

Northern Ireland Carbon Intensity Indicators 2022



Sustainability at the heart of a living, working, active landscape valued by everyone.



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

www.daera-ni.gov.uk



**INVESTORS
IN PEOPLE**

Contents

Key Points	2
Introduction - Carbon Intensity Indicators for Northern Ireland	4
Summary of changes to indicators since previous publication	5
Summary of Indicator trends	6
1. Cross-cutting Indicators	8
1.1 Ratio of greenhouse gas emissions to gross value added.....	8
1.2 Greenhouse gas emissions per capita.....	9
2. Power Sector	10
2.1 Greenhouse gas emissions per unit of electricity generated.....	10
2.2 Electricity generation by fuel type	11
3. Building Sector	12
3.1 Residential greenhouse gas emissions per household.....	12
3.2 Housing stock with energy efficiency measure.....	13
3.3 Mean Standard Assessment Procedure rating for dwelling stock.....	13
3.4 Grants processed for energy efficiency measures	14
3.5 Primary energy source for heating of residential buildings.....	14
3.6 Penetration of renewable heat.....	15
4. Industry Sector	16
4.1 Number of participants in the Carbon Reduction Commitment Energy Efficiency Scheme.....	16
4.2 CO ₂ emissions from participants in the Carbon Reduction Commitment Energy Efficiency Scheme.....	16
5. Transport Sector	17
5.1 CO ₂ emissions of licenced cars.....	17
5.2 Road transport emissions per vehicle kilometre travelled.....	18
5.3 Average distance travelled per person per year by mode of transport	19
5.4 Mode of transport	19
5.5 Bus passengers, distance travelled.....	20
5.6 NI Rail service passengers, distance travelled.....	20
5.7 Plug-in cars, vans and quadricycles licensed.....	21
6. Agriculture Sector	22
6.1 Emissions intensity of milk production	22
6.2 Area of new woodland planting	22
6.3 Soil nitrogen balance (3 year average).....	23
6.5 Metabolic energy from grass silage.....	24
7. Waste Sector	25
7.1 Greenhouse gas emissions from waste management per capita.....	25
7.2 Local authority collected municipal waste.....	25

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 65% from 1998 to 2020.
- In 2020, greenhouse gas (GHG) emissions intensity for NI was estimated at around 0.48 kilograms of carbon dioxide (CO₂) equivalent per £ of GVA. In 1998 this figure stood at 1.38 kilograms.
- GHG emissions per capita decreased 36% from 17.2 tonnes CO₂ equivalent per person in 1990 to 11.0 tonnes in 2020. The population increased by 19% over this period, while greenhouse gas emissions decreased by 24%.
- GHG emissions per unit of electricity generated decreased 45% from 631 grams CO₂ per kWh in 2004 to 347 grams in 2020. 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 6% from 3.78 tonnes of CO₂ equivalent per household in 2008 to 3.55 tonnes in 2020. Fuel switching to natural gas from more carbon-intensive fuels such as coal and oil has reduced emissions, but more households create greater demand for energy.
- The average CO₂ emissions from licensed cars has declined over the years from 149.8 g/km in 2014 to 133.7g/km in 2021.
- Total emissions (excluding sequestration) related to milk production decreased from an average of 1,927 grams of CO₂ equivalent per kilogram of Energy Corrected Milk (ECM) in 1990 to 1,215 grams in 2020. Whilst milk production in the dairy sector has expanded by 85% 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 1,136 kilograms of CO₂ equivalent per person in 1990 to 382 kilograms in 2020. 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 were developed during the work programme of the then Cross-Departmental Working Group on Climate Change. The indicators will continue to inform the work of the Green Growth Strategy and NI Climate Action plan.

