland Greenhouse Gas Inventory

In line with the UK Greenhouse Gas Inventory revision process, estimates of emissions for Northern Ireland are reviewed each year and the whole historical data series is revised, where necessary, to incorporate methodological improvements, changes to international reporting guidelines or new data. Table 4 demonstrates the impact of these revisions on the base year and for the year 2021, the latest year available for both the previous and current year's emission estimates.

Full details of the methods used to produce the latest greenhouse gas emissions estimates are published in the UK's National Inventory Report¹⁷ (NIR).

Changes are applied back through the time series to 1990 in order to ensure that the trend in emissions from 1990 to the latest year is based on a consistent method. Therefore, it is not appropriate to compare the emissions time series from one year with that from another. However, the latest inventory represents a single consistent data series going back to 1990, and this therefore allows year-on-year comparisons to be made.

Table 4: Revisions in the 2021 Greenhouse Gas Inventory,
Northern Ireland, Base year and 2021

	MtCO ₂ e					
	Base Year 1990-2021 inventory)	Base Year (1990-2022 inventory)	Base Year change	2021 (1990-2021 inventory)	2021 (1990-2022 inventory)	2021 change
Agriculture	5.4	5.4	0.0	6.2	6.3	0.1
Buildings and product uses	4.6	4.6	0.0	3.2	3.7	0.4
Domestic transport	3.6	3.6	0.0	3.8	3.8	-0.1
Electricity supply	5.3	5.3	0.0	3.1	3.1	0.0
Fuel supply	0.0	0.0	0.0	0.0	0.0	0.0
Industry	5.4	5.3	-0.1	3.0	2.1	-0.9
LULUCF	2.8	2.7	-0.1	2.3	2.2	-0.1
Waste	2.0	2.0	0.0	0.8	0.8	0.0
Total	29.2	29.0	-0.3	22.5	22.0	-0.5

¹⁷ Previous UK NIRs can be found at [The National Atmospheric Emissions Inventory Reports](#). The latest NIR covering 1990-2022 emissions were submitted to the UNFCCC on 14th March 2024.

Reasons for revisions to the Northern Ireland data include the following:

- **Agriculture**
 - Revisions to burning oil combustion in the UK inventory.
 - UK activity data updates for enteric fermentation and manure management for various livestock.
 - UK activity data updates for manufactured fertilisers and plant residues.
 - Inclusion of new data to the forest land carbon stock change soil model and inclusion of urban trees across the whole timeseries.

- **Buildings and product uses**
 - Revisions to the Digest of UK Energy Statistics (DUKES) for the later portion of the timeseries and to incorporate point source data into the methodology.
 - Recalculations to the UK inventory for burning oil combustion in this sector.
 - Revisions to UK inventory for gas oil with revisions to crown dependency gas oil estimates, reducing the remaining fuel available for the UK.
 - Revisions to emissions from coal are from revisions to the split methodology to use the 2020 domestic solid fuel grid for this fuel.
 - Revisions to the UK inventory as a result of the HFC-Outlook improvement task.

- **Domestic transport**
 - Revisions to the activity data.
 - A more appropriate fuel consumption split between hot and cold emissions.
 - Revisions to the NRMM model to disaggregate the vehicle type which has also led to significant revisions.
 - Revisions to the UK inventory as a result of the HFC-Outlook improvement task.

- **Electricity supply**
 - There have been minor recalculations in 2020 and 2021 primarily due to revisions to DUKES data for scrap tyres to lime and cement kilns.

- **Fuel supply**
 - Recalculations are primarily due to revisions to DUKES data in later years and also small recalculations across the timeseries due to a revision to the model used to split emissions from abandoned coal mines to the countries.

- **Industry**
 - Significant recalculations across the timeseries revising down the emissions from the Industry sector as a result of:
 - Updates in Northern Ireland specific gas data.
 - Most significant recalculations from gas combustion in industry, due to recalculations to the UK inventory between 2016-2021 from a revision to DUKES and a slight revision to the total gas demand from Local Distribution Zone (LDZ) DUKES data which resulted in recalculations to the carbon emissions factors.

