

Northern Ireland Greenhouse Gas Emissions 2021



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Department of
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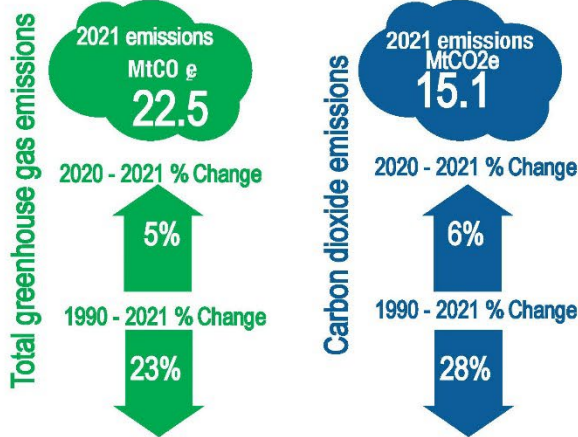
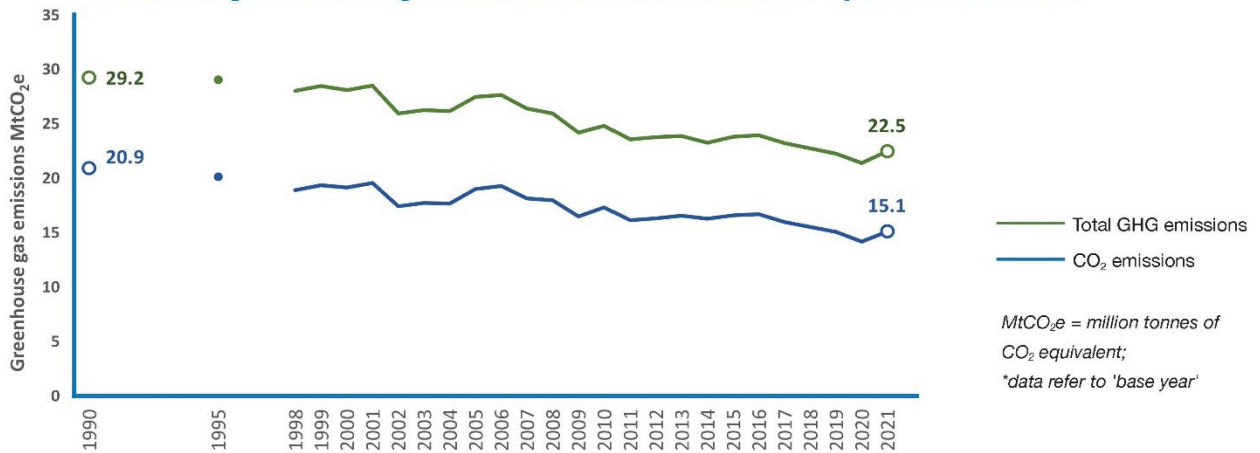
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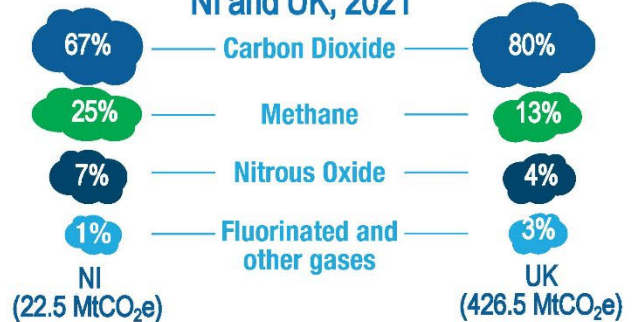
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NI Greenhouse Gas Statistics 1990-2021

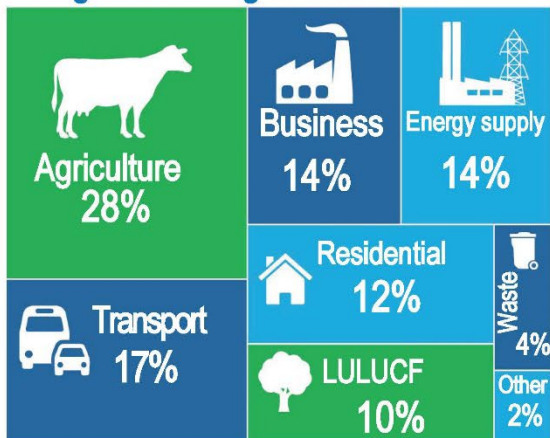
2021 NI greenhouse gas emissions have decreased by 23% since 1990*



Composition of greenhouse gas emissions (%), NI and UK, 2021



Agriculture was the largest emitting sector of NI greenhouse gas emissions in 2021



*Other consists of Public and Industrial processes

Energy Supply delivered the largest reduction in emissions from 1990 to 2021 (-2.2 MtCO₂e)



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Northern Ireland greenhouse gas statistics 1990-2021

