Northern Ireland Carbon Intensity Indicators 2021

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Department of Agriculture, Environment and Rural Affairs

www.daera-ni.gov.uk

INVESTORS IN PEOPLE

Contents

Key Points

• Gross Value Added (GVA) is used to measure NI's economic output, since 1998 it has grown substantially, while greenhouse gas emissions have declined. The ratio of total greenhouse gas emissions to GVA, in NI, decreased 62% from 1998 to 2019.

• In 2019, greenhouse gas (GHG) emissions intensity for NI was estimated at around 0.51 kilograms of carbon dioxide (CO_2) equivalent per £ of GVA. In 1998 this figure stood at 1.34 kilograms.

• GHG emissions per capita decreased 31% from 16.3 tonnes CO_2 equivalent per person in 1990 to 11.3 tonnes in 2019. The population increased by 19% over this period, while greenhouse gas emissions decreased by 18%.

• GHG emissions per unit of electricity generated decreased 48% from 631 grams CO_2 per kWh in 2004 to 330 grams in 2019. This has been driven by the growth of renewable energy generation in NI, a shift away from coal use towards gas for electricity generation, and improvements in energy efficiency.

• Residential GHG emissions per household have decreased 4% from 3.78 tonnes of CO_2 equivalent per household in 2008 to 3.63 tonnes in 2019. Fuel switching to natural gas from more carbon-intensive fuels such as coal and oil has reduced emissions, but more households creates greater demand for energy.

• Road transport emissions per vehicle kilometre travelled decreased 11% from 244 grams of CO_2 equivalent per vehicle kilometre travelled in 2008 to 218 in 2019.

• Total emissions (excluding sequestration) related to milk production decreased from a population average of 1,927 grams of CO_2 equivalent per kilogram (Energy Corrected Milk-ECM) in 1990 to 1,240 grams in 2019. Whilst milk production in the dairy sector has expanded by 81% since 1990, the total number of dairy cows over this period has increased by only 13%, meaning this improvement in carbon footprint has been driven by substantial increases in milk yield per cow.

• Waste management emissions per capita have decreased 66% from 1,135 kilograms of CO_2 equivalent per person in 1990 to 385 kilograms in 2019. The population increased by 19% over this period while greenhouse gas emissions from

waste management fell by 60%, due in a large part to the introduction of methane capture and oxidation systems at landfill sites.

Introduction - Carbon Intensity Indicators for Northern Ireland

To complement the emissions data available from the historic GHG Inventory and the Northern Ireland (NI) GHG Projections and to help Government track the effectiveness of carbon reduction policies, a set of local Carbon Intensity (CI) indicators have been developed. The indicators were agreed by the Mitigation Sub-Group of the Cross-Departmental Working Group on Climate Change (CDWGCC) and populated by DAERA's Statistics and Analytical Services Branch, taking advice as appropriate, from the CDWGCC Analysts' Sub-Group. Please note that this group is now known as the Future Generations Analysts' Sub-Group

Rather than measuring absolute emissions levels, emissions intensity is concerned with capturing the amount of CO_2 equivalent generated per unit of output or per capita, e.g., power sector emissions per unit of electricity generated or total NI emissions per head of population.

The value of taking such an approach is that, whilst overall emissions might be seen to be increasing for a particular sector in line with an expanding economy, the carbon intensity might be decreasing which could still be viewed as a positive outcome. The CI indicators are therefore another way of measuring progress made in NI towards reducing GHG emissions in terms of intensity as opposed to absolute emissions. Estimated absolute emissions for NI are available in the NI greenhouse gas inventory 1990-2019 statistical bulletin.

The CI indicators are supplemented by a set of associated proxy indicators which, whilst not intensity indicators as such, are logically linked to emissions and/or emissions intensity levels. Consideration of proxy indicators allows a greater range of indicators to be monitored as there are less data constraints. It can also be easier to see how indicators are linked to various policy initiatives. Examples here could be the proportion of travel undertaken by sustainable means such as walking or cycling, or the energy efficiency of the building stock.

This report presents a series of indicators, for each of the key emissions sectors, with each section generally beginning with an intensity indicator (where available), supplemented by proxy indicators. For ease of reference, the intensity indicators

have been highlighted in blue in Table 1 to distinguish them from supporting proxy indicators.

Trend data are presented as graphs, from as far back as practical to collect up to the latest year available. Separate tables with full time-series data are available on the [Northern Ireland Carbon Intensity Indicators 2021](#) page. For some indicators, data may only recently have become available. In such cases, the current year will be the base year with the trend building from that point onwards. The intention is to update indicators on an annual basis.

A User Guidance document has been produced to support this report which will develop over time. Users are strongly encouraged to consult the [Northern Ireland Carbon Intensity indicators user guidance 2021](#) when considering particular indicators in order to properly understand what the indicator is measuring, its relevance from an emissions/intensity perspective and any significant limitations.

Summary of changes to indicators since previous publication

When the report is reviewed, some additional indicators may be added and in some instances indicators may need to be removed. No such changes took place this year. Where future changes occur they will be included here. Some of the data in this publication have been impacted by the COVID-19 pandemic. In some instances, data collection was disrupted and data are not available. In other instances the impacts of travel restrictions are apparent e.g. in transport data. Where data have been impacted, detail will be provided in the notes section for the relevant indicator.

Summary of Indicator trends

The table below summarises the long term and recent trend for each CI indicator (highlighted in blue) and proxy indicator. Changes in trend are colour coded; green shows positive change, red shows negative change and amber shows no, or unclear, change (e.g. an increase in total kilometres travelled is not necessarily a negative trend from a carbon reduction perspective if a greater proportion of travel is undertaken by walking/cycling or public transport rather than by car). The time period covered by the long term and recent trends will vary per indicator. For the majority of indicators, the long term trend refers to the trend from the first year data are available, until the most recent year. The recent trend refers to the trend between the current and previous year. Separate tables with full time-series data are available on the Northern Ireland Carbon Intensity Indicators 2021 page.

Table 1 Summary of indicator trends

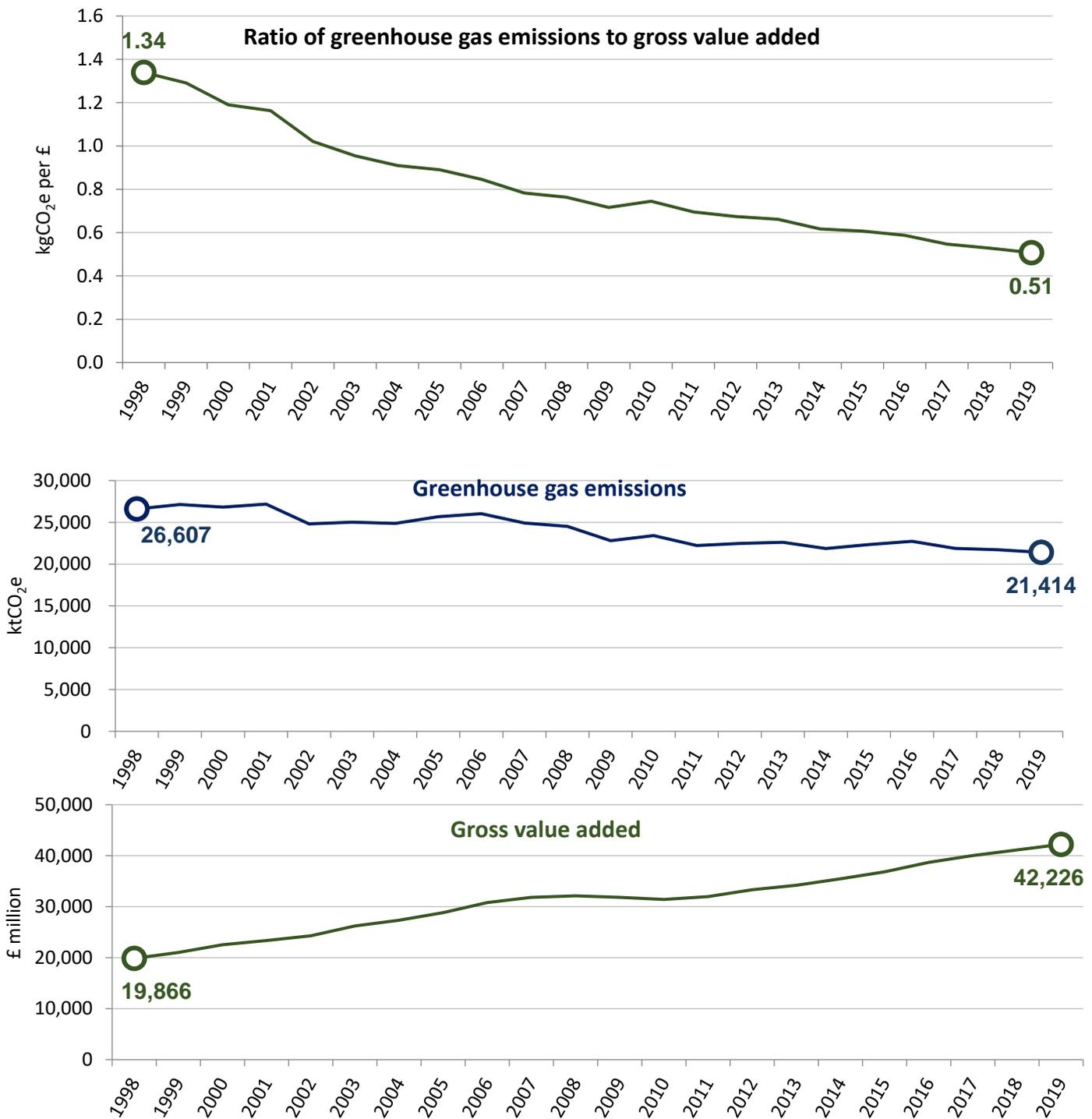| Indicator	Long term trend	Recent trend
CROSS-CUTTING INDICATORS		
1.1 Ratio of greenhouse gas emissions to gross value added	Positive	Positive
1.2 Greenhouse gas emissions per capita	Positive	Positive
POWER SECTOR INDICATORS		
2.1 Emissions per unit of electricity generated	Positive	Positive
2.2 Electricity generation by fuel type - Coal	Positive	Positive
2.2 Electricity generation by fuel type - Oil	Positive	Negative *
2.2 Electricity generation by fuel type - Gas	Negative *	Negative *
2.2 Electricity generation by fuel type - Renewables	Positive	Positive
BUILDING SECTOR INDICATORS		
3.1 Residential greenhouse gas emissions per household	Positive	Negative
3.2 Housing stock with energy efficiency measure - Full Cavity wall	Positive	Negative
3.2 Housing stock with energy efficiency measure -Loft insulation	Positive	Positive
3.2 Housing stock with energy efficiency measure -Full double-glazing	Positive	Positive
3.3 Standard Assessment Procedure ratings for residential buildings	Positive	Positive
3.4 Grants processed for energy efficiency measures	Negative	Negative
3.5 Primary energy source for heating of residential buildings - Oil	Negative	No Change
3.5 Primary energy source for heating of residential buildings - Gas	Positive	Positive
3.5 Primary energy source for heating of residential buildings - Solid fuel	Positive	Positive
3.6 Penetration of renewable heat - Non-domestic RHI applications		Positive
3.6 Penetration of renewable heat - Domestic RHI applications		Positive

Note: * Whether an increase/decrease in gas use is good or bad with respect to greenhouse gas emissions will depend on the electricity source in the absence of the gas. For example, burning less coal and more natural gas would help reduce emissions because natural gas results in lesser emissions than coal

Indicator	Long term trend	Recent trend
INDUSTRY SECTOR INDICATORS		
4.1 Number of participants in the Carbon Reduction Commitment Energy Efficiency Scheme	Negative	No Change
4.2 CO_2 emissions from participants in the Carbon Reduction Commitment Energy Efficiency Scheme	Positive	Positive
TRANSPORT SECTOR INDICATORS		
5.1 Average CO_2 of Licensed cars	Positive	
5.1 Licensed cars by CO_2 emissions 0-100 g/kg	Positive	
5.1 Licensed cars by CO_2 emissions Over 170g/kg	Positive	
5.2 Road transport emissions per vehicle kilometre travelled	Positive	Positive
5.3 Average distance travelled per person per year by mode of transport - All modes of transport	Negative	Negative
5.3 Average distance travelled per person per year by mode of transport - Walking/cycling	Positive	Positive
5.4 Mode of transport - Car, motorcycle, private taxis	Negative	No Change
5.4 Mode of transport - Walking/cycling	Negative	No Change
5.4 Mode of transport - Public transport	Negative	No Change
5.5 Bus passenger journeys	Positive	Positive
5.6 NI Rail service passengers, number of journeys and distance travelled	Positive	Positive
5.7 Plug-in cars, vans and quadricycles licensed	Positive	Positive
AGRICULTURE SECTOR INDICATORS		
6.1 Emissions intensity of milk production	Positive	Positive
6.2 Area of new forest and woodland plantings	Positive	Positive
6.3 Soil nitrogen balance	Negative	Positive
6.4 Average daily carcase gain of beef cattle - All Steers	Positive	Positive
6.4 Average daily carcase gain of beef cattle - All Heifers	Positive	Positive
6.5 Metabolic energy from grass silage	Negative	No Change
WASTE SECTOR INDICATORS		
7.1 Greenhouse gas emissions from waste management per capita	Positive	Positive
7.2 Local authority collected municipal waste - Arisings	Positive	Negative
7.2 Local authority collected municipal waste - Composting	Positive	Positive
7.2 Local authority collected municipal waste - Energy Recovery	Positive	Positive
7.2 Local authority collected municipal waste - Landfill	Positive	Positive

Note: Indicator 5.1 - there is a break in this series due to various factors. As a result, figures in each period are not directly comparable with other periods, more information is provided in the relevant section.