- Recalculations are from burning oil combustion due to revisions to DUKES (impacting 2018-2021) and a re-allocation of burning oil to end use sectors more closely aligned to DUKES allocations. This however only applies post-1998 as older data are based on paper copies of DUKES.
 - Recalculations to combustion of coal which are due to revisions to the DA split. The DA split for coal combustion in other industries was revised for the early timeseries to make the extrapolation methodology more consistent with other fuel splits and for the later timeseries due to revisions to DUKES in the UK inventory.
 - Revisions to the NRMM model to disaggregate the vehicle type.
 - Revisions to the UK inventory as a result of the HFC-Outlook improvement task.
- **LULUCF**
 - Recalculations due to implementation of updated organic soil emission factors and activity data used in LULUCF soils. Revisions were made to the emission factors for organic soils, and activity data for forest land were updated to include forest planting and restocking data. This has caused a general decrease in emissions estimates. LULUCF remains net source across the entire time-series.
 - Minor changes to baseline peat areas in Northern Ireland in line with the peat map.
 - **Waste**
 - Minor revisions across the timeseries, ranging from -0.1% to 0.9%. A revision to the compositing data timeline was provided by UK Centre For Ecology & Hydrology affecting the national inventory.

Overview of Territorial Emissions Statistics sectors

Sector	Description
Agriculture	Emissions from agricultural machinery and fuel combustion, livestock (enteric fermentation and manure management) and agricultural soils (excluding carbon stock changes which are included in the LULUCF sector).
Buildings and Product Uses	Emissions from fuel combustion in residential, public, and commercial buildings, largely for heating. Also includes emissions from house and garden mobile machinery, anaesthetics, F-gases from air conditioning, refrigeration, heat pumps, aerosols as well as other product uses. Excludes emissions from industrial buildings which are instead included in the Industry sector.
Domestic Transport	Emissions from road vehicles, domestic aviation and shipping (including military), fishing vessels, and railways. Also includes emissions from transport related mobile machinery (e.g. at airports and ports) and F-gases from mobile air conditioning and refrigeration. International aviation and shipping emissions are not included in the national total, though are reported separately.
Electricity Supply	Emissions from power stations for electricity generation, including incinerators generating energy from waste. Excludes emissions from organisations generating their own electricity (autogeneration) even when exported to the electricity grid. These emissions are instead included in the sector in which they occur.
Fuel supply	Emissions from the supply of fuels, e.g. oil, gas and coal. Includes activities such as extraction, production, venting, flaring, processing (e.g. oil refining) and distribution. Excludes emissions from coke production which are instead included in the Industry sector as coke is primarily used in the iron and steel industry.
Industry	Emissions from fuel combustion in the manufacturing and construction industries, industrial processes, and F-gases from industrial refrigeration. Emissions from coke production are included in this sector as coke is primarily used in the iron and steel industry. Includes emissions from organisations generating their own electricity and heat (autogeneration) even when exported to the electricity grid or used in heat networks.
Land Use, Land Use Change and Forestry (LULUCF)	Includes emissions and removals of CO ₂ from changes in the carbon stock in forestland, cropland, grassland, wetlands, settlements and harvested wood products, and emissions of other greenhouse gases from drainage (excl. croplands and intensive grasslands) and rewetting of soils, nitrogen mineralisation associated with loss and gain of soil organic matter, and fires. As impacts of carbon stock

Sector	Description
Waste	changes are included in this sector, CO2 emissions of biogenic origin (e.g. burning biomass for energy) are excluded from other sectors to avoid double counting. Emissions from the treatment and disposal of waste, such as landfill, composting, incineration without energy recovery and wastewater handling. Excludes emissions from incinerators generating energy from waste as these are reported in the Electricity Supply sector.