Rather than measuring absolute emissions levels, emissions intensity is concerned with capturing the amount of CO₂ 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 1990-2020 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 2022](#) 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 2022](#) 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 2022](#) 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	Negative
2.2 Electricity generation by fuel type - Coal	Positive	Negative
2.2 Electricity generation by fuel type - Oil	Positive	Positive
2.2 Electricity generation by fuel type - Gas	No Change	Negative
2.2 Electricity generation by fuel type - Renewables	Positive	Positive
BUILDING SECTOR INDICATORS		
3.1 Residential greenhouse gas emissions per household	Positive	Positive
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	Positive
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

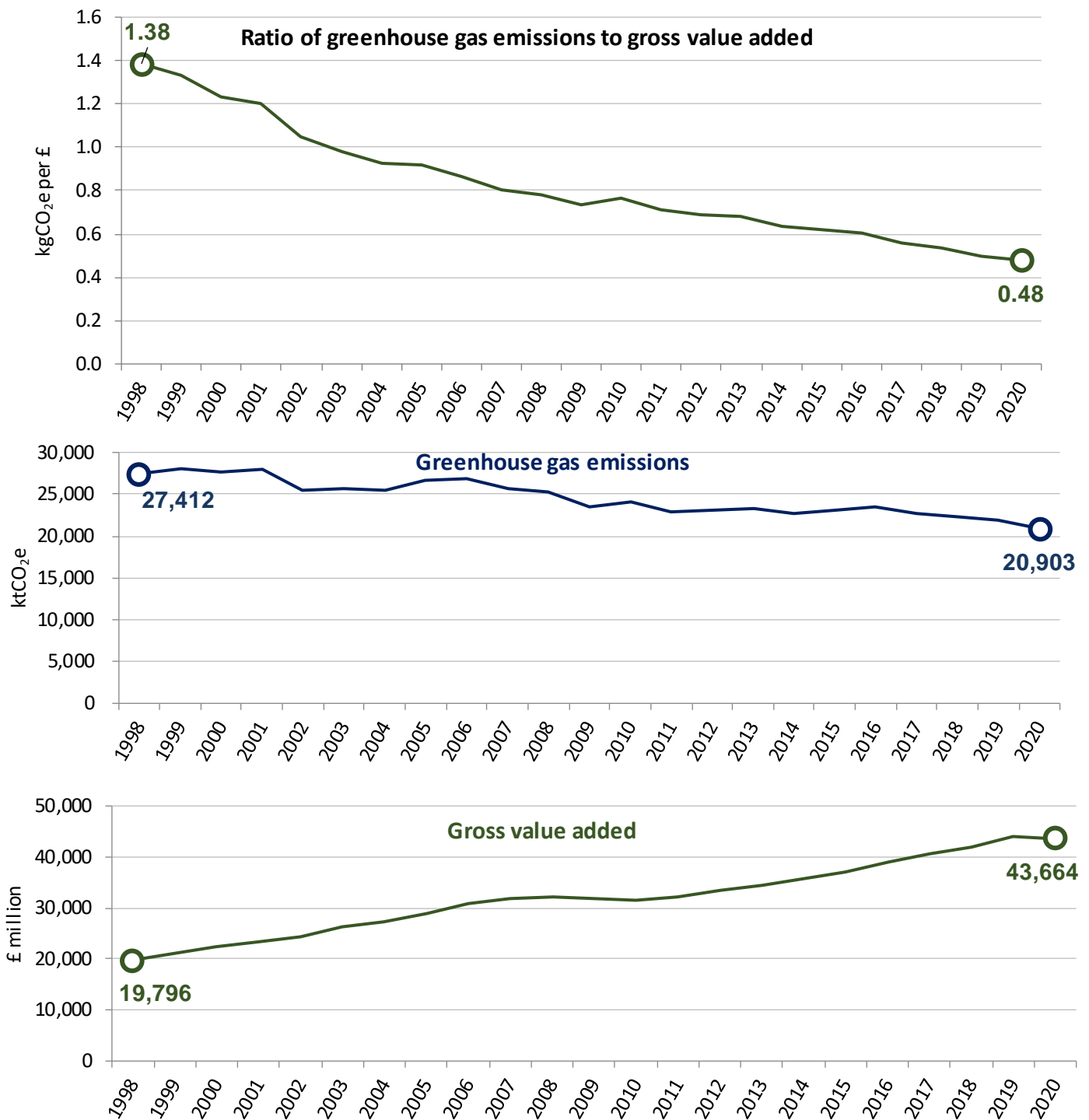
Notes: Indicator 2.2 Whether an increase/decrease in gas/oil use is good or bad with respect to greenhouse gas emissions will depend on the electricity source in the absence of the gas/oil. For example, burning less coal and more natural gas would help reduce emissions because natural gas results in 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	Positive
5.1 Licensed cars by CO ₂ emissions 0-100 g/kg	Positive	Positive
5.1 Licensed cars by CO ₂ emissions Over 170g/kg	Positive	Positive
5.2 Road transport emissions per vehicle kilometre travelled	Positive	Negative
5.3 Average distance travelled per person per year by mode of transport - All modes of transport	Positive	Positive
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	Positive	Positive
5.4 Mode of transport - Walking/cycling	Positive	Positive
5.4 Mode of transport - Public transport	Positive	Positive
5.5 Bus passenger kilometres	Positive	Negative
5.6 NI Rail service passenger kilometres	Positive	Negative
5.7 Plug-in cars, vans and quadricycles licensed	Positive	Positive
AGRICULTURE SECTOR INDICATORS		
6.1 Emissions intensity of milk production	Positive	
6.2 Area of new forest and woodland plantings	Positive	Positive
6.3 Soil nitrogen balance	No Change	Positive
6.4 Average daily carcass gain of steers	Positive	Positive
6.4 Average daily carcass gain of heifers	Positive	No Change
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