1. Cross-cutting Indicators

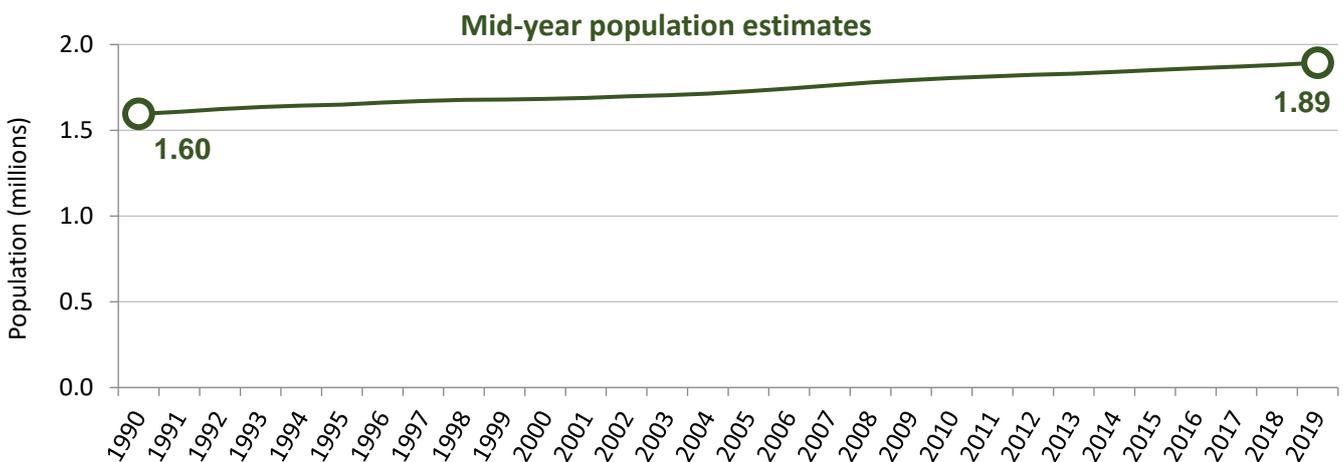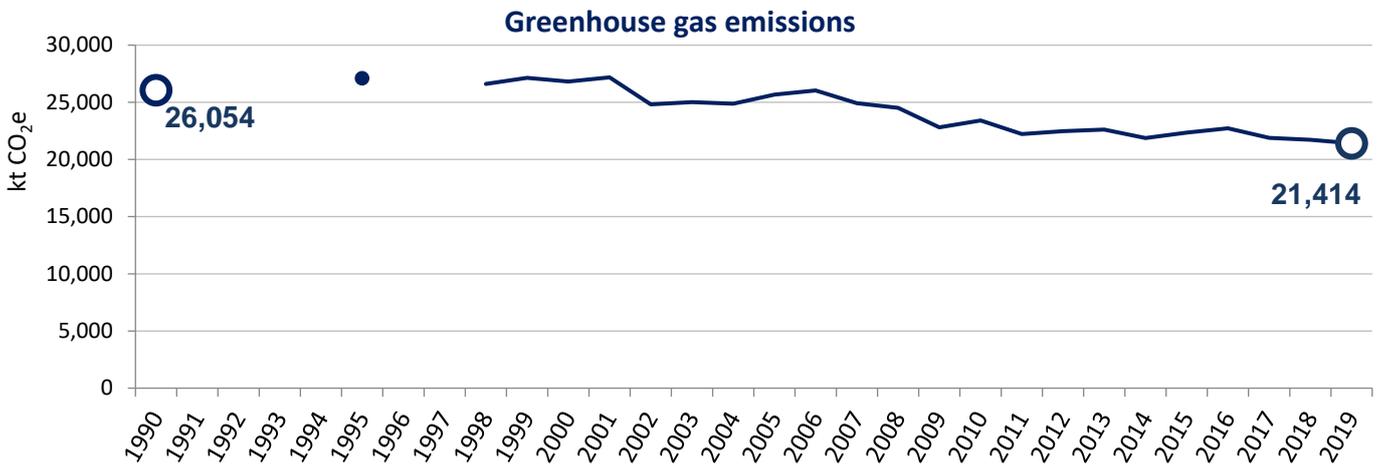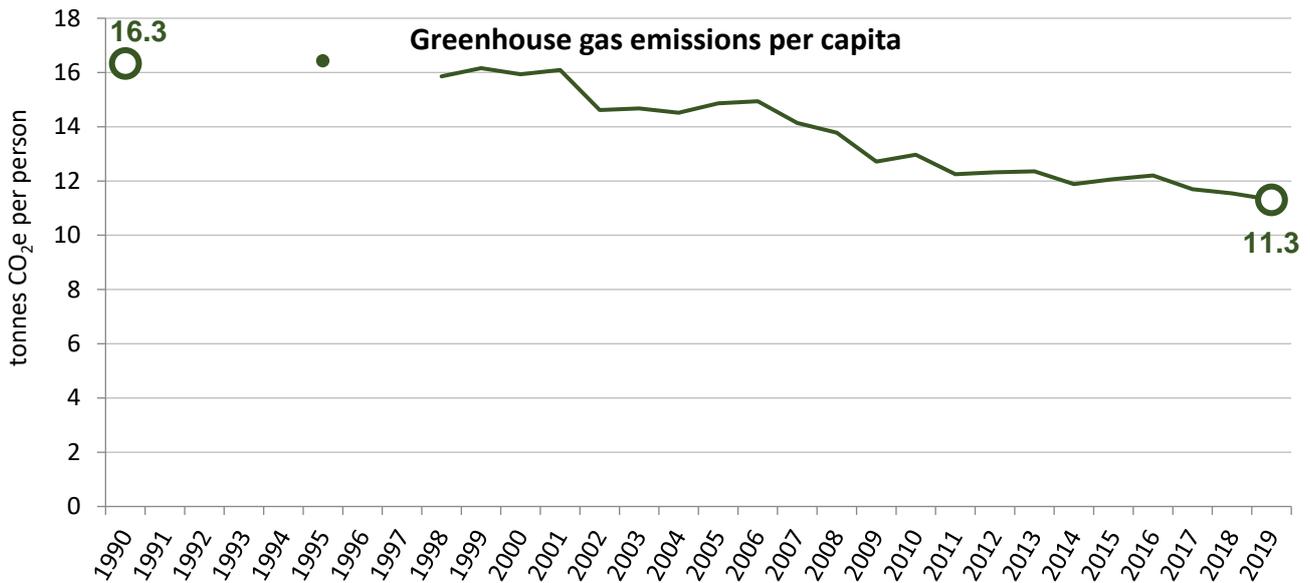## 1.1 Ratio of greenhouse gas emissions to gross value added

Ratio of greenhouse gas emissions to gross value added

1.34

0.51

Greenhouse gas emissions

26,607

21,414

Gross value added

19,866

42,226

Source: Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2019
Source: Regional Gross Value added (balanced) per head and income components, ONS
Notes: GVA (Income Approach) at current basic prices
Figures for greenhouse gas emissions and gross value added are updated annually due to ongoing improvements to data collection or estimation techniques
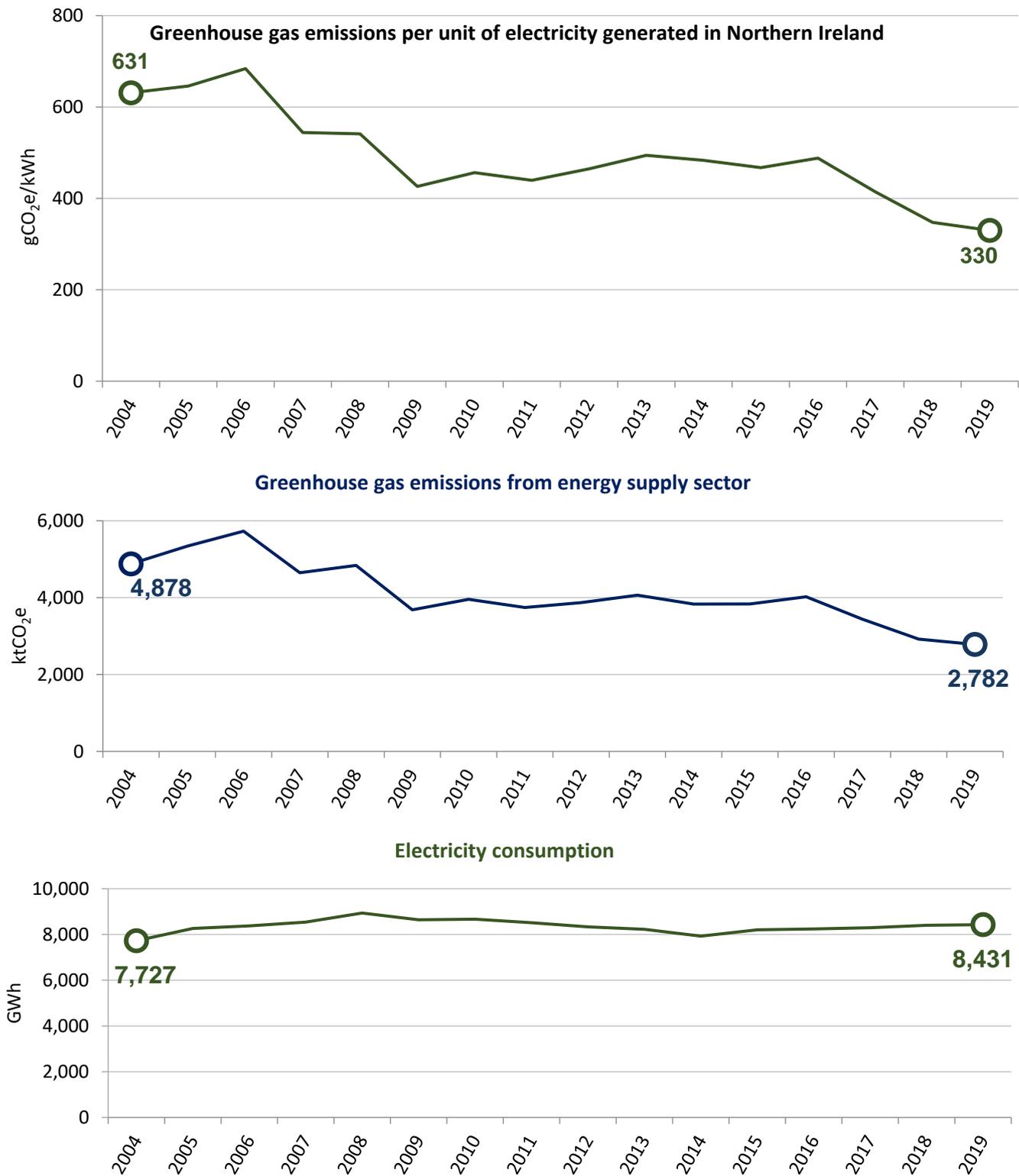
1.2 Greenhouse gas emissions per capita

Greenhouse gas emissions per capita

tonnes CO_2e per person

16.3

11.3

Greenhouse gas emissions

kt CO_2e

26,054

21,414

Mid-year population estimates

Population (millions)

1.60

1.89

Source: Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2019
Source: NISRA, 2019 mid-year population estimates
Notes: Figures for greenhouse gas emissions are updated annually due to ongoing improvements to data collection or estimation techniques

2. Power Sector

## 2.1 Greenhouse gas emissions per unit of electricity generated

Greenhouse gas emissions per unit of electricity generated in Northern Ireland

Greenhouse gas emissions from energy supply sector

Electricity consumption

Source: Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2019
Source: BEIS Energy Trends Special Feature
Notes: Figures for greenhouse gas emissions are updated annually due to ongoing improvements to data collection or estimation techniques