Key points

- In 2021, Northern Ireland's net greenhouse gas emissions were estimated to be **22.5 million tonnes of carbon dioxide equivalent (MtCO₂e)**. This net figure is a result of an estimated 23.7 MtCO₂e total emissions, offset by 1.2 MtCO₂e of emissions removed through sequestration.
- The net figure of 22.5 MtCO₂e, in 2021, represents an increase of 5.0% compared with 2020. The longer-term trend showed a decrease of 23.2% compared with emissions in 1990.
- In 2021, agriculture was the largest emitting sector, responsible for 27.6% of emissions. Transport contributed 16.7% to overall emissions, whilst the business, energy supply and residential sectors contributed 14.0%, 13.7% and 12.4%, respectively.
- Between 2020 and 2021 all sectors, with the exception of waste management and public, showed an increase in emissions. The largest increases in terms of tonnes of carbon dioxide equivalent were in the Transport (0.4 MtCO₂e), Agriculture (0.3 MtCO₂e) and Energy Supply (0.2 MtCO₂e) sectors.
- In 2021, Northern Ireland contributed 5.3% of all UK greenhouse gas emissions, which stood at 426.5 MtCO₂e. In the UK there has been a 47.7% reduction in emissions between 1990 and 2021. During the same period, the reduction in emissions in Northern Ireland was 23.2%, compared to 50.2% in England, 49.3% in Scotland and 35.0% in Wales.

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Contents

Key points	2
Contents	3
Introduction	4
Monitoring Progress	4
Northern Ireland Summary	6
Emissions by Sector	9
Emissions by Gas	13
UK and Republic of Ireland Comparisons	15
End user emissions	15
Change in Global Warming Potentials	17
Revisions to the Northern Ireland Greenhouse Gas Inventory	18
Further information	21
Overview of National Communication sectors	23

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, are required to be set in legislation before 31st December 2023.

Northern Ireland is currently at the start of its first carbon budget (2023-2027), at the end of the carbon budget, emissions and progress made during this period will be assessed and details provided. The 2021 greenhouse gas inventory currently shows a reduction of 23.2% in greenhouse gas emissions compared to the baseline year.

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.

Previous Programme for Government Indicator

Monitoring of the 2016-21 Draft Programme for Government (PfG) Indicators ceased in May 2021. Departments had proposed Indicators for a new Draft Framework, which was consulted on in 2021 and to date has not been agreed. Previously, greenhouse gas emissions estimates were included as an Indicator under outcome 2: we live and work sustainably – protecting the environment.

- In 2021, Northern Ireland's greenhouse gas emissions were estimated to be 22.5 MtCO₂e in comparison to the 23.3 MtCO₂e estimated in the baseline year for PfG reporting (2014). See Table 5 of the data tables that accompany this report⁵.

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

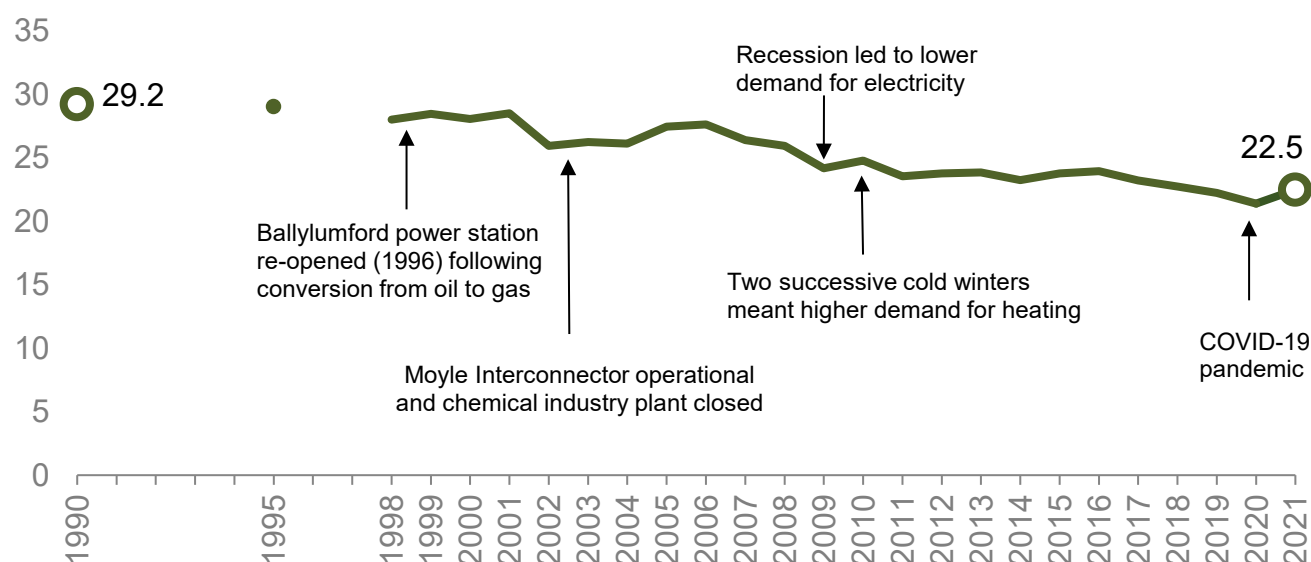
³ [Final statement for the second carbon budget period](#)

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

⁵ [Northern Ireland Greenhouse Gas Statistics 1990-2021 statistical bulletin data and charts](#)

Northern Ireland Summary

Figure 1: Greenhouse gas emissions
Northern Ireland, 1990, 1995, 1998-2021
MtCO_{2e}