Notes: Indicator 5.1 – caution should be applied when making comparisons because of breaks in time series. **Indicators 5.3 and 5.4** – caution should be applied when making comparisons because of methodological changes. **Indicator 6.1** Unable to make recent comparison. More information is provided in the relevant sections.

1. Cross-cutting Indicators

1.1 Ratio of greenhouse gas emissions to gross value added



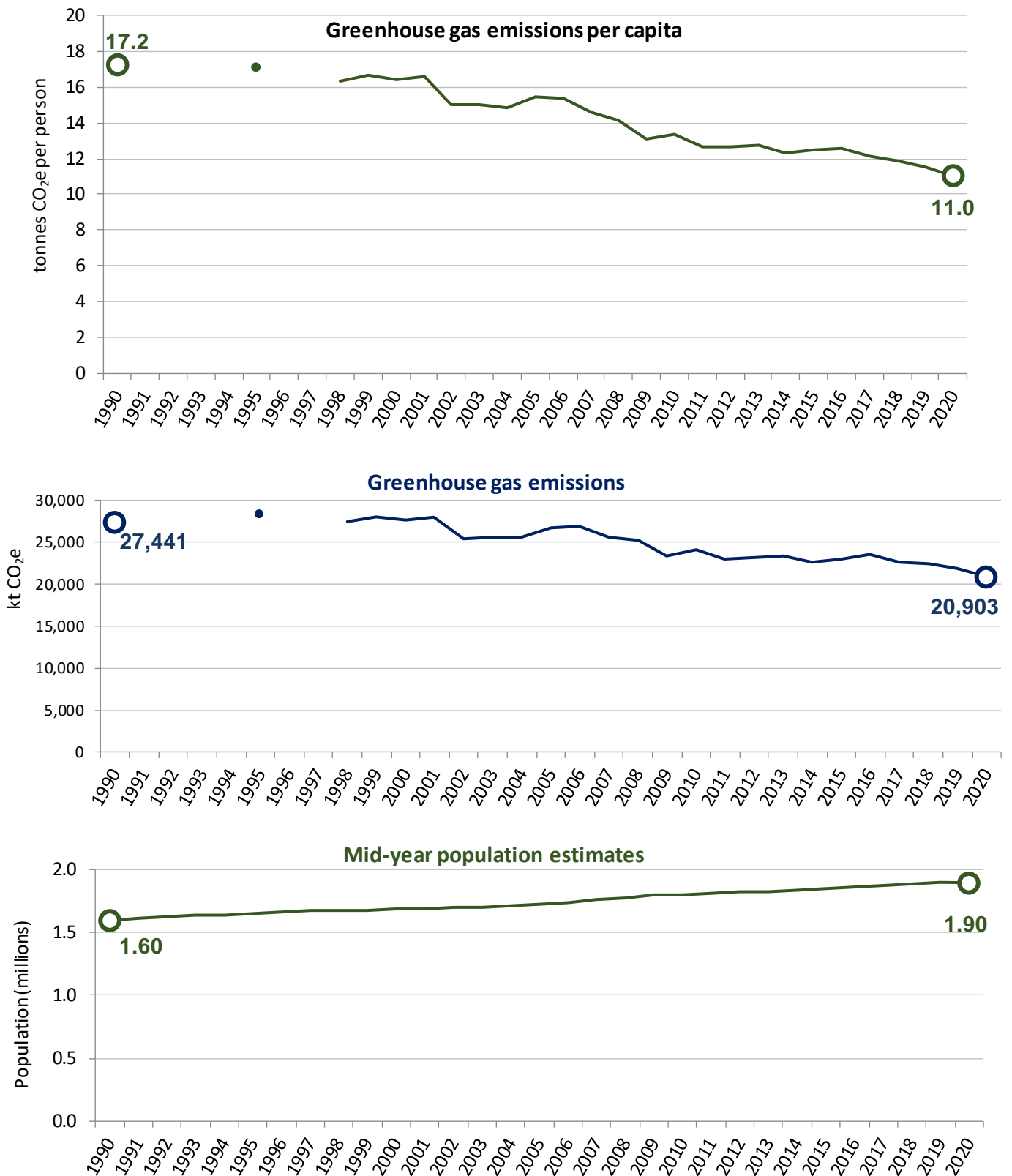
Source: [Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2020](#)