2.2 Electricity generation by fuel type

Electricity generated by fuel type in Northern Ireland
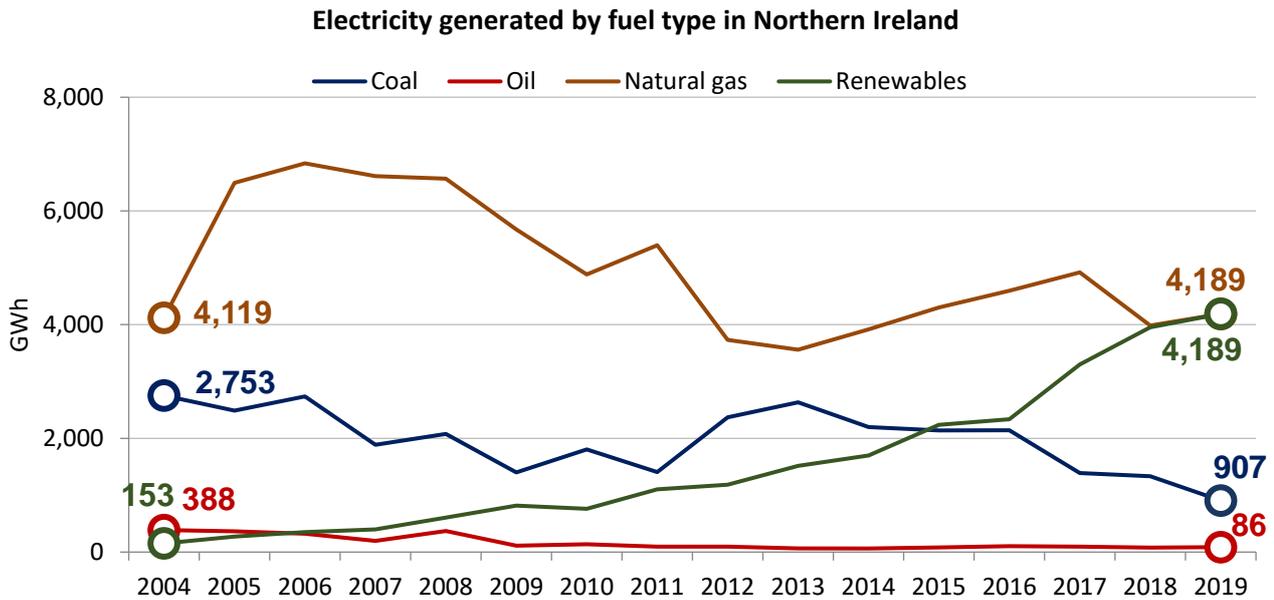
Source: BEIS Energy Trends Special Feature
Notes: Includes generation from both Major Power Producers (MPP) and other generators
Whether an increase/decrease in gas use is good or bad with respect to greenhouse gas emissions will depend on the electricity source in the absence of the gas. For example, burning less coal and more natural gas would help reduce emissions because natural gas results in lesser emissions than coal

3. Building Sector

3.1 Residential greenhouse gas emissions per household
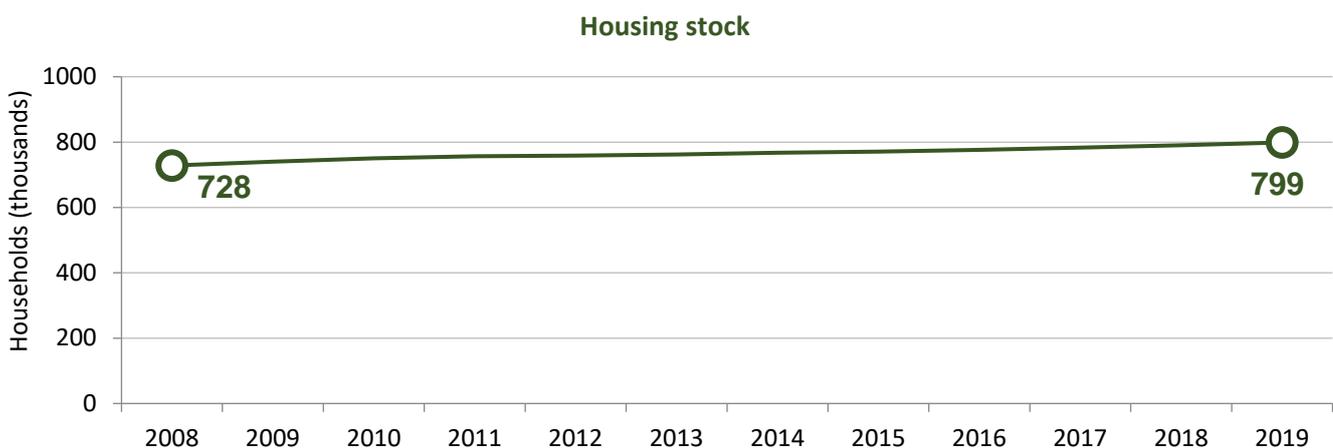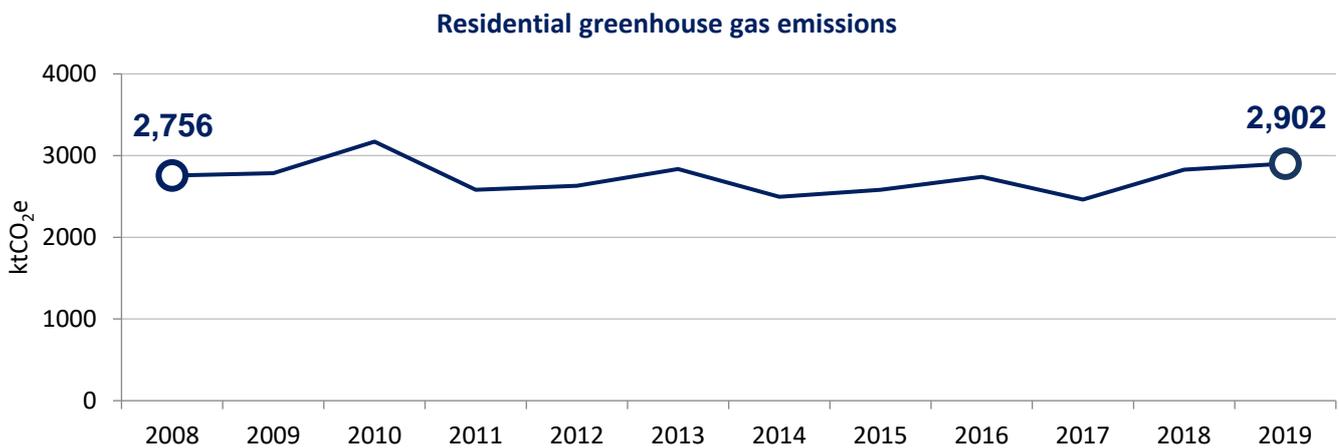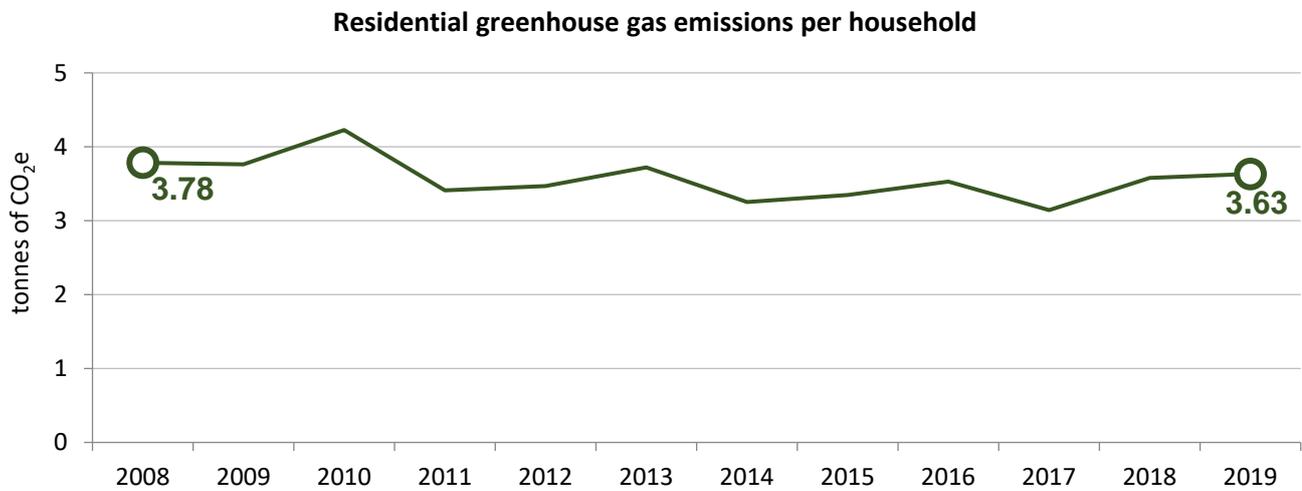
Residential greenhouse gas emissions per household

**Residential greenhouse gas emissions**

Housing stock

Source: Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2019
Source: NI Annual housing stock statistics
Notes: Housing stock figures include vacant properties
Figures for greenhouse gas emissions are updated annually due to ongoing improvements to data collection or estimation techniques
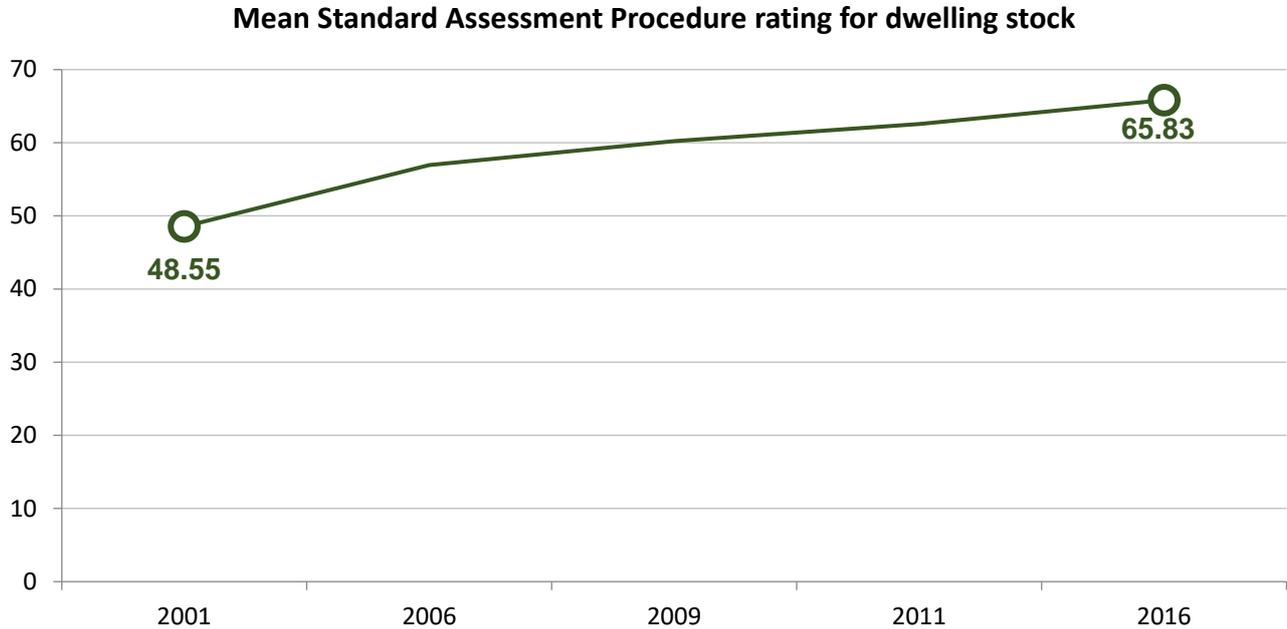
3.2 Housing stock with energy efficiency measure
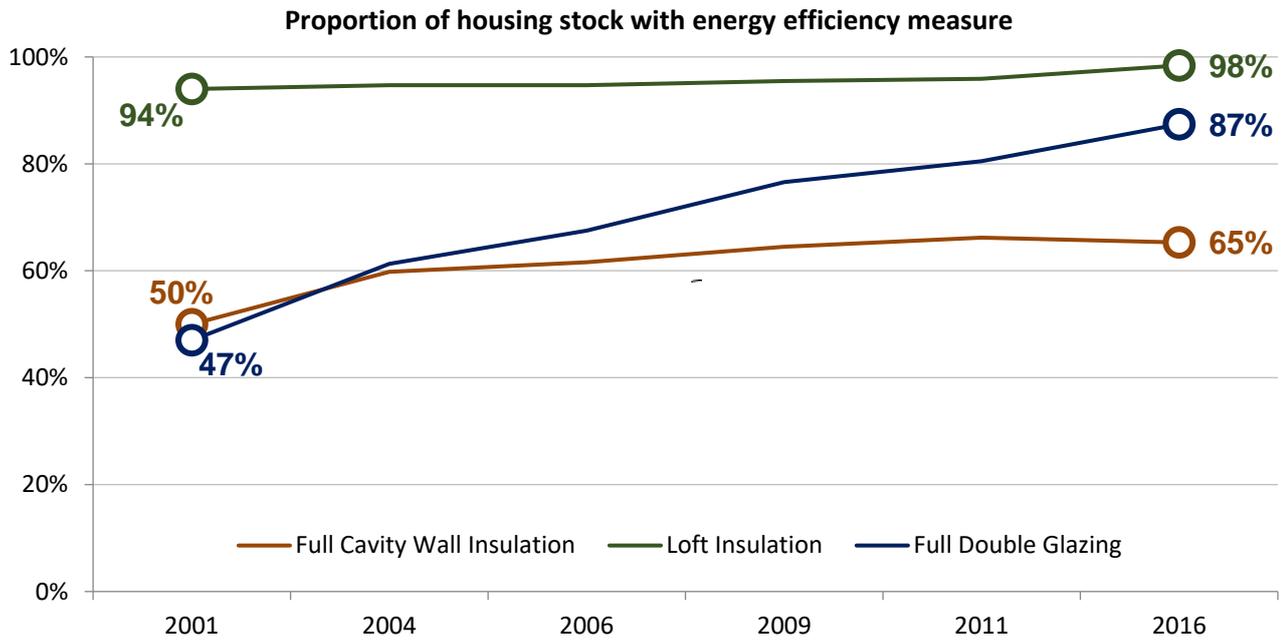
Proportion of housing stock with energy efficiency measure

