Northern Ireland Greenhouse Gas Emissions 2017

Department of
Agriculture, Environment and Rural Affairs

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Northern Ireland greenhouse gas inventory 1990-2017

Key points:

- In 2017, Northern Ireland's greenhouse gas emissions were estimated to be 20.0 million tonnes of carbon dioxide equivalent. This was a decrease of 3% compared to 2016.

- The longer term trend showed a decrease of 18% compared to the base year (1990).

- The largest sectors in terms of emissions in 2017 were agriculture (27%), transport (23%) and energy supply (17%). Most 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, waste management and residential sectors. These were driven by improvements in energy efficiency, fuel switching from coal to natural gas, which became available in the late 1990s, and the introduction of methane capture and oxidation systems in landfill management.

- Northern Ireland accounted for 4% of UK greenhouse gas emissions in 2017. In total, the UK reduced emissions by 42% between the base year and 2017. England and Scotland reduced emissions by 45% and 48%. Wales and Northern Ireland reduced emissions by 25% and 18% respectively.

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Contents

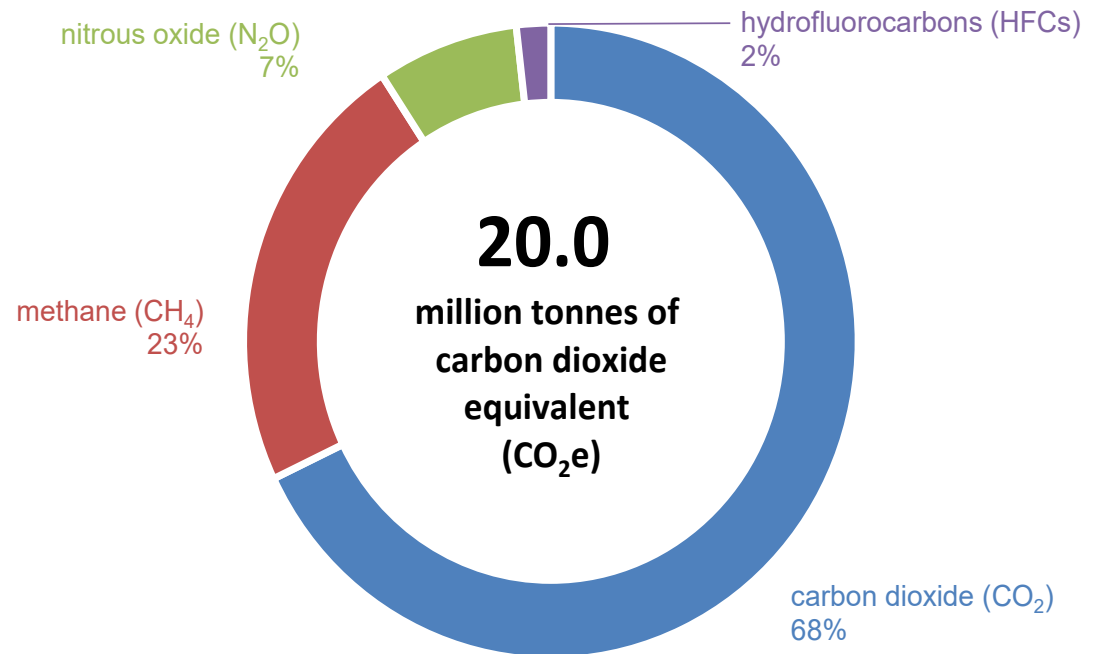**An Official Statistics publication**

Introduction

The purpose of this statistical bulletin is to summarise the latest published estimates of greenhouse gas emissions for Northern Ireland. The tables from which these estimates are sourced is available from the National Atmospheric Emissions Inventory website http://naei.beis.gov.uk/reports/reports?section_id=4

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.

By source emissions

- In 2017, Northern Ireland's greenhouse gas emissions were estimated to be 20.0 million tonnes of carbon dioxide equivalent (MtCO2e). This was a decrease of 3.3% compared to 2016.

- The longer term trend showed a decrease of 17.9% compared to 24.3 MtCO2e in the base year. The base year is 1990 for carbon dioxide, methane and nitrous oxide, and 1995 for the fluorinated gases.

- Carbon dioxide accounted for 68% of all greenhouse gas emissions in Northern Ireland (13.6 MtCO2) in 2017. The proportions of each gas are shown in Figure 1. Carbon dioxide was the most common 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.