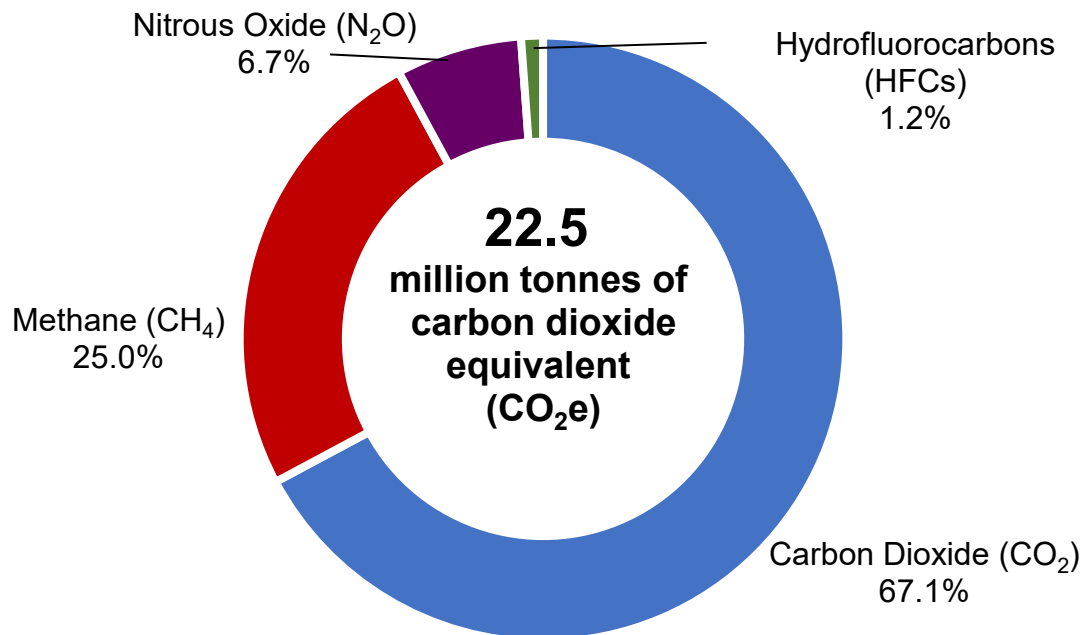
- In 2021, Northern Ireland's net greenhouse gas emissions⁶ were estimated to be 22.5 million tonnes of carbon dioxide equivalent (MtCO_{2e}). This was an increase of 5.0% compared to 2020 (Figure 1). In absolute terms this is a rise of 1.1 MtCO_{2e} and is the largest increase in greenhouse gas emissions observed in a single year in over fifteen years.
- The increase from 2020 to 2021, is in contrast to the 3.8% decline in emissions reported for 2020 when compared to 2019 emissions, following the COVID-19 pandemic and its associated restrictions. Emissions in 2021 are 1.0% (0.2 MtCO_{2e}) higher than pre-pandemic 2019 figures.
- The longer-term trend showed a decrease of 23.2% compared to 29.2 MtCO_{2e} in the base year (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, 2021



- Carbon dioxide accounted for 67.1% of all greenhouse gas emissions in Northern Ireland (15.1 MtCO₂e) in 2021. The proportions of other greenhouse gases were methane 25.0%, nitrous oxide 6.7% and hydrofluorocarbons 1.2% (Figure 2).
- Northern Ireland contributed 5.3% of total UK greenhouse gas emissions, whilst accounting for 2.8% of the UK's population in 2021⁹. Latest estimates show Northern Ireland accounted for 2.2% of UK's economic output (Gross Value Added) in 2021¹⁰.
- In terms of emissions per capita, Northern Ireland produced the equivalent of 11.8 tonnes of CO₂ per person compared with a UK figure of 6.4 tonnes of CO₂ per person.
- Methane emissions, attributable to Northern Ireland, made up 9.8% 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 (27.6%) 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 8.9%; for Wales, it was 15.9% and for Scotland the proportion of emissions, due to agriculture, was 19.1%.

Emissions by Sector

Figure 3: Greenhouse gas emissions by sector (%)¹¹
Northern Ireland, 2021

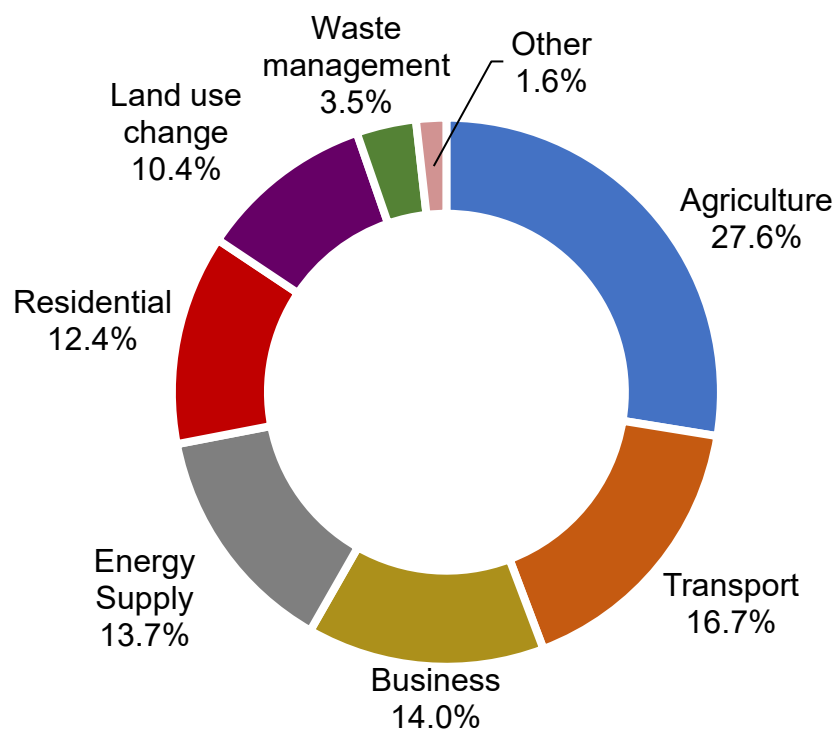


Table 1a: Greenhouse gas emissions by sector, change in MtCO_{2e}
Northern Ireland; Base year, 2020, 2021