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



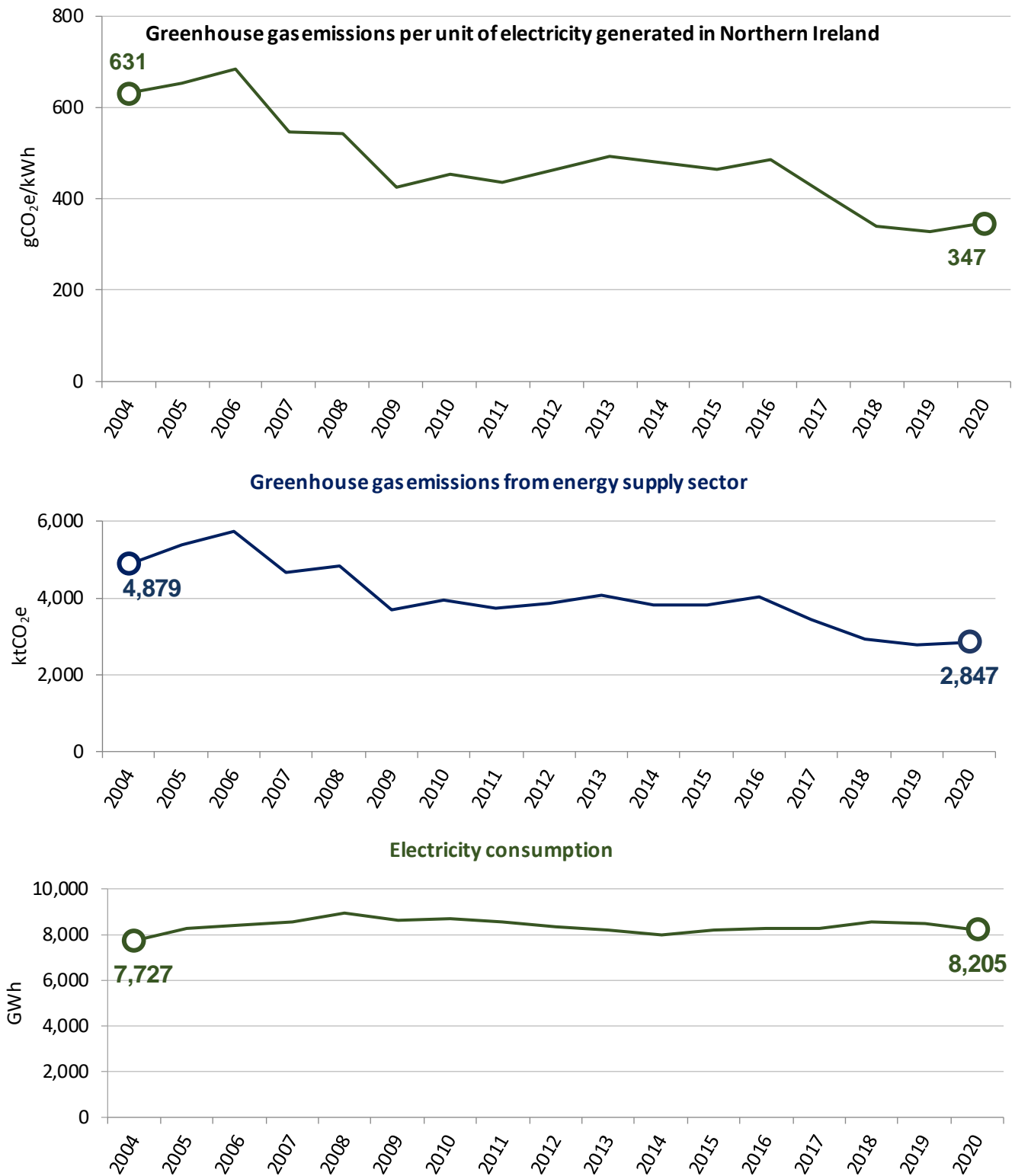
Source: [Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2020](#)