Figure 1: Greenhouse gas emissions by gas
Northern Ireland, 2017

nitrous oxide (N_2O) 7%

hydrofluorocarbons (HFCs) 2%

methane (CH_4) 23%

20.0 million tonnes of carbon dioxide equivalent (CO_2e)

carbon dioxide (CO_2) 68%

- Northern Ireland accounted for 4.3% of total UK greenhouse gas emissions in 2017, whilst accounting for 2.8% of the UK's population and 2.2% of UK's economic output (Gross Value Added) in 2017.

- For methane and nitrous oxide Northern Ireland accounted for larger shares of the UK's emissions at 8.9% and 7.3% respectively. Agricultural sources 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.

Emissions by sector

Table 1: Greenhouse gas emissions by sector
Northern Ireland; base year, 2016, 2017

Units: MtCO$_2$e

Sector	base year	2016	2017	% of total emissions 2017	% change base year to 2017	% change 2016 to 2017
Agriculture	5.3	5.3	5.4	27	2.0	1.2
Business	3.1	2.5	2.4	12	-22.8	-6.0
Energy supply	5.3	4.0	3.4	17	-35.7	-15.1
Industrial process	0.8	0.2	0.2	1	-78.4	-3.1
Land use change	0.4	0.4	0.5	2	23.0	9.8
Public	0.5	0.2	0.2	1	-61.3	-1.0
Residential	3.7	2.7	2.6	13	-28.3	-2.0
Transport	3.5	4.5	4.5	23	30.2	0.4
Waste management	1.9	0.8	0.8	4	-56.8	1.4
Total	24.3	20.7	20.0	100	-17.9	-3.3

Unrounded source data are available from
https://www.daera-ni.gov.uk/publications/northern-ireland-greenhouse-gas-inventory-1990-2017-statistical-bulletin

- As shown in figure 2, the largest sectors in terms of emissions in 2017 were agriculture (27%), transport (23%) and energy supply (17%). Most 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, waste management and residential sectors. These were driven by improvements in energy efficiency, fuel switching from coal to natural gas, which became available in the late 1990s, and the introduction of methane capture and oxidation systems in landfill management.
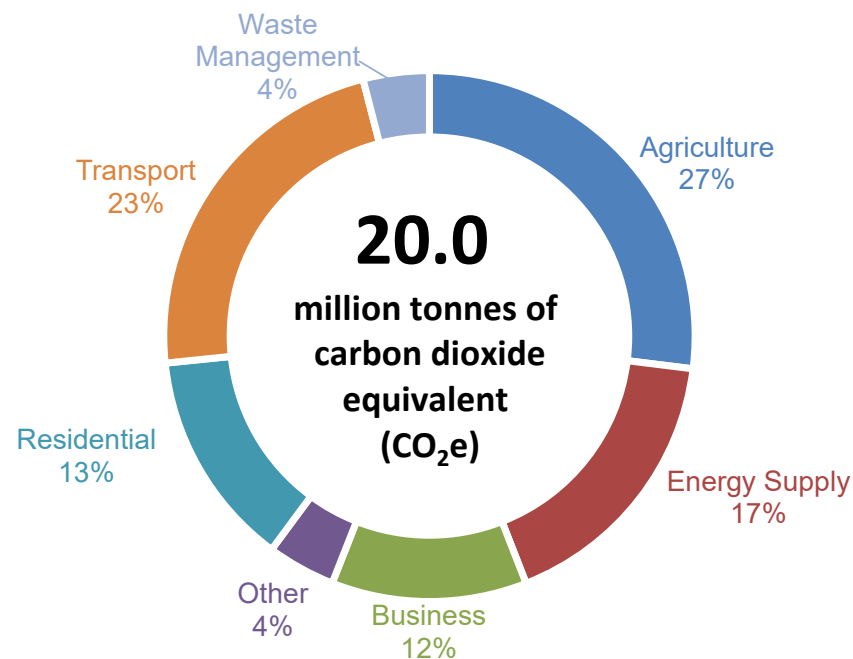
- Between 2016 and 2017, emissions from the energy supply sector decreased by 15.1% and accounted for most of the total decrease. This is due to a reduction in coal combustion at power stations in Northern Ireland.

Figure 2: Greenhouse gas emissions by sector
Northern Ireland, 2017

- The transport, land use change and agriculture sectors showed higher emissions in 2017 than in the base year. As shown in figure 4, overall transport emissions increased by 30.2% from the base year due to growth in demand for transport, despite improvements in efficiency of vehicles. Emissions from agriculture have increased by 2.0% and are driven by increased emissions from cattle due to increased livestock numbers. The relatively small net contribution to emissions (2.4%) made by the land use change sector increased by 23.0% over the time period; this mainly reflects the changes in carbon stock associated with land conversions between Cropland, Grassland, Settlements and Forest land. The largest growth in emissions since 1990 is from grassland converted to settlements in Northern Ireland.