Source: House Condition Survey
Notes: No further update, due to COVID-19 the NIHCS 2021 has been postponed until 2022

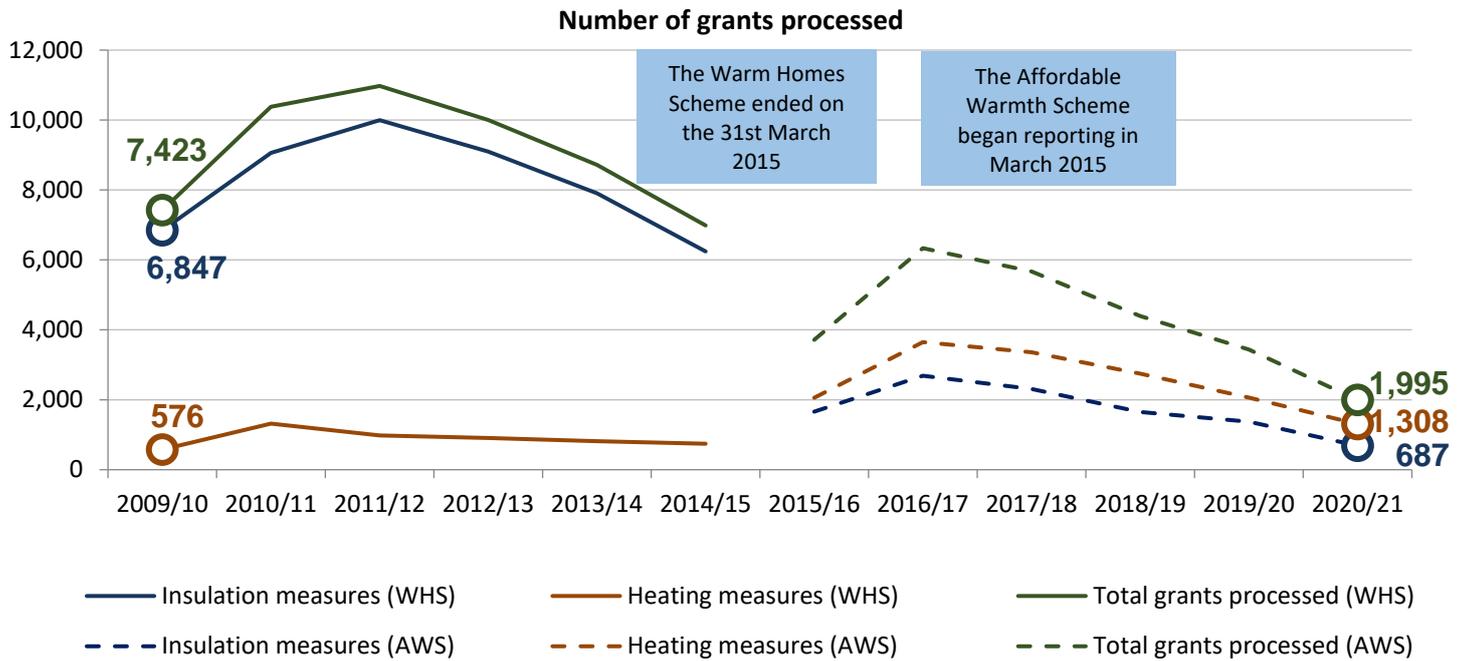## 3.3 Mean Standard Assessment Procedure rating for dwelling stock

Mean Standard Assessment Procedure rating for dwelling stock

Source: House Condition Survey
Notes: No further update, due to COVID-19 the NIHCS 2021 has been postponed until 2022

3.4 Grants processed for energy efficiency measures

Number of grants processed

The Warm Homes Scheme ended on the 31st March 2015

The Affordable Warmth Scheme began reporting in March 2015

7,423

6,847

576

1,995

1,308

687

- Insulation measures (WHS)
- Heating measures (WHS)
- Total grants processed (WHS)
- Insulation measures (AWS)
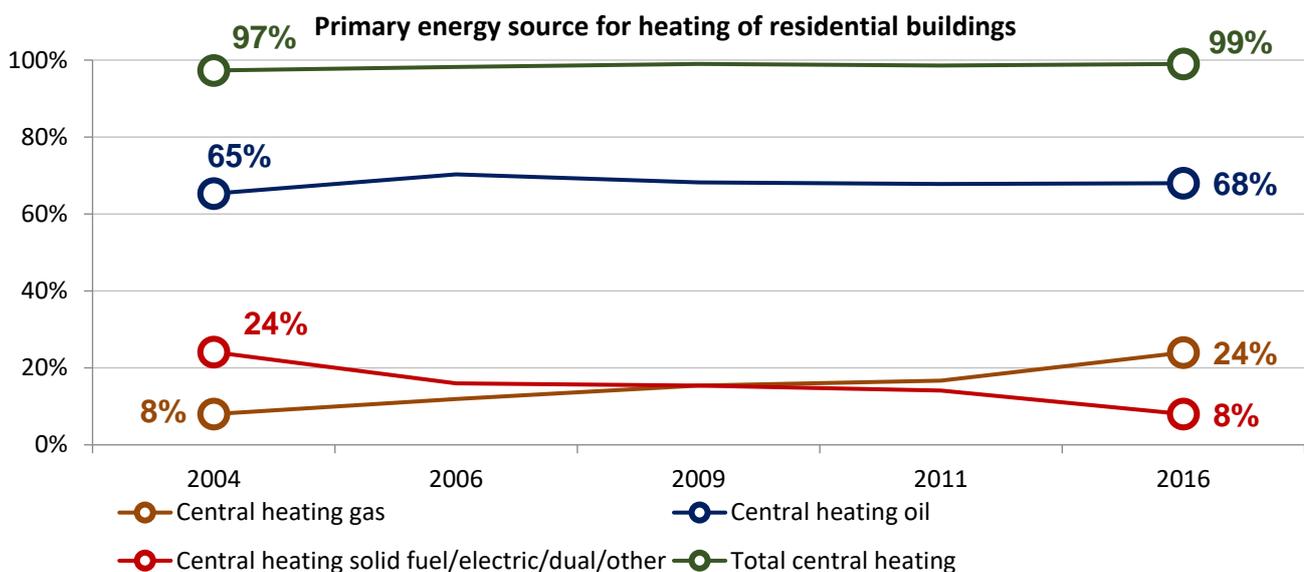- Heating measures (AWS)
- Total grants processed (AWS)

Source: Department for Communities, Strategic Planning & Resources Branch
Notes: The Warm Homes Scheme ended on 31 March 2015 and has been replaced by the Affordable Warmth Scheme. The heating options for these schemes are quite different, so they cannot be directly compared
The Affordable Warmth Scheme started in September 2014, however the numbers between then and March 2015 are too small to report
Numbers for 2020/21 likely to be affected by COVID-19, during lockdown the NIHE Grants Offices were only able to address emergency cases (those without heating)

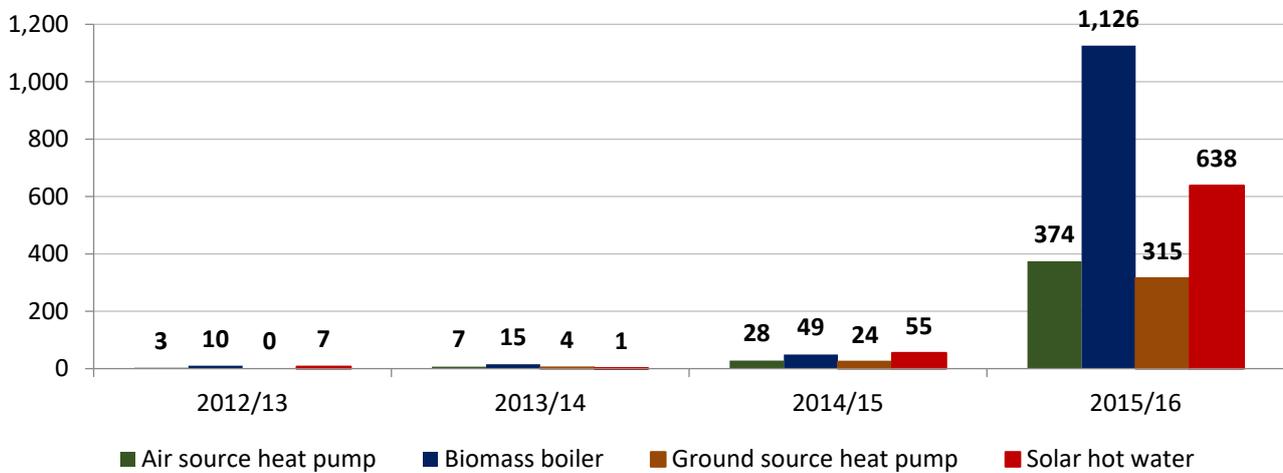## 3.5 Primary energy source for heating of residential buildings

Primary energy source for heating of residential buildings

97%

99%

65%

68%

24%

24%

8%

8%

- Central heating gas
- Central heating oil
- Central heating solid fuel/electric/dual/other
- Total central heating
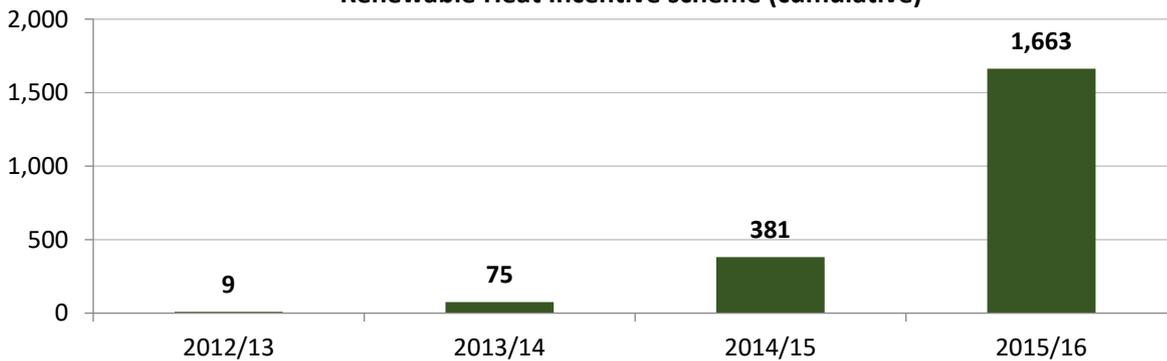
Source: House Condition Survey
Notes: No further update, due to COVID-19 the NIHCS 2021 has been postponed until 2022
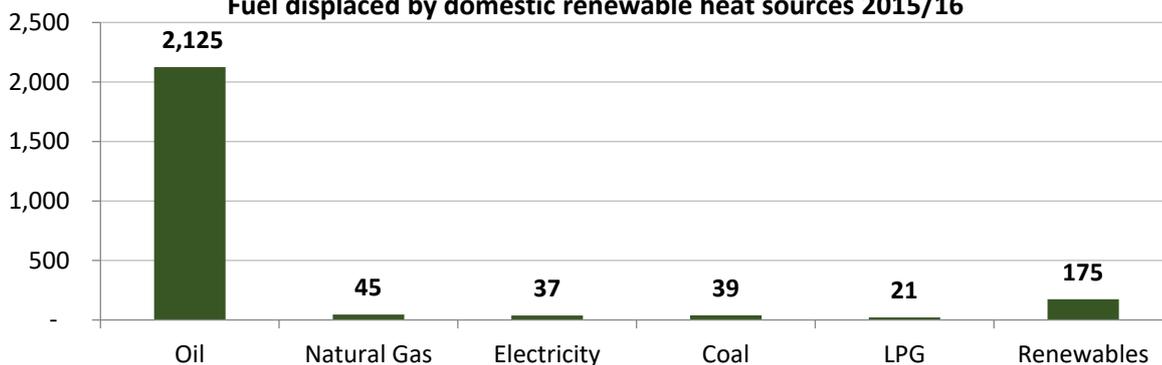
3.6 Penetration of renewable heat

**Number of Domestic RHI / RHPP Applications
in Receipt of an Upfront Payment**

Legend: Air source heat pump · Biomass boiler · Ground source heat pump · Solar hot water

	2012/13	2013/14	2014/15	2015/16
Air source heat pump	3	7	28	374
Biomass boiler	10	15	49	1,126
Ground source heat pump	0	4	24	315
Solar hot water	7	1	55	638