Sector	Base year	2020	2021	MtCO _{2e}	
				Change base year to 2021	Change 2020 to 2021
Agriculture	5.4	5.9	6.2	0.8	0.3
Business	5.0	3.1	3.2	-1.8	0.0
Energy Supply	5.3	2.8	3.1	-2.2	0.2
Industrial Process	0.7	0.2	0.2	-0.5	0.0
Land Use Change	2.8	2.3	2.3	-0.5	0.0
Public	0.6	0.1	0.1	-0.5	0.0
Residential	3.7	2.7	2.8	-0.9	0.1
Transport	3.6	3.4	3.8	0.1	0.4
Waste Management	2.0	0.8	0.8	-1.2	0.0
Total	29.2	21.4	22.5	-6.8	1.1

¹¹ Other consists of Public (0.8%) and Industrial Process (1.0%).

Table 1b: Greenhouse gas emissions by sector, % change

Northern Ireland; Base year, 2020, 2021

MtCO_{2e}

Sector	Base year	2020	2021	% change	
				base year to 2021	2020 to 2021
Agriculture	5.4	5.9	6.2	14.7	4.5
Business	5.0	3.1	3.2	-36.9	1.0
Energy Supply	5.3	2.8	3.1	-41.9	8.3
Industrial Process	0.7	0.2	0.2	-68.3	3.7
Land Use Change	2.8	2.3	2.3	-17.5	0.6
Public	0.6	0.1	0.1	-77.2	-1.3
Residential	3.7	2.7	2.8	-25.3	4.8
Transport	3.6	3.4	3.8	3.2	11.3
Waste Management	2.0	0.8	0.8	-60.6	-0.6
Total	29.2	21.4	22.5	-23.2	5.0

- As shown in Figure 3, the largest sectors in terms of emissions in 2021 were agriculture (27.6%), transport (16.7%), business (14.0%) and energy supply (13.7%). The remainder of emissions were produced by residential (12.4%), land use change (10.4%), waste management (3.5%) and other (1.6%) sectors.
- Between 2020 and 2021 all sectors, with the exception of waste management and public, showed an increase in emissions. The largest increases in terms of tonnes of carbon dioxide equivalent were in the transport, agriculture, and energy supply sectors.
 - Transport emissions increased by 0.4 MtCO_{2e} between 2020 and 2021. The rise in transport emissions reflects the relaxation of COVID-19 travel restrictions. The increase in emissions is reflected across all vehicle types but particularly passenger cars.
 - The increase in agricultural emissions (0.3 MtCO_{2e}) was primarily due to increased emissions from off-road machinery as a result of favourable growing conditions for cereals and other crops.
 - The 0.2 MtCO_{2e} increase in emissions seen in energy supply, is due to increased coal-fired power generation between 2020 and 2021¹². This was driven by less favourable weather conditions for renewable sources. In particular, there was a reduction in wind generation due to lower wind speeds experienced during 2021¹³. The increase in fossil fuel generation observed from 2020 to 2021 does not follow the longer-