Figure 3: Greenhouse gas emissions
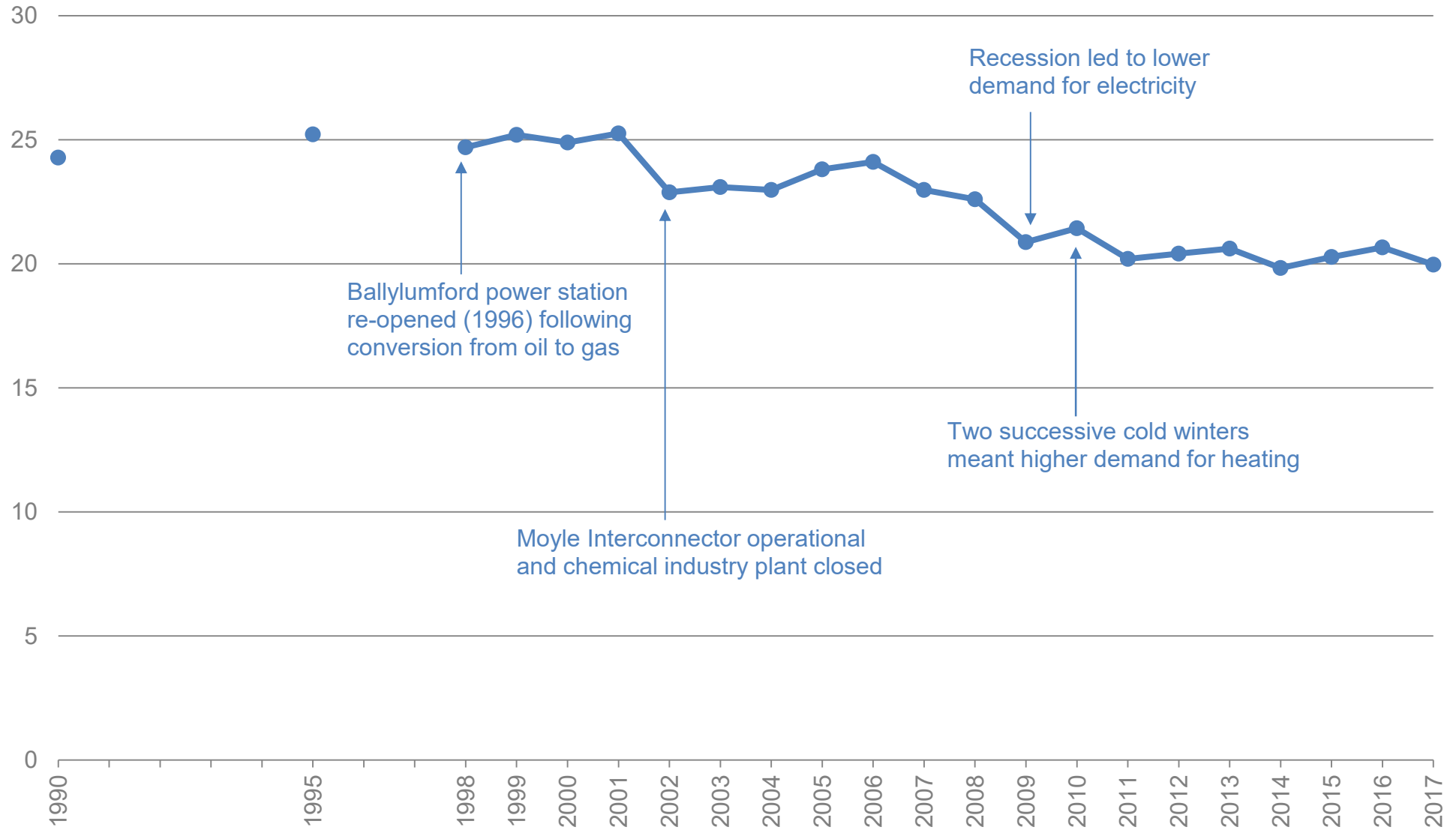Northern Ireland, 1990 to 2017