**Number of installations under the non domestic
Renewable Heat Incentive scheme (cumulative)**

2012/13	2013/14	2014/15	2015/16
9	75	381	1,663

Fuel displaced by domestic renewable heat sources 2015/16

Oil	Natural Gas	Electricity	Coal	LPG	Renewables
2,125	45	37	39	21	175

Source: Energy Efficiency Branch, Department for the Economy
**Notes:** Figures for the Domestic RHI / RHPP are reported as applications rather than installations as they were in 2016
Due to differences in the way each scheme is run, it is deemed most appropriate to report the domestic scheme in applications and the non domestic scheme in installations
No further updates available, schemes closed to new applications on 29th February 2016
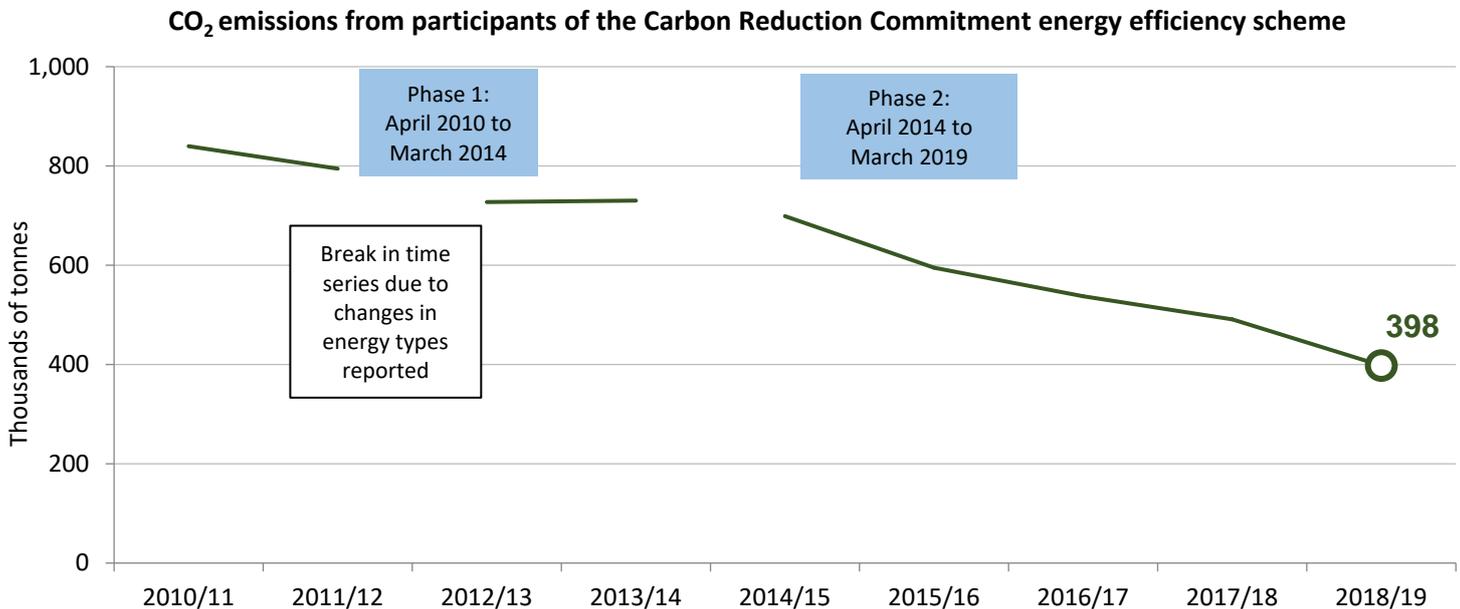
4. Industry Sector

4.1 Number of participants in the Carbon Reduction Commitment Energy Efficiency Scheme
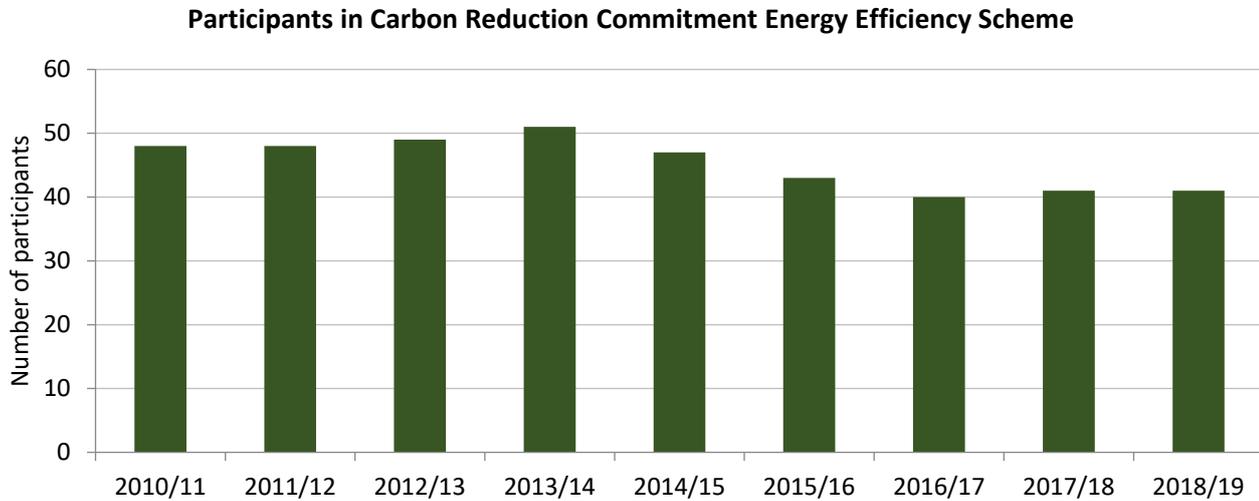
Participants in Carbon Reduction Commitment Energy Efficiency Scheme

Source: UK Environment Agency, Carbon reduction Commitment Annual report publication
Notes: Taken from the spreadsheet by filtering on those where 'NI Environment Agency' is the Regulator.
No further updates available, scheme closed in March 2019

4.2 CO_2 emissions from participants in the Carbon Reduction Commitment Energy Efficiency Scheme

CO_2 emissions from participants of the Carbon Reduction Commitment energy efficiency scheme

Source: UK Environment Agency, Carbon reduction Commitment Annual report publication
Notes: Due to changes to the Carbon Reduction Commitment energy efficiency scheme, it is not possible to directly compare 2010/11 - 2011/12 with 2012/13 - 2013/14 or 2014/15 - 2018/19
Reductions in emissions should be treated with caution due to the loss of participants because of mergers, site closures and the economic downturn
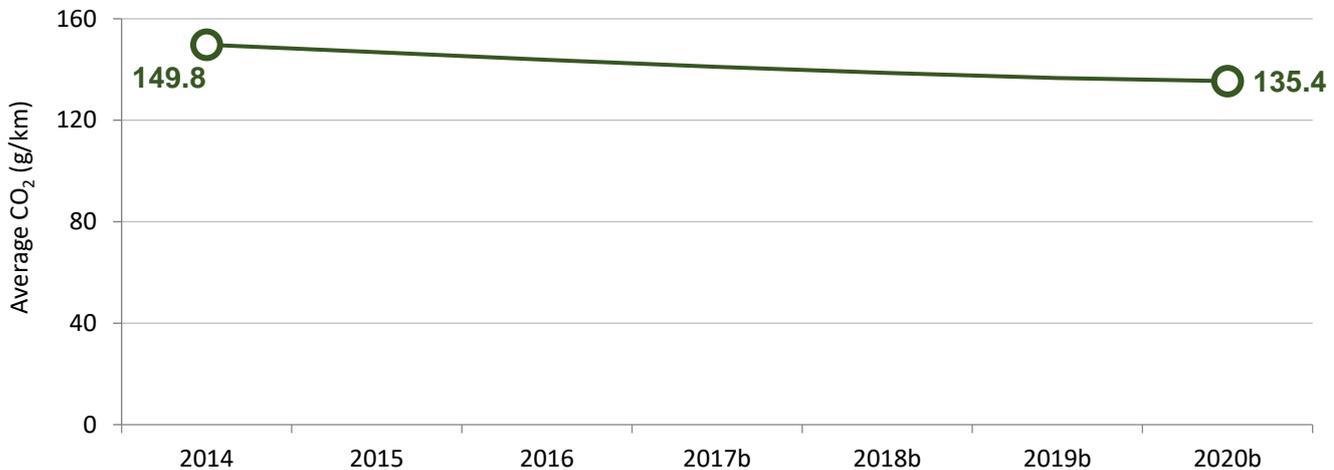These figures were revised in October 2020 to maintain consistency with the figures published in the annual report, these may be revised as a result of internal review or audit
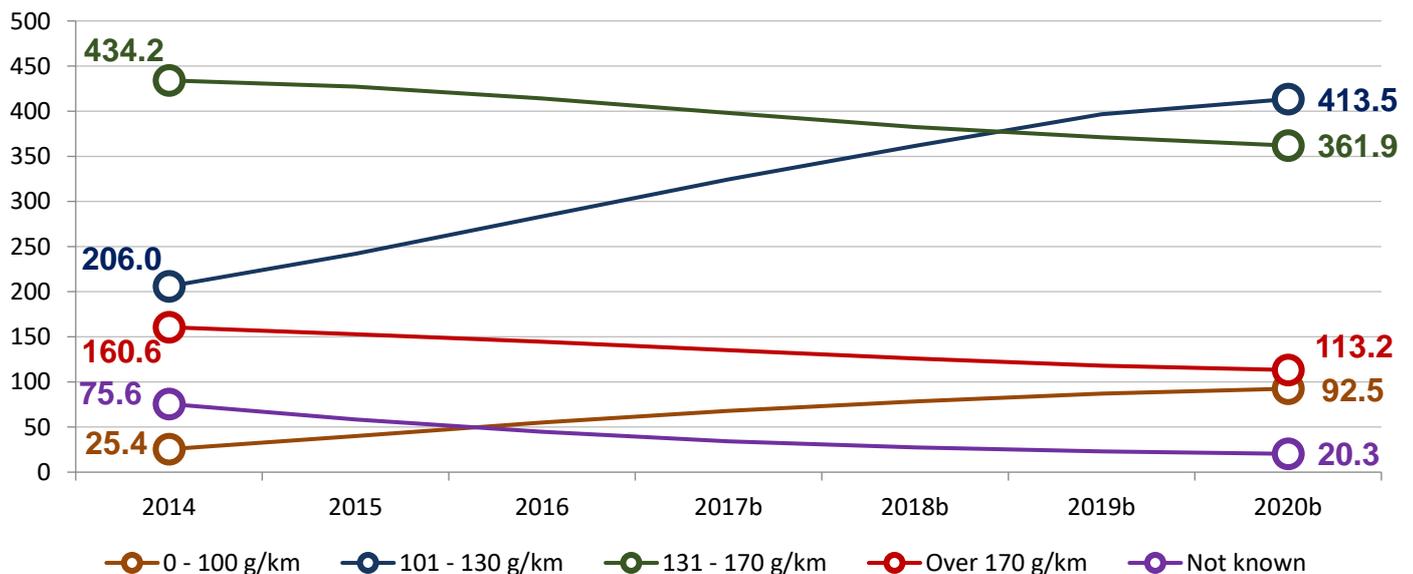No further updates available, scheme closed in March 2019

5. Transport Sector
5.1 CO$_2$ emissions of licenced cars

Average CO$_2$ (g/km) of licensed cars in Northern Ireland

Licensed cars by CO$_2$ emissions (Thousands)

Legend: 0 - 100 g/km | 101 - 130 g/km | 131 - 170 g/km | Over 170 g/km | Not known

Source: Department for Transport, Licensed Cars (VEH02)
Notes: b. Break in series due to various factors. As a result, figures in each period are not directly comparable with other periods
2017 Q2: Vehicle Excise Duty (VED) bands are changed for cars registered for the first time
2018 Q3/Q4: Cars registered prior to September 2018 reported a NEDC figure; those between September 2018 and December 2018 reported either a NEDC or an e-NEDC figure
2019 Q1: Cars registered from January 2019 to March 2020 reported an e-NEDC figure
2020 Q2: Cars registered from April 2020 onwards reported a WLTP figure. Whilst the e-NEDC figure was designed to be broadly 'equivalent' with an NEDC figure, the new WLTP figure is typically about 20% higher for petrol and diesel cars
More information on VED is available at: Vehicle Excise Duty
More information on the NEDC and WLTP measurements is available at: Vehicle Licensing Statistics- Notes and Definitions PDF (215KB)
Data are presented where over half of licensed cars have available CO$_2$ emissions data