Source: [NISRA, 2020 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

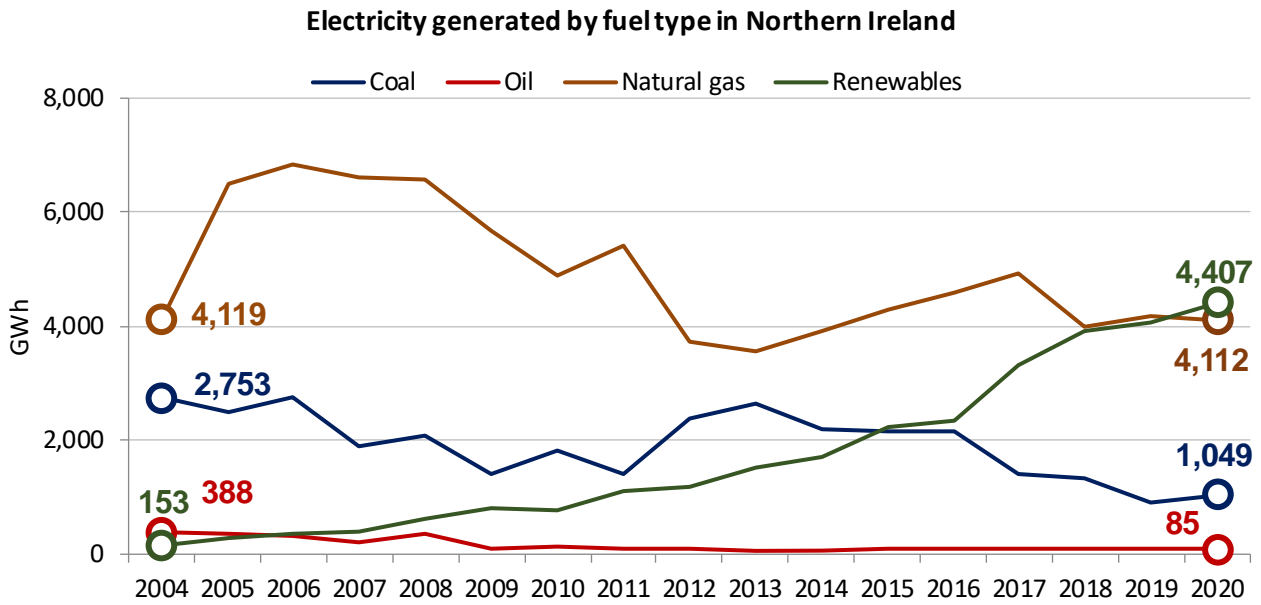


Source: [Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2020](#)