$MtCO_2e$

Recession led to lower demand for electricity

Ballylumford power station re-opened (1996) following conversion from oil to gas

Two successive cold winters meant higher demand for heating

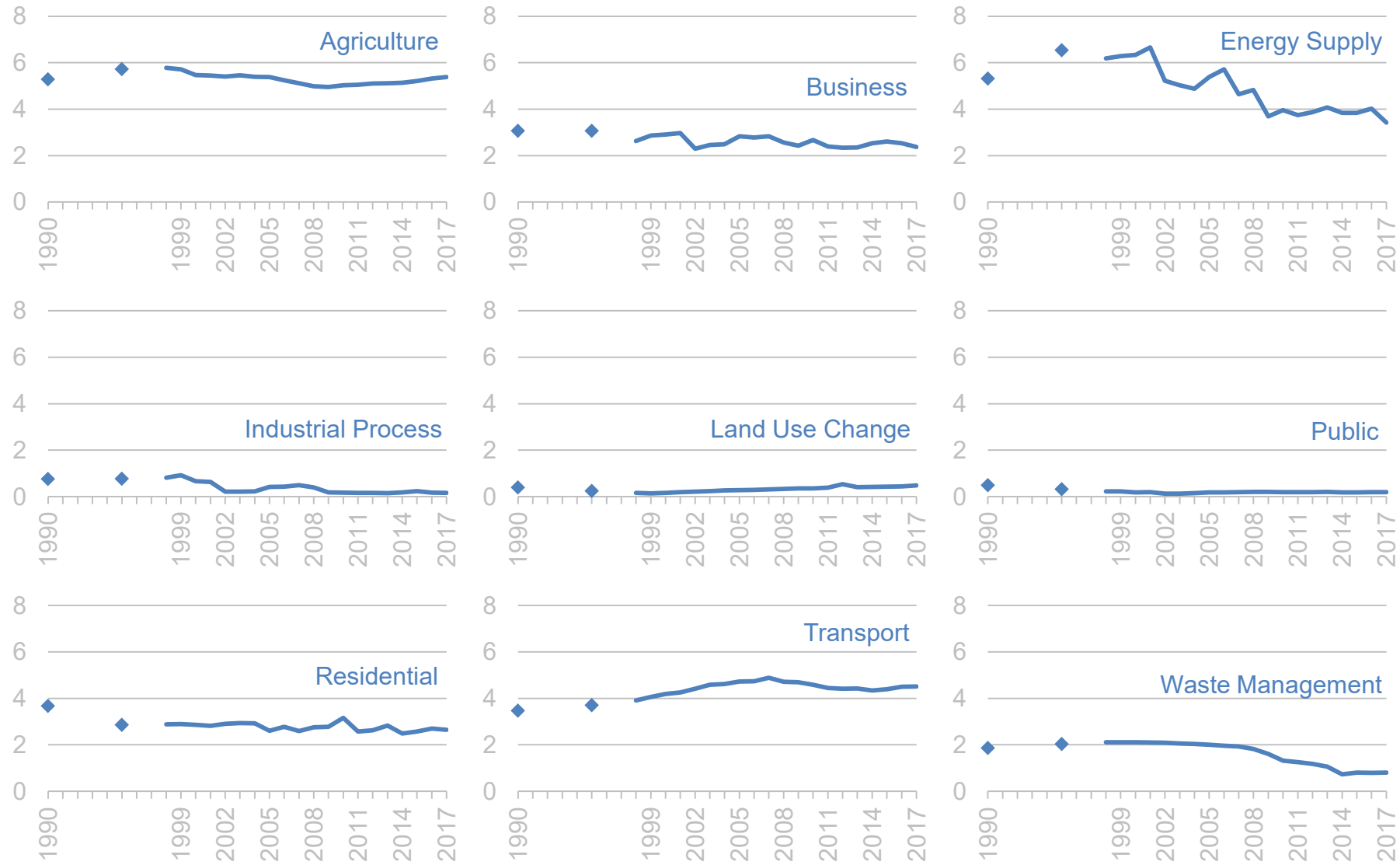Moyle Interconnector operational and chemical industry plant closed

Figure 4: Greenhouse gas emissions by sector
Northern Ireland, 1990 to 2017
MtCO$_2$e

Performance towards targets

- The UK Climate Change Act commits the UK to reducing emissions by at least 80% by 2050 from 1990 baseline levels.