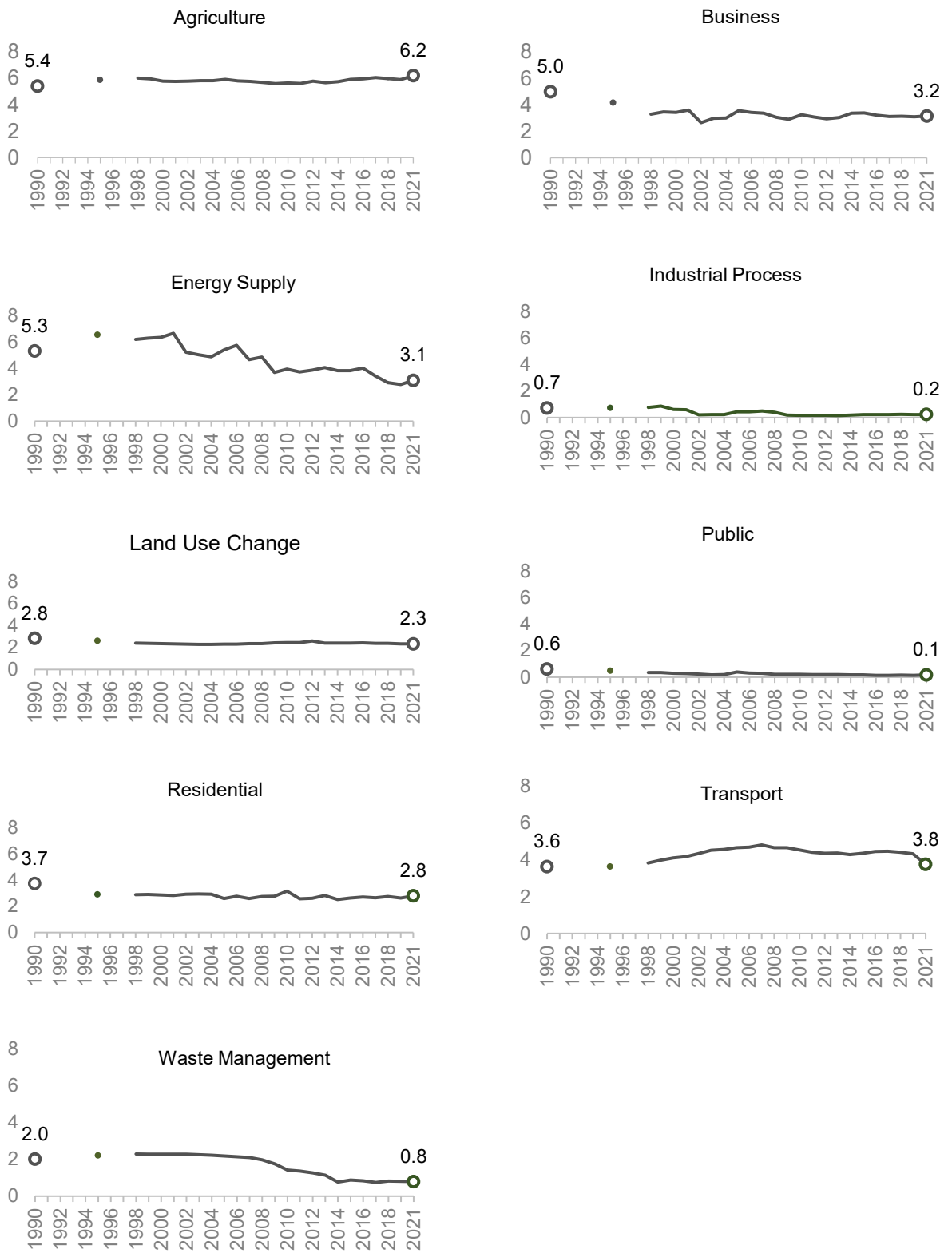
¹² [Electricity generation and supply in Scotland, Wales, Northern Ireland, and England, 2017 to 2021](#)

¹³ [Electricity Consumption and Renewable Generation in Northern Ireland - Jan 2021 to Dec 2021](#)

term trend which shows a decrease in coal use and a reduction in the carbon intensity of electricity generation.

- The majority of sectors showed a decreasing trend since the base year. The largest decreases, in terms of tonnes of carbon dioxide equivalent, were in the energy supply, business and waste management sectors (Table 1a, Figure 4).
 - The longer-term trend for the energy supply sector has shown a fall in emissions of 2.2 MtCO_{2e}, due to fuel switching away from coal and oil for power generation.
 - The drop in emissions from the business sector (1.8 MtCO_{2e}) reflects reductions in emissions from the food and drink industries, as well as a reduction in emissions from fossil fuels combusted for heat and power production in industry.
 - The reduction in emissions from the waste sector (1.2 MtCO_{2e}) is due to the continued process of methane capture and oxidation systems within landfill sites.
- Land use change sector emissions also decreased by 17.5% over the time period (base year to 2021) of 0.5 MtCO_{2e}. The Land use change sector is the only sector where emissions sequestrations are recorded.
 - The main contributors to this sector are emissions from wetlands (1.6 MtCO_{2e}), croplands (0.9 MtCO_{2e}), and settlements (0.7 MtCO_{2e}).
 - These emissions were partly offset by sequestration, primarily consisting of removals by forest land (-0.6 MtCO_{2e}) (specifically forest land remaining forest land); and removals by grasslands (-0.5 MtCO_{2e}) (specifically cropland converted to grassland and settlements converted to grassland).
- In Northern Ireland the land use change sector is a net emitter of greenhouse gas emissions (+2.3 MtCO_{2e}), this is also the case in Scotland (+0.4 MtCO_{2e}). Whereas in England and Wales the land use change sector can be classified as a 'sink' due to its net effect being one that absorbs carbon (-0.8 MtCO_{2e}, in both administrations).
- Both agriculture and transport showed higher emissions in 2021 than in the base year (Table 1a, 1b, Figure 4).
 - Emissions from agriculture have increased by 14.7%, this reflects the increase in livestock numbers over this period, however, it is partly offset by lower nitrogen fertiliser applications.
 - Emissions from transport have increased by 3.2%, due to the growth in vehicle demand over this period despite improved vehicle efficiency.