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

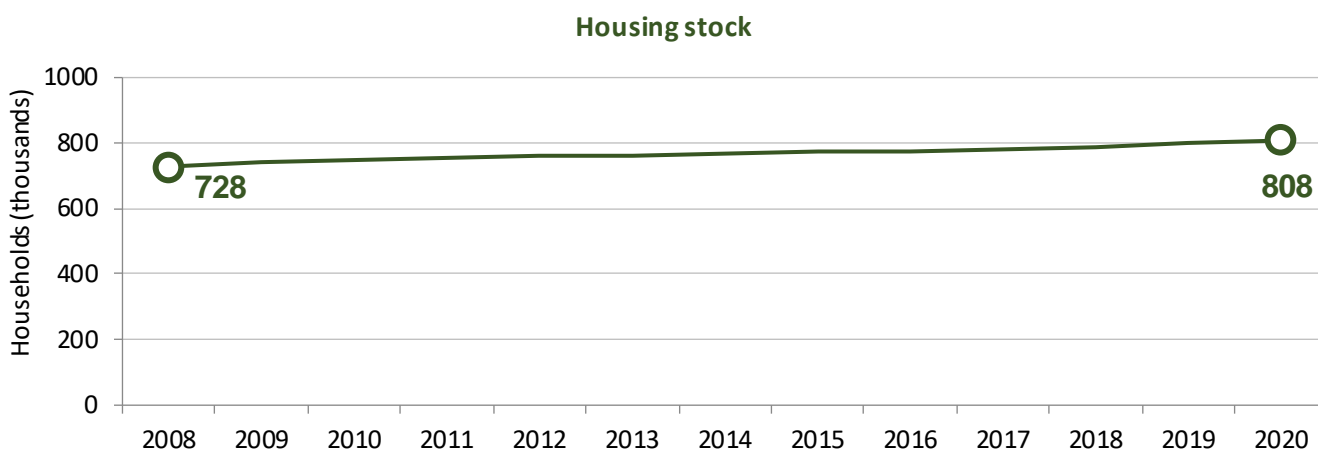
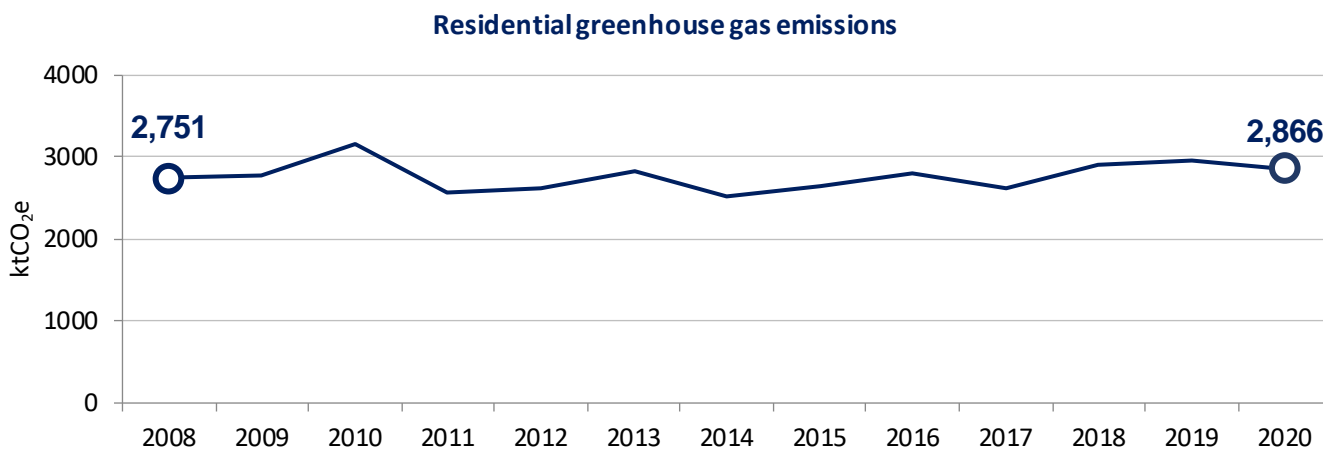
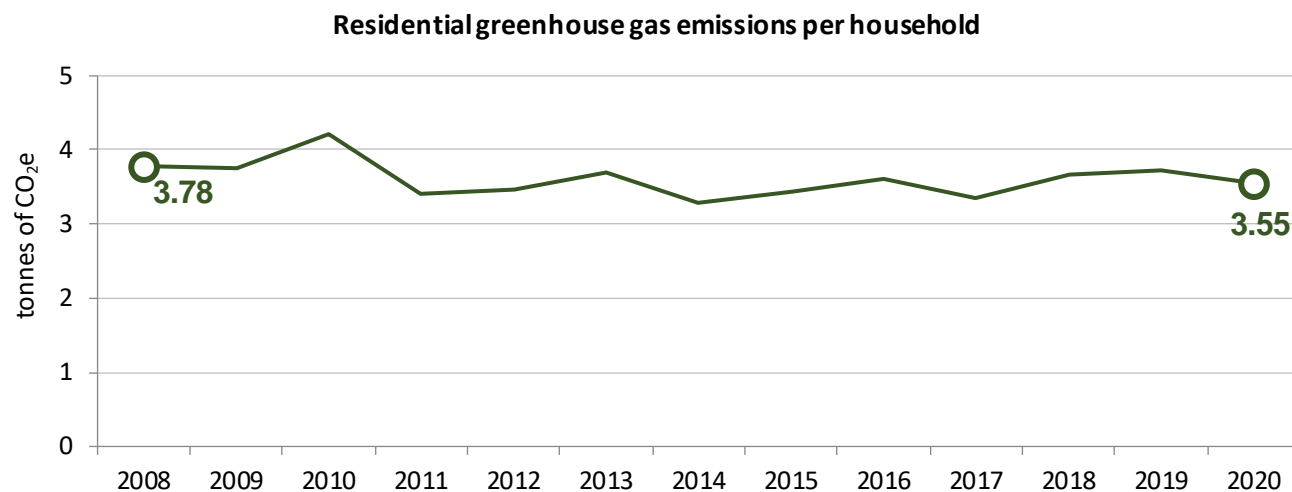