5.2 Road transport emissions per vehicle kilometre travelled

Road transport emissions per vehicle kilometre travelled

Greenhouse gas emissions from road transport sector
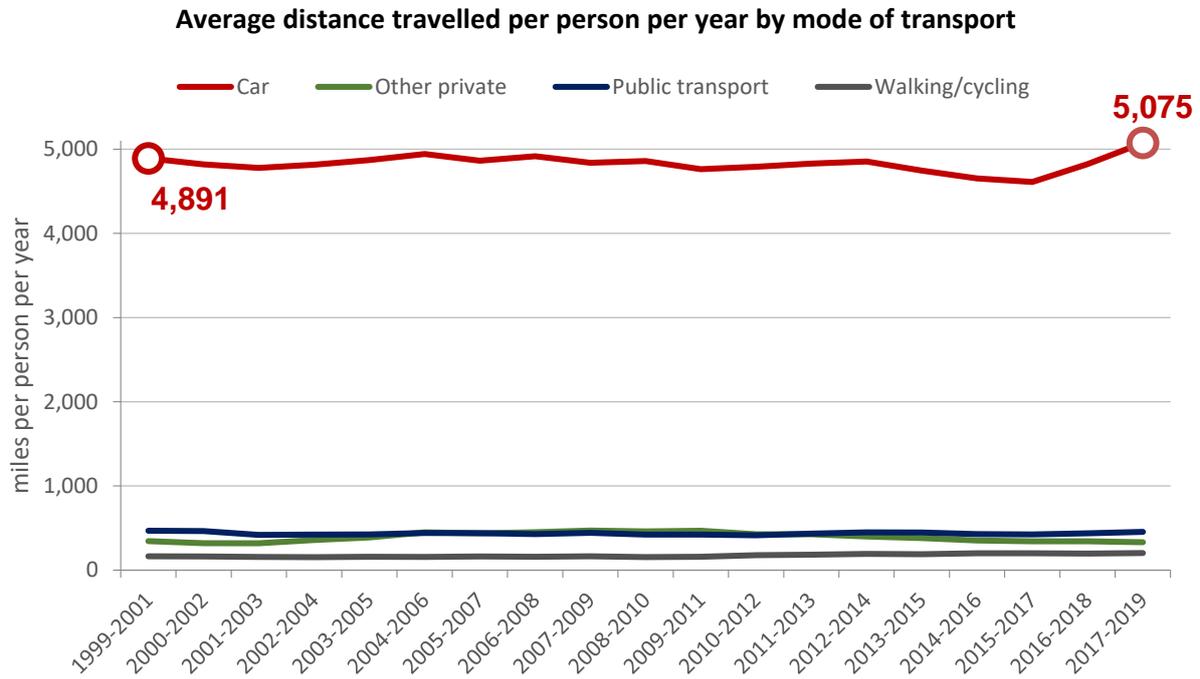

Vehicle kilometres travelled
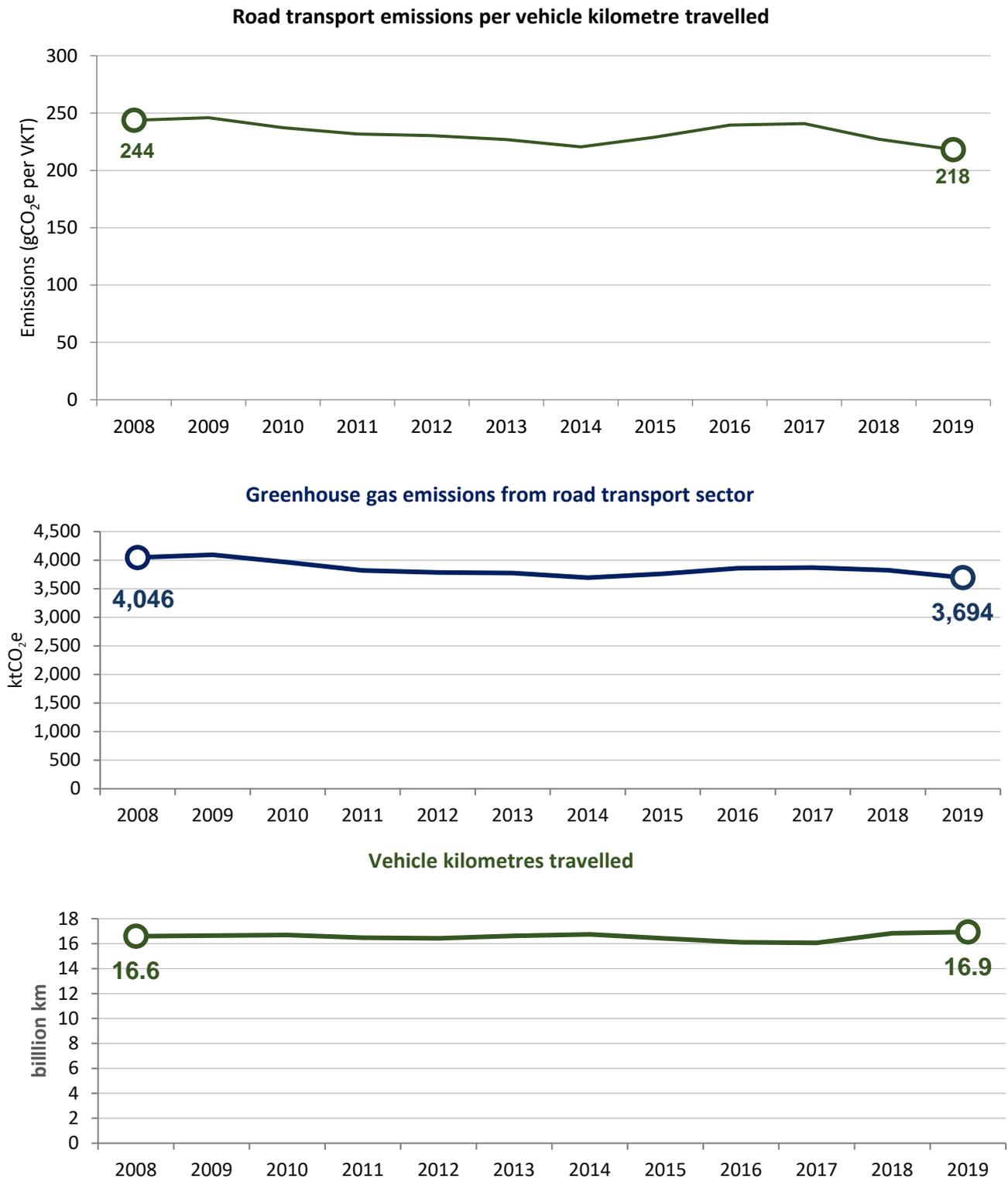
Source: Northern Ireland Road Safety Strategy to 2020 Annual Statistical Report 2020; Table 5
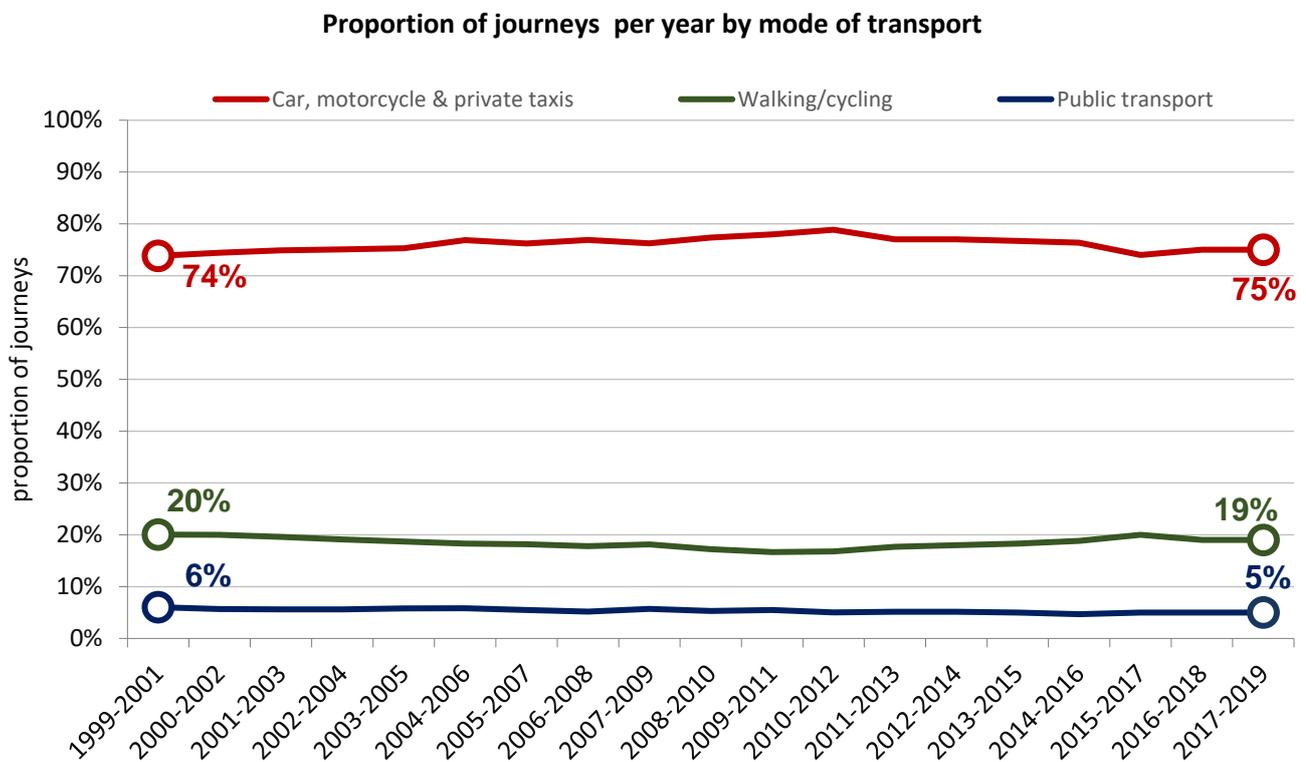**Source:** Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2019
Notes: Figures for greenhouse gas emissions are updated annually due to ongoing improvements to data collection or estimation techniques

## 5.3 Average distance travelled per person per year by mode of transport

Average distance travelled per person per year by mode of transport

Legend: Car — Other private — Public transport — Walking/cycling

5,075

4,891

y-axis: miles per person per year (0, 1,000, 2,000, 3,000, 4,000, 5,000)

x-axis: 1999-2001, 2000-2002, 2001-2003, 2002-2004, 2003-2005, 2004-2006, 2005-2007, 2006-2008, 2007-2009, 2008-2010, 2009-2011, 2010-2012, 2011-2013, 2012-2014, 2013-2015, 2014-2016, 2015-2017, 2016-2018, 2017-2019

Source: Travel Survey for Northern Ireland in-depth report 2017-2019

5.4 Mode of transport

Proportion of journeys per year by mode of transport

Legend: Car, motorcycle & private taxis — Walking/cycling — Public transport

74% **75%**

20% **19%**

6% **5%**

y-axis: proportion of journeys (0%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%)

x-axis: 1999-2001, 2000-2002, 2001-2003, 2002-2004, 2003-2005, 2004-2006, 2005-2007, 2006-2008, 2007-2009, 2008-2010, 2009-2011, 2010-2012, 2011-2013, 2012-2014, 2013-2015, 2014-2016, 2015-2017, 2016-2018, 2017-2019

Source: Travel Survey for Northern Ireland in-depth report 2017-2019

5.5 Bus passengers, distanced travelled
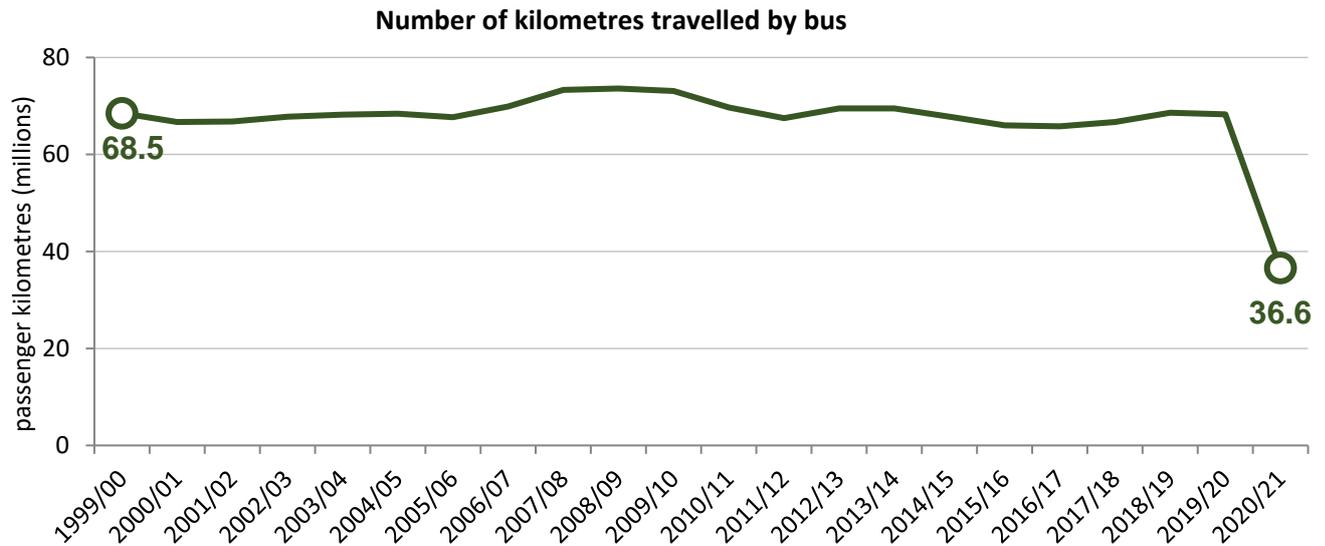
Number of kilometres travelled by bus

Source: Northern Ireland Transport Statistics 2020-2021
Notes: These data are supplied by Translink and should be viewed as management information rather than Official Statistics
CityBus became Metro with effect from 2005. Glider was introduced in September 2018
Whether a decrease in passenger journeys by bus is good or bad for greenhouse gas emissions will depend on why the journeys have decreased
For example, if it is a result of more car journeys then this would mean higher greenhouse gas emissions, whereas cycling would result in lower emissions
2020/21 figures are provisional
During 2020/21 there were movement restrictions in place across NI due to COVID-19