Figure 4: Greenhouse gas emissions by sector
Northern Ireland, 1990, 1995, 1998-2021
MtCO₂



Emissions by Gas

Table 2a: Greenhouse gas emissions by gas change in MtCO₂e

Northern Ireland, Base year, 2020, 2021

Sector	Base year	2020	2021	Change base year to 2021	Change 2020 to 2021
Carbon dioxide	20.9	14.2	15.1	-5.9	0.9
Methane	6.4	5.4	5.6	-0.8	0.2
Nitrous Oxide	1.9	1.5	1.5	-0.4	0.0
'F-gases'	0.0	0.3	0.3	0.2	0.0
Total	29.2	21.4	22.5	-6.8	1.1

Table 2b: Greenhouse gas emissions by gas, % change

Northern Ireland, Base year, 2020, 2021

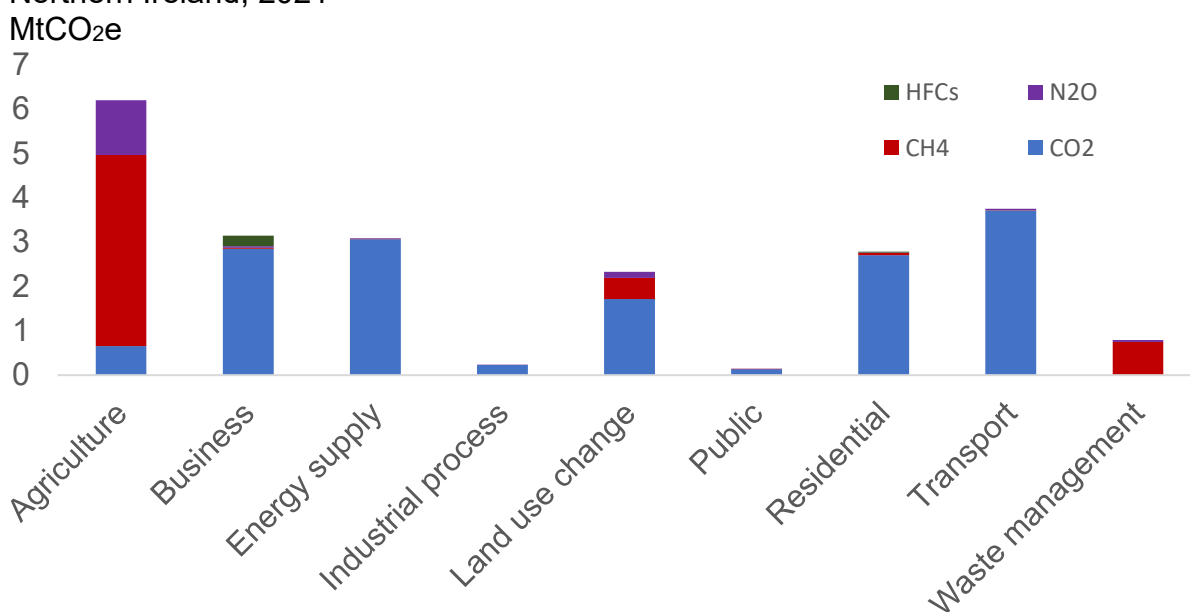
Sector	Base year	2020	2021	% change base year to 2021	% change 2020 to 2021
Carbon dioxide	20.9	14.2	15.1	-28.0%	6.5%
Methane	6.4	5.4	5.6	-12.4%	3.0%
Nitrous Oxide	1.9	1.5	1.5	-19.6%	1.7%
'F-gases'	0.0	0.3	0.3	908.5%	-6.5%
Total	29.2	21.4	22.5	-23.2%	5.0%

- Carbon dioxide has accounted for the largest share of greenhouse gas emissions emitted in Northern Ireland across the 1990 to 2021 time series. However, the volume of total CO₂ emissions has declined from 20.9 MtCO₂e (71.6% of total emissions), in the base year, to 15.1 MtCO₂e (67.1% of total emission) in 2021.
- 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 recorded a decrease of 0.8 MtCO₂e (-12.4%) whilst emissions of nitrous oxide have reduced by 0.4 MtCO₂e (-19.6%).
- As such, in the base year, methane made up 21.9% of total emissions and this proportion increased to 25.0% of all emissions in 2021. For nitrous oxide, the respective figures were 6.4% and 6.7%.
- Emissions from F-gases totalled 0.3 MtCO₂e in 2021 (1.2% of the total greenhouse gases in 2021). The total volume of F-gases increased by 0.2 MtCO₂e, since the base year, largely as a result of increased emissions of HFCs in the business sector.

Table 3: Greenhouse gas emissions by gas within sector
Northern Ireland, 2021

Sector	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	MtCO ₂ e
								All gases
Agriculture	0.7	4.3	1.2	0.0	0.0	0.0	0.0	6.2
Business	2.8	0.0	0.0	0.2	0.0	0.0	0.0	3.2
Energy Supply	3.1	0.0	0.0	0.0	0.0	0.0	0.0	3.1
Industrial Process	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Land Use Change	1.7	0.5	0.1	0.0	0.0	0.0	0.0	2.3
Public	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Residential	2.7	0.1	0.0	0.0	0.0	0.0	0.0	2.8
Transport	3.7	0.0	0.0	0.0	0.0	0.0	0.0	3.8
Waste Management	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.8
Total	15.1	5.6	1.5	0.3	0.0	0.0	0.0	22.5

Figure 5: Individual greenhouse gas emissions within sector¹⁴
Northern Ireland, 2021



- Carbon dioxide was the most abundant gas emitted across all sectors except for agriculture and waste management. 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 management 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 2020. 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 47.7%
 - England has reduced emissions by 50.2%
 - Scotland has reduced emissions by 49.3%
 - Wales has reduced emissions by 35.0%
 - Northern Ireland has reduced emissions by 23.2%
- 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 47.6% by 2020. 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 2021, the Republic of Ireland trend in national total emissions (including LULUCF) showed an overall increase of greenhouse gas emissions of 11.6%, from 61.7 MtCO₂e in 1990 to 69.4 Mt CO₂e in 2021¹⁵.