- The draft Programme for Government Framework 2016-2021 contains greenhouse gas emissions as an indicator under outcome 2: we live and work sustainably – protecting the environment. The criteria used to report change for this indicator is +/- 1.0 percentage points cumulatively on an annual basis against the baseline year value in 2014, when Northern Ireland's greenhouse gas emissions were estimated to be 19.8 MtCO2e. A decrease in estimated emissions, compared to the PfG baseline year (2014), of greater than 1 percentage point (cumulatively) is considered a positive change whilst an increase in estimated emissions of greater than 1 percentage point (cumulatively) is considered a negative change. A change of less than 1 percentage point (cumulatively) is considered as no change.

- In 2017, Northern Ireland's greenhouse gas emissions were estimated to be 20.0 MtCO2e. This is an increase of 0.7% since the baseline year for PfG reporting (2014) and is considered as no change for PfG reporting.

Table 2: Greenhouse gas emissions - progress against Programme for Government measure
Northern Ireland; base year, 2014-2017

	NI GHG emissions (in MtCO2e)	% change from 2014 (base year for PfG reporting)	Progress to date using criteria for reporting change (+/-1pp per annum)
2014 (base year for PfG reporting)	19.83		
2015	20.28	2.3%	
2016	20.66	4.2%	
2017	19.97	0.7%	no change

Unrounded source data are available from
https://www.daera-ni.gov.uk/publications/northern-ireland-greenhouse-gas-inventory-1990-2017-statistical-bulletin

- The trends in greenhouse gas emissions vary across the different parts of the UK between the base year and 2017. It should be noted that the regional estimates are less certain than the overall UK estimate. Estimates for the UK are available in Tables 2 and 3 of the data tables that accompany this report.

    - UK has reduced emissions by 42%
    - Scotland has reduced emissions by 48%
    - England has reduced emissions by 45%
    - Wales has reduced emissions by 25%
    - Northern Ireland has reduced emissions by 18%

Note that the UK greenhouse gas emissions publication uses a 1990 base year for all gases (including fluroinated gases) which also results in a reduction of 42% by 2017. Note also that for consistency in the above list, the figure for Scotland, derived as part of the UK estimate, does not include international aviation and shipping. However the Scottish Government do include international aviation and shipping in greenhouse gas statistics produced in Scotland.

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.

- Total greenhouse gas emissions for Northern Ireland in 2017 in the end user inventory were 19.5 $MtCO_2e$. Four sectors accounted for more than 90% of end user emissions in 2017. These were agriculture (28%), transport (26%), residential (19%) and business (18%).

- 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. Statistics on the UK's Carbon Footprint are available from the Department for Environment, Food and Rural Affairs https://www.gov.uk/government/statistics/uks-carbon-footprint.

Uncertainty

When using the statistics in this bulletin users should be aware of the levels of uncertainty around the published estimates. For example, the estimated reduction of 18% in Northern Ireland greenhouse gas emissions has a 95% confidence interval that ranges from 9% to 29% reduction. For more information see background notes 4 and 5.

Background information

1. This is the tenth release of the Northern Ireland greenhouse gas inventory statistical bulletin. It will continue to be updated annually. The data were produced 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. Each year the greenhouse gas inventory is extended and updated. The entire historical data series is revised to incorporate methodological improvements and new data. This takes into account revisions to the datasets used in its compilation. Therefore, once the latest year's inventory is published, the previous version becomes redundant and cannot be used for comparison purposes. However the latest inventory contains a single consistent time series going back to 1990 which can be used to examine trends.

3. Emissions are reported for seven greenhouse gases: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6) and nitrogen trifluoride (NF_3). Depending on their molecular weights, radiative properties and residence times in the atmosphere, each greenhouse gas has a different capacity to cause global warming. The base year is 1990 for carbon dioxide, methane and nitrous oxide, and 1995 for the fluorinated gases. The fluorinated gases are hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride and nitrogen trifluoride. Emissions in this bulletin are reported according to the National Communication sectors. This is in accordance with international reporting guidelines from the United Nations Framework Convention on Climate Change (UNFCCC). Descriptions of each sector are available on page 11.

4. 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. The uncertainties are presented as confidence intervals. The width of the interval provides a measure of the accuracy of the estimate.

5. Uncertainty estimates for Northern Ireland emissions are available for the base year, the latest year (2017) and for the percentage change between the two years. For the base year, the 95% confidence interval is ±10%, and for 2017 it is ±7%. For the percentage reduction between the base year and 2017, the 95% confidence interval ranges from 9% to 29%, with a central estimate of 18%. 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 this gas 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.

6. 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 the front cover.

7. 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 https://www.gov.uk/government/publications/uk-greenhouse-gas-emissions-statistics-user-guidance.

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 GHGs from the atmosphere whilst sources emit GHGs. 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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