5.6 NI Rail service passengers, distance travelled
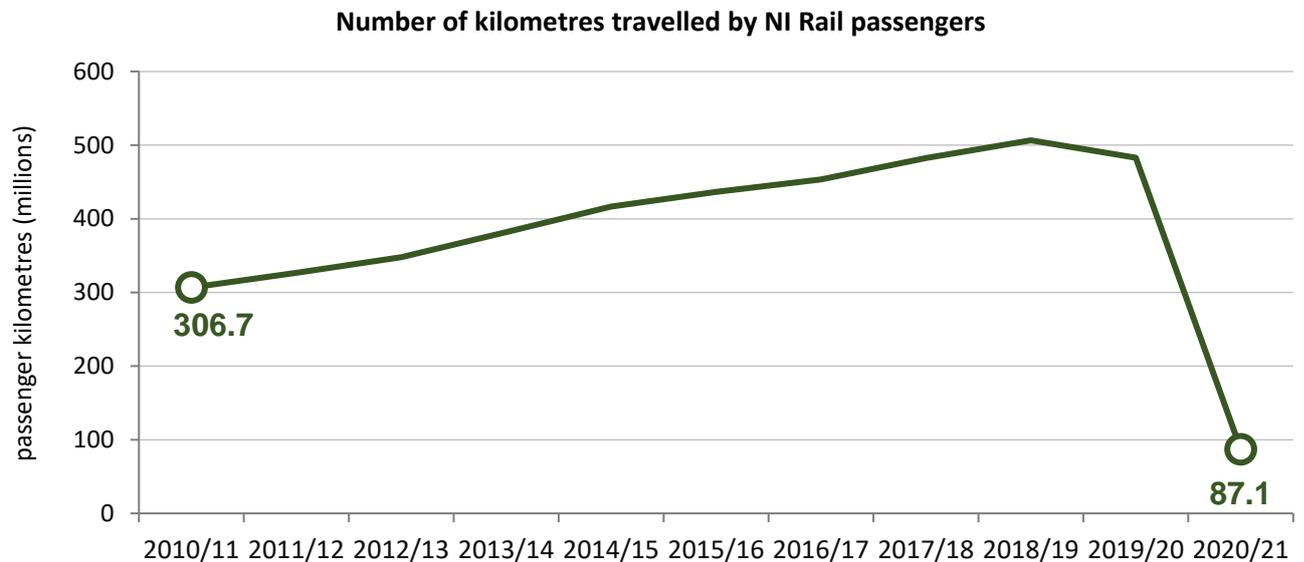
Number of kilometres travelled by NI Rail passengers

Source: Northern Ireland Transport Statistics 2020-2021
Notes: These data are supplied by Translink and should be viewed as management information rather than Official Statistics
There has been a discontinuity in this series due to a methodological change. Figures for 2013/14 and onwards cannot be compared with earlier years
2020/21 figures are provisional
During 2020/21 there were movement restrictions in place across NI due to COVID-19

5.7 Plug-in cars, vans and quadricycles licensed

Number of plug-in cars, vans and quadricycles licensed by the end of quarter
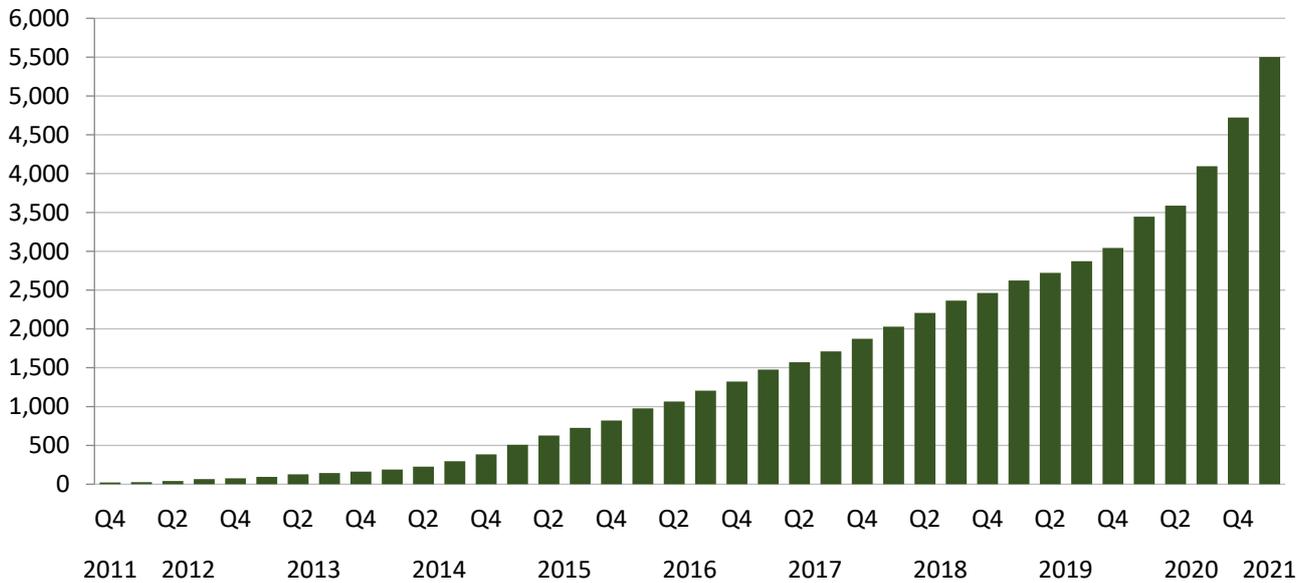
Source: Department for Transport, Vehicle Licensing Statistics, Table VEH0131
**Notes:** Figures include all models identified as being battery electric, plug-in hybrid electric, or range-extended electric, most but not all of these will be models eligible for the Department for Transport Plug In Car or Van grants
For more details, see: Low-emission vehicles eligible for a plug-in grant
The location of the registered keeper is based on the contact address held by DVLA, and does not necessarily reflect where the vehicle is kept
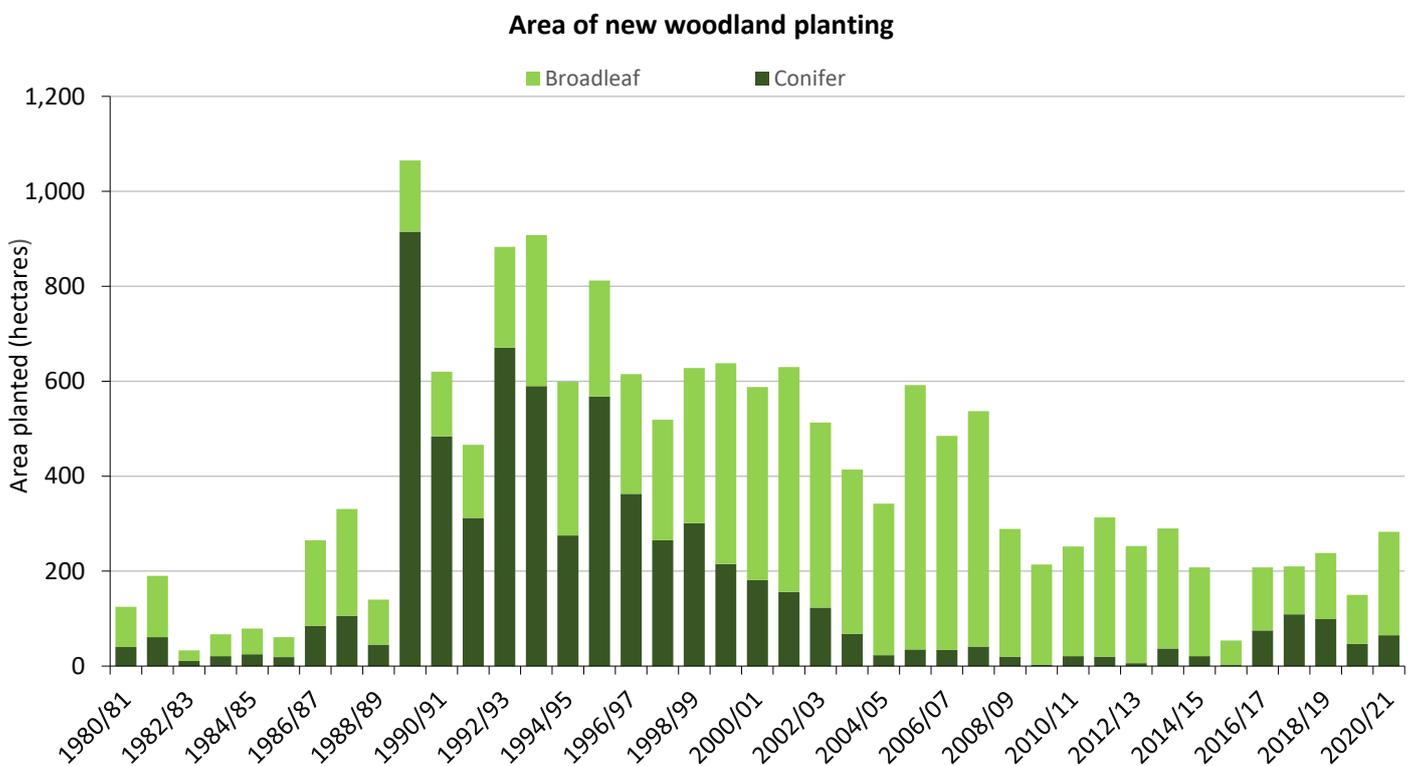
6. Agriculture Sector

6.1 Emissions intensity of milk production

Emissions intensity of milk production
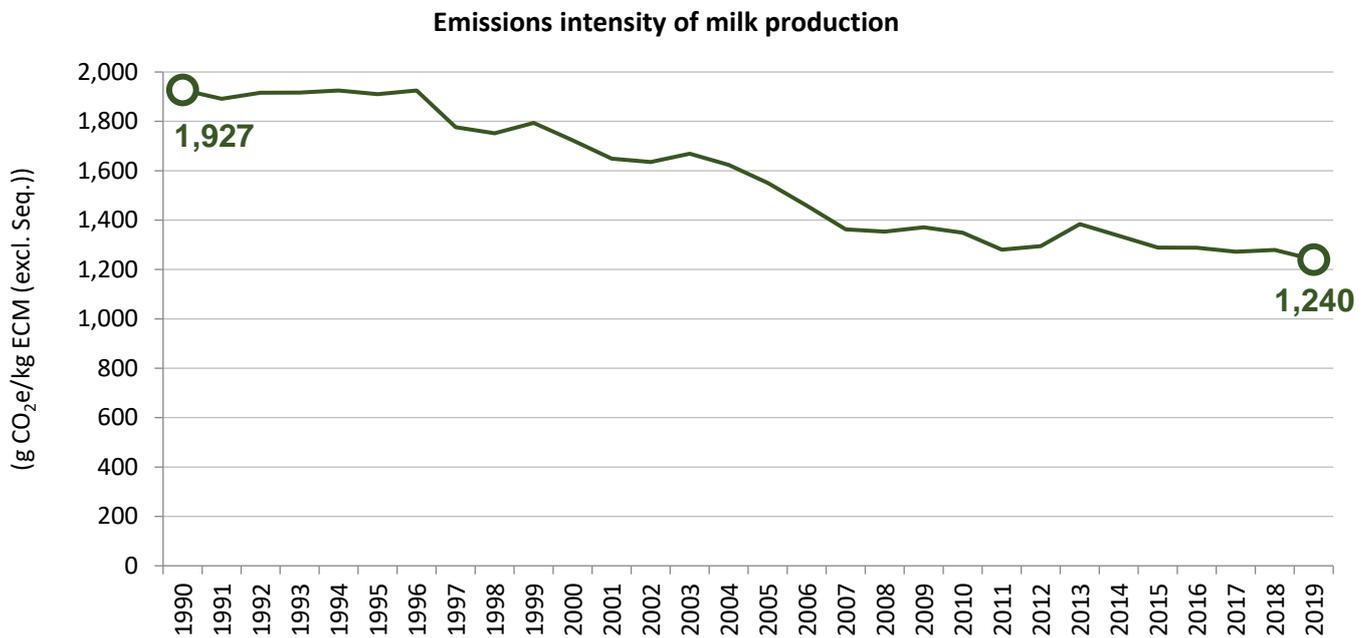
Source: Greenhouse Gas Emissions on NI Dairy Farms, Department of Agriculture, Environment and Rural Affairs
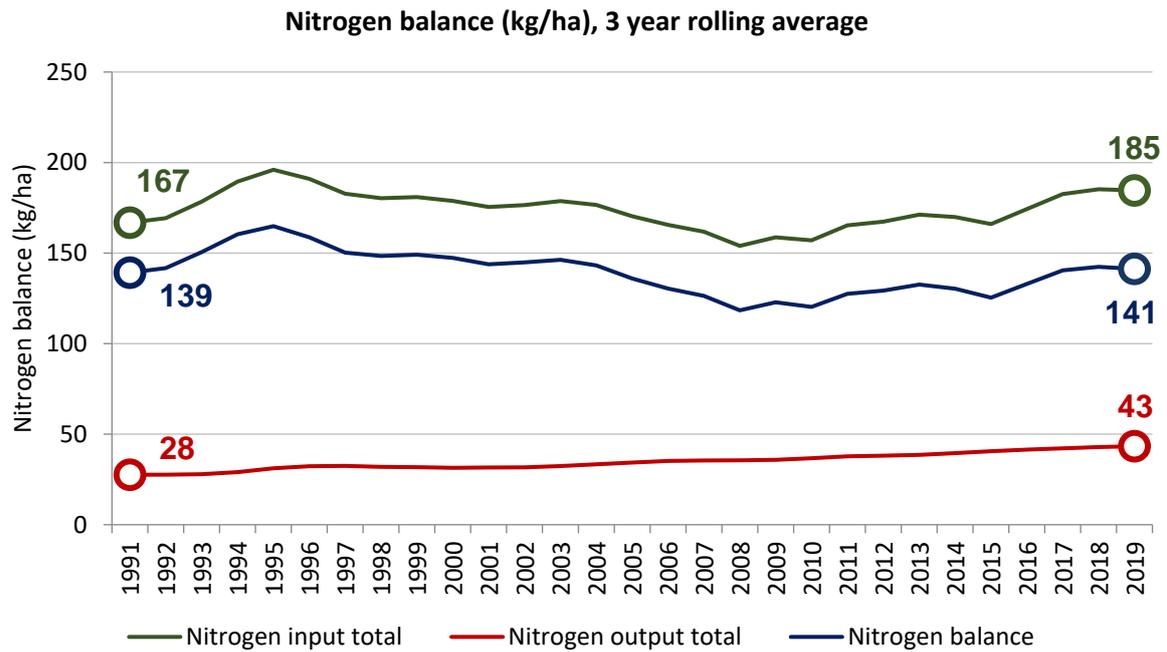
6.2 Area of new woodland planting