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, all of 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 2021, total greenhouse gas emissions for Northern Ireland in the end user inventory were 22.0 MtCO₂e. Agriculture accounted for over a quarter (28.6%) of these end user emissions. The transport, business and residential sectors were the next biggest contributors to end user emissions, at 18.9%, 18.9% and 17.0%, 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 2021](#)

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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](#).

Change in 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 last year's publication of the Northern Ireland greenhouse gas statistics, emissions estimates were based on the IPCC's Fourth Assessment Report (AR4) and were consistent with international reporting up to 2020. 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.

Since CO₂ is the reference gas that other greenhouse gas emissions are weighted against, emissions from CO₂ are not affected by changes to GWPs. With CO₂ making up the majority of greenhouse gas emissions (67.2% in 2021) the impact of the change on overall greenhouse gas emissions means an increase of approximately 2%. However, for those sectors such as agriculture and waste which are dominated by gases other than CO₂ the impact on sectoral totals is greater. For further information on the impact of the move from AR4 to AR5 GWPs see Tables 6 and 7 in last year's publication¹⁷. A list of AR4 and AR5 GWPs of greenhouse gases used in the NI/UK inventory is available at the following link: [UK greenhouse gas emissions: other technical reports](#)

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](#))

¹⁷ [Northern Ireland greenhouse gas inventory 1990 – 2020 statistical bulletin](#)

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 2020, 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 Report¹⁸ (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, by sector

Northern Ireland, Base year and 2020

	MtCO ₂ e					
	Base Year (1990-2020 inventory)	Base Year (1990-2021 inventory)	Base year Change	2020 (1990-2020 inventory)	2020 (1990-2021 inventory)	2020 change
Agriculture	5.5	5.4	-0.1	5.9	5.9	0.1
Business	3.9	5.0	1.1	2.8	3.1	0.3
Energy Supply	5.3	5.3	0.0	2.8	2.8	0.0
Industrial Process	0.7	0.7	0.0	0.2	0.2	0.0
Land Use Change	2.8	2.8	0.0	2.4	2.3	-0.1
Public	0.4	0.6	0.2	0.1	0.1	0.0
Residential	3.7	3.7	0.0	2.9	2.7	-0.2
Transport	3.4	3.6	0.2	3.4	3.4	0.0
Waste Management	2.0	2.0	0.0	0.8	0.8	0.0
Total	27.9	29.2	1.3	21.3	21.4	0.1

¹⁸ Previous UK NIRs can be found at [The National Atmospheric Emissions Inventory Reports](#). The latest NIR covering 1990-2021 emissions were submitted to the UNFCCC on 15th April 2023.

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

- Agriculture
 - Update to the proportion of cattle stored on slurry systems.
 - Revisions to slaughter weight time series from 2018.
 - Revisions to milk yield data in the more recent years.
 - Revision of the methodology used to estimate fertiliser application rates.
 - Revisions to land use areas and crop yield.
 - Updates to the methodology concerning the use of fertilisers.
 - Integration of an upgraded non-road mobile machinery model which includes new emissions estimates from agricultural mobile machinery.
- Business
 - Revisions following new bottom-up estimates for off-road machinery fuel use.
 - Integration of new mapping grids for the use of fuels at industrial sites.
 - Recalculations to Digest of UK Energy Statistics (DUKES) activity data, affecting later years of the time series.
- Energy Supply
 - Revisions to DUKES data, resulting in minor recalculations in later years.
 - Change in devolved administrations split for petroleum refining to better align with the Emissions Trading Scheme data.
- LULUCF
 - Recalculations due to implementation of updated organic soil emission factors.
 - Updates to activity data for forest land to include forest planting and restocking data.
- Residential
 - Large recalculations in 2019 and 2020 due to revisions to the DUKES activity data.
 - Domestic combustion of natural gas was revised for 2019 and 2020 due to updates to the Carbon Emission Factors in the Local Distribution Zone data.
 - Minor recalculations throughout the time series due to revisions to the calorific values in the domestic combustion model.
- Transport
 - Recalculations due to revised minor road data for 2000 to 2020.
 - Revision to the UK total gas use in road transport for later years.
- Waste Management

-
- Revisions to the UK total for municipal wastewater which is then scaled across devolved administrations.
 - Removal of methane emissions associated with disposal to land, landfill, or incineration, to prevent double counting.
 - Revision to the approach of uplifting of wastewater to sea to be region-specific.

Further information

1. This is the fourteenth 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 National Communication sectors. This is in accordance with international reporting guidelines from the UNFCCC. Descriptions of each sector are available on page 23.
3. The Kyoto Protocol¹⁹, 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 Amendment²⁰ 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'²¹ 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

¹⁹ [The Kyoto Protocol, UNFCCC](#)

²⁰ [The Doha Amendment, UNFCCC](#)

²¹ [The Paris Agreement, UNFCCC](#)