Further information

1. This is the fifteenth release of the Northern Ireland greenhouse gas inventory statistical bulletin. It will continue to be updated annually. The data were produced by a consortium led by Ricardo Energy and Environment, on behalf of the Department for Business, Energy & Industrial Strategy, the Scottish Government, the Welsh Assembly Government and the Northern Ireland Department of Agriculture, Environment and Rural Affairs.
2. Emissions in this bulletin are reported according to the Territorial Emissions Statistics sectors. This is in accordance with international reporting guidelines from the UNFCCC. Descriptions of each sector are available on page 24.
3. The Kyoto Protocol¹⁸, a 1997 addition to the UNFCCC treaty, committed countries, including the UK, to monitor emissions and report on an emission reduction target over the period 2008 to 2012. In December 2012, the Doha Amendment¹⁹ to the Kyoto Protocol was adopted for a second commitment period, 2013 to 2020, with new reduction targets agreed for industrialised countries and economies in transition. Assessments of the fulfilment of these targets is in its final stages.
4. The reduction in emissions for the UK is set against a baseline of emissions in 1990 (for carbon dioxide, methane, and nitrous oxide) and 1995 (for the F-gases, i.e., hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride and nitrogen trifluoride). The sum of these emissions in 1990 and 1995 is called the base year emissions.
5. Beyond the reduction targets of the Doha Agreement, 196 countries, at the Conference of the Parties (COP21) of the UNFCCC in Paris in 2015, signed up to an international treaty to combat climate change and adapt to its effects. This 'Paris Agreement'²⁰ requires countries to submit climate action plans, referred to as nationally determined contributions (NDCs). In their NDCs, countries communicate actions they will take to reduce their greenhouse gas emissions in order to reach the goals of the Paris Agreement. Each successive NDC is expected to be increasingly ambitious.
6. The greenhouse gas emission estimates are based on a wide range of data sources and sources of uncertainty include statistical differences, assumptions, proxy datasets and expert judgement. In addition, the natural variability in the processes that are being modelled introduce uncertainty. For example, carbon content of fuels and farming practices under different climatic conditions and soil types. Therefore, when using the statistics in this bulletin, users should be mindful of the uncertainty around the published

¹⁸ [The Kyoto Protocol, UNFCCC](#)

¹⁹ [The Doha Amendment, UNFCCC](#)

²⁰ [The Paris Agreement, UNFCCC](#)

estimates. These uncertainties are presented as confidence intervals and the width of the interval provides a measure of the accuracy of the estimate.

7. Uncertainty estimates for Northern Ireland emissions are available for the base year, the latest year (2022) and for the percentage change between these two years. For the base year, a close approximation of the 95% confidence interval is $\pm 8\%$, and for 2022 it is $\pm 6\%$. For the percentage reduction between the base year and 2022, the 95% confidence interval ranges from 20% to 37%. There remains greater uncertainty around emissions in Northern Ireland compared to other parts of the United Kingdom due to the relative importance of methane and nitrous oxide emissions in the Agriculture sector. Emissions of these gases are more difficult to estimate than carbon dioxide, and the Agriculture sector makes up a larger share of Northern Ireland's emissions than in other parts of the UK. In addition, the fuel activity data for Northern Ireland is more uncertain than other devolved administrations, due to the greater use of solid fuels and oils.
8. Our statistical practice is regulated by the Office for Statistics Regulation (OSR). OSR sets the standards of trustworthiness, quality and value in the Code of Practice for Statistics that all producers of official statistics should adhere to.
You are welcome to contact us directly with any comments about how we meet these standards. Alternatively, you can contact OSR by emailing regulation@statistics.gov.uk or via the OSR website.
9. The UK greenhouse gas inventory National Statistics user guide provides a simple guide to the origins and use of data in the compilation of the UK Greenhouse Gas Inventory. This guide can be accessed through the Department for Business, Energy & Industrial Strategy website [An introduction to the UK's greenhouse gas inventory](#).
10. A summary of the quality issues relating to statistics on UK territorial greenhouse gas emissions is available within the [UK Background Quality Report](#) and the methodology used to compile the UK national inventory is described in [The National Inventory Report](#)

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