Area of new woodland planting

Source: Woodland Statistics - new planting and restocking
Notes: Based on areas for which grants were paid during the year

6.3 Soil nitrogen balance (3 year average)

Nitrogen balance (kg/ha), 3 year rolling average

Source: Department of Agriculture, Environment and Rural Affairs Northern Ireland

6.4 Average daily carcase gain of beef cattle

Average daily carcase gain of steers and heifers slaughtered
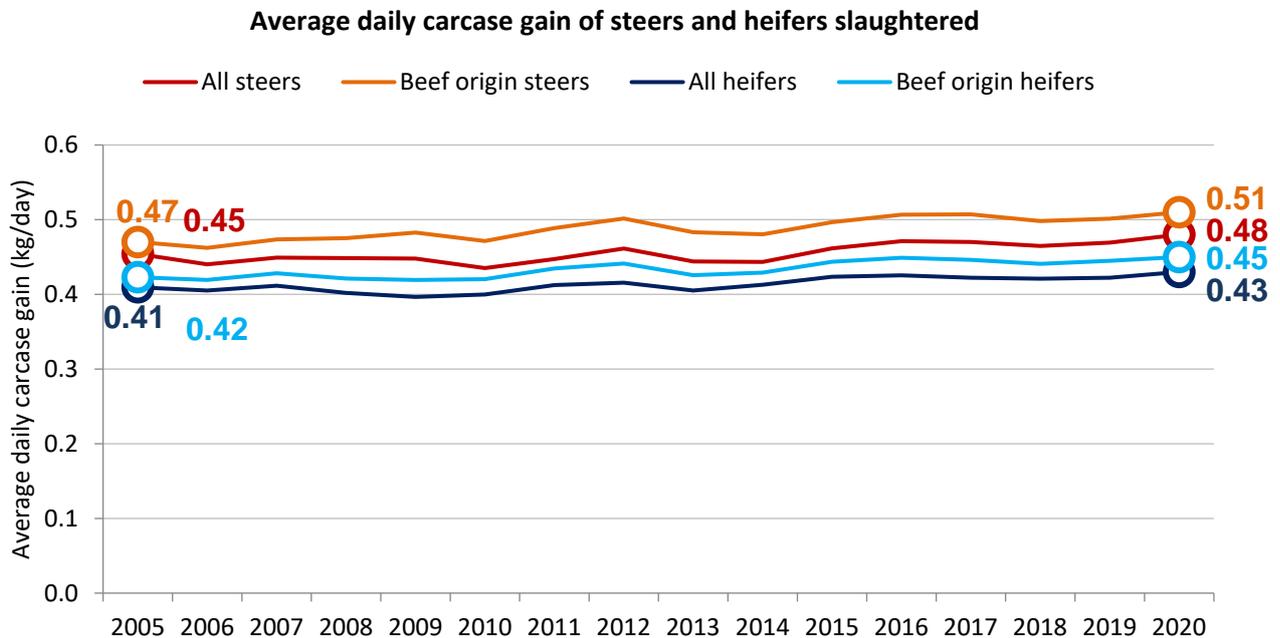
Source: Department of Agriculture, Environment and Rural Affairs Northern Ireland

6.5 Metabolic energy from grass silage

Metabolic energy from grass silage, 3 year averages
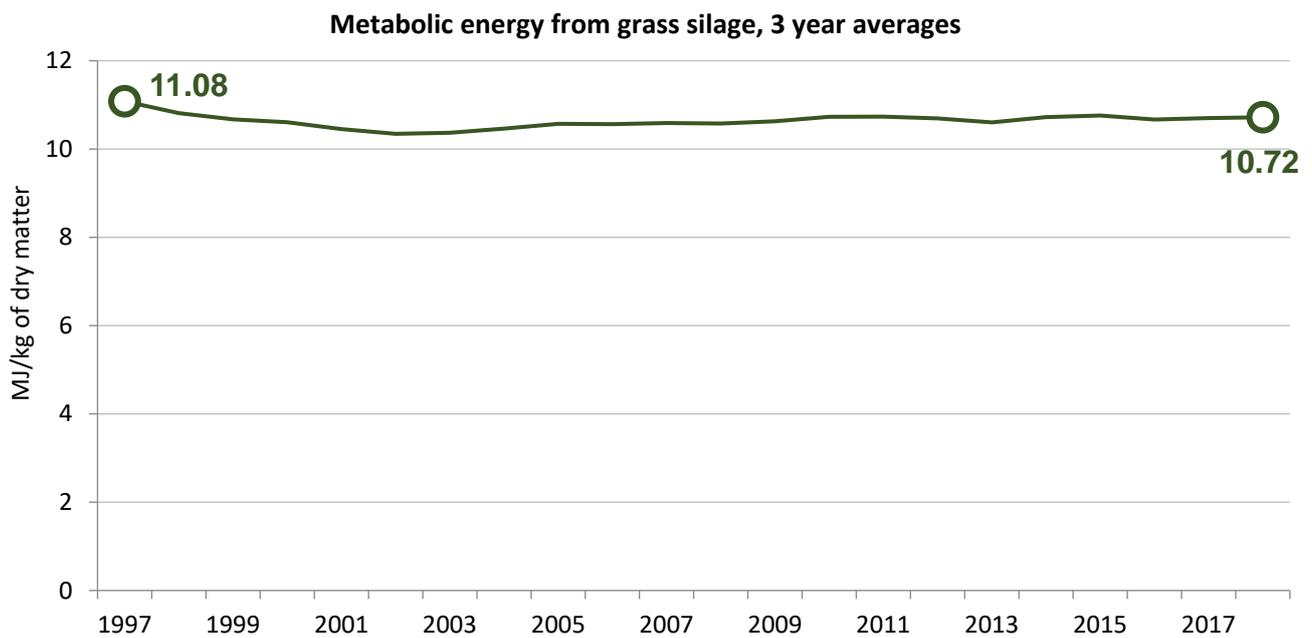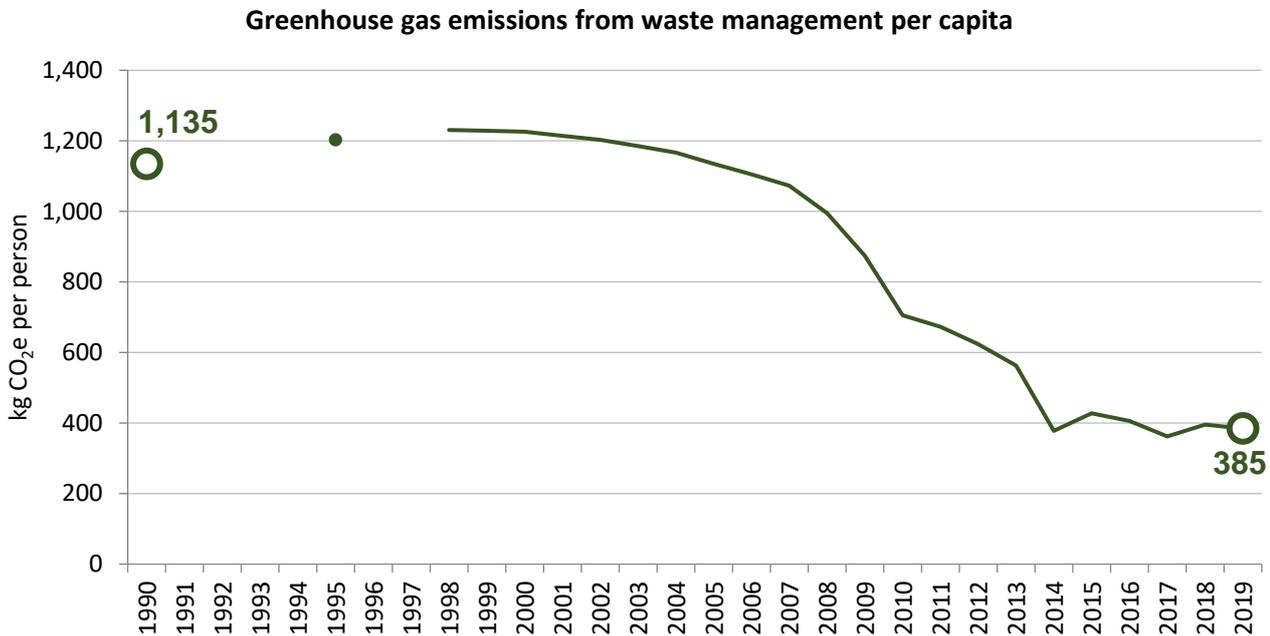

Source: Department of Agriculture, Environment and Rural Affairs Northern Ireland
Notes: No further updates available

7. Waste Sector

7.1 Greenhouse gas emissions from waste management per capita

**Greenhouse gas emissions from waste management per capita**

Source: Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2019
Source: NISRA, 2019 mid-year population estimates
Notes: Figures for greenhouse gas emissions are updated annually due to ongoing improvements to data collection or estimation techniques

7.2 Local authority collected municipal waste

Local authority collected municipal waste arisings, sent for recycling/composting, energy recovery and landfill
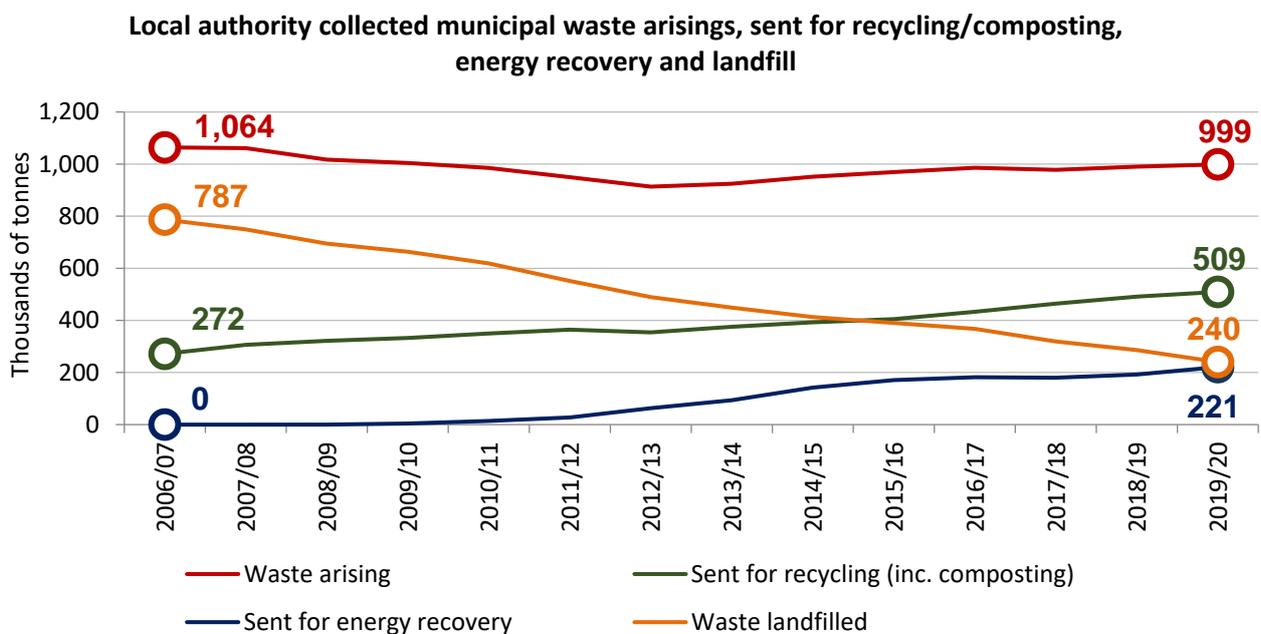
Source: Northern Ireland LAC Municipal Waste Management Statistics

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