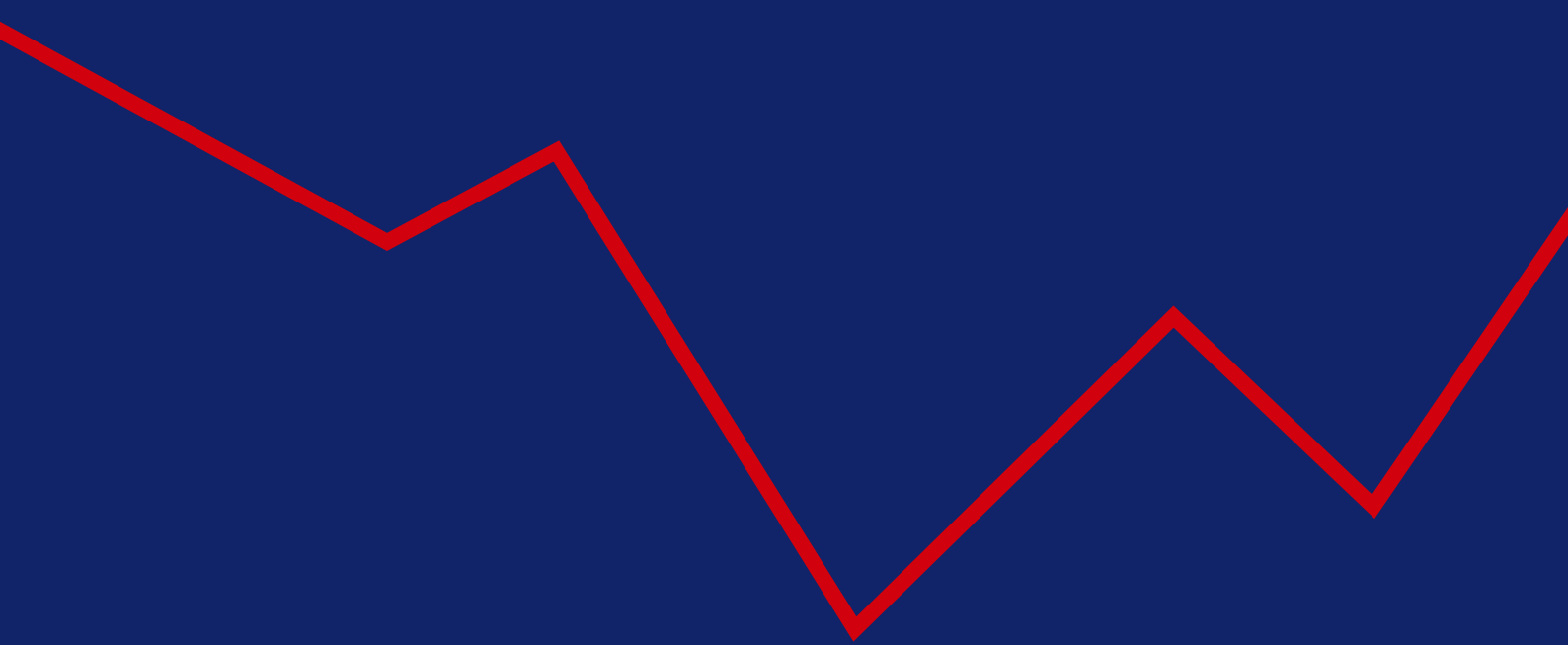
bulletin, users should be mindful of the uncertainty around the published estimates. These uncertainties are presented as confidence intervals and the width of the interval provides a measure of the accuracy of the estimate.

7. Uncertainty estimates for Northern Ireland emissions are available for the base year, the latest year (2021) 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 2021 it is $\pm 5\%$. For the percentage reduction between the base year and 2021, the 95% confidence interval ranges from 16% to 33%. 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. Official Statistics are produced to a high professional standard. They undergo regular quality assurance reviews to ensure that they meet customer needs. They are produced free from any political interference. As we want to engage with users of our statistics, we invite you to feedback your comments on this publication. Contact details are available on page 2.
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](#).

Overview of National Communication sectors

Sector	Description
Energy supply	Emissions are predominantly from power stations but also coal mining, oil refineries and other fuel production. Emissions are significantly affected by abatement technology at power stations and the type of fuel being produced or combusted.
Transport	Includes road transport, domestic shipping and aviation, and aircraft support vehicles. Road transport is the most significant source therefore emissions are affected by vehicle efficiency, distance travelled and number of vehicles.
Residential	Includes fuel combustion for heating, cooking, garden machinery, gases released from aerosols and inhalers, and emissions released from the breakdown of products such as detergents. Emissions are affected by energy efficiency, heating and hot water demands, and the fuel type for domestic combustion.
Business	Includes emissions from stationary combustion in the industrial and commercial sectors, industrial off-road machinery, and refrigeration and air conditioning.
Public	Includes emissions from fuel combustion in public sector buildings (e.g. public administration, defence, education and health and social work). Emissions are predominantly affected by fuel type.
Industrial process	Includes all emissions from industry except fuel combustion and therefore includes chemical and metal production, and mineral products (e.g. cement and lime). Emissions are significantly affected by abatement technology.
Agriculture	Includes emissions from livestock, agricultural soils, stationary combustion, and off-road machinery. Emissions are affected by the number of livestock, the quantity of fertiliser applied to land, and the intensity of activity.
Land use change	This covers sinks and sources of emissions from land use, land use change and forestry. Sinks remove greenhouse gas from the atmosphere whilst sources emit greenhouse gas. Emissions are affected by deforestation rates and land management.
Waste management	Emissions include those from waste disposed at landfills, wastewater treatment, and waste incineration. Emissions are affected by regulation of landfills and the proportion of waste that is recycled.

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