Source: [BEIS Energy Trends Special Feature](#)

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



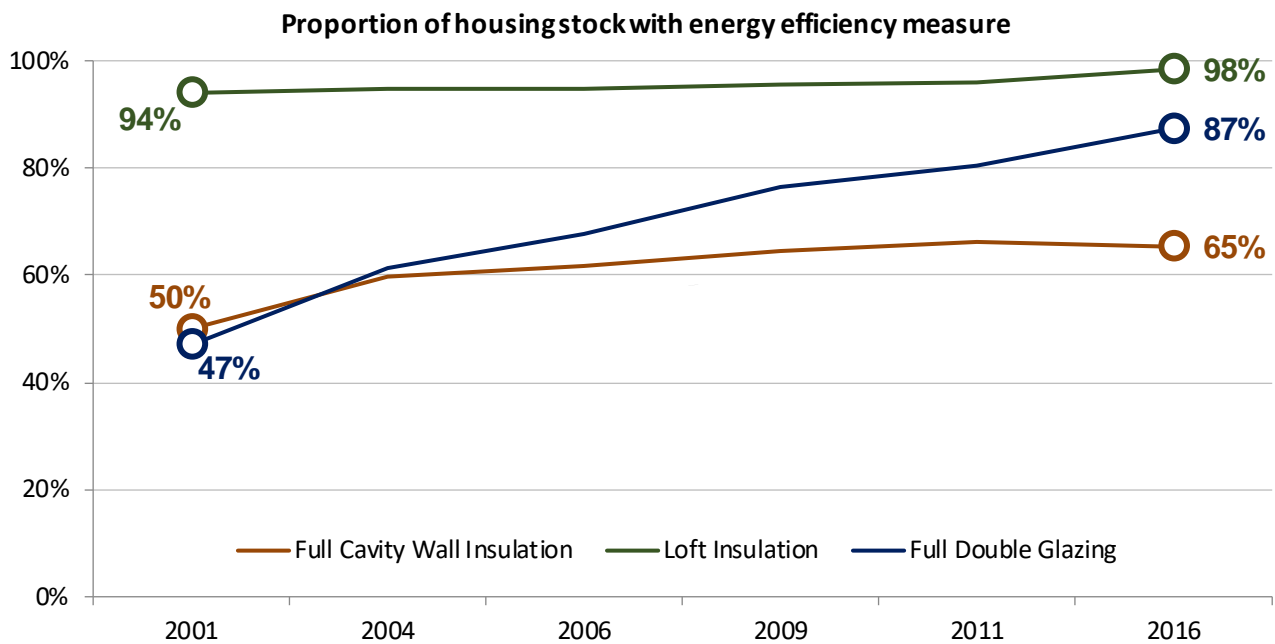
Source: [Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2020](#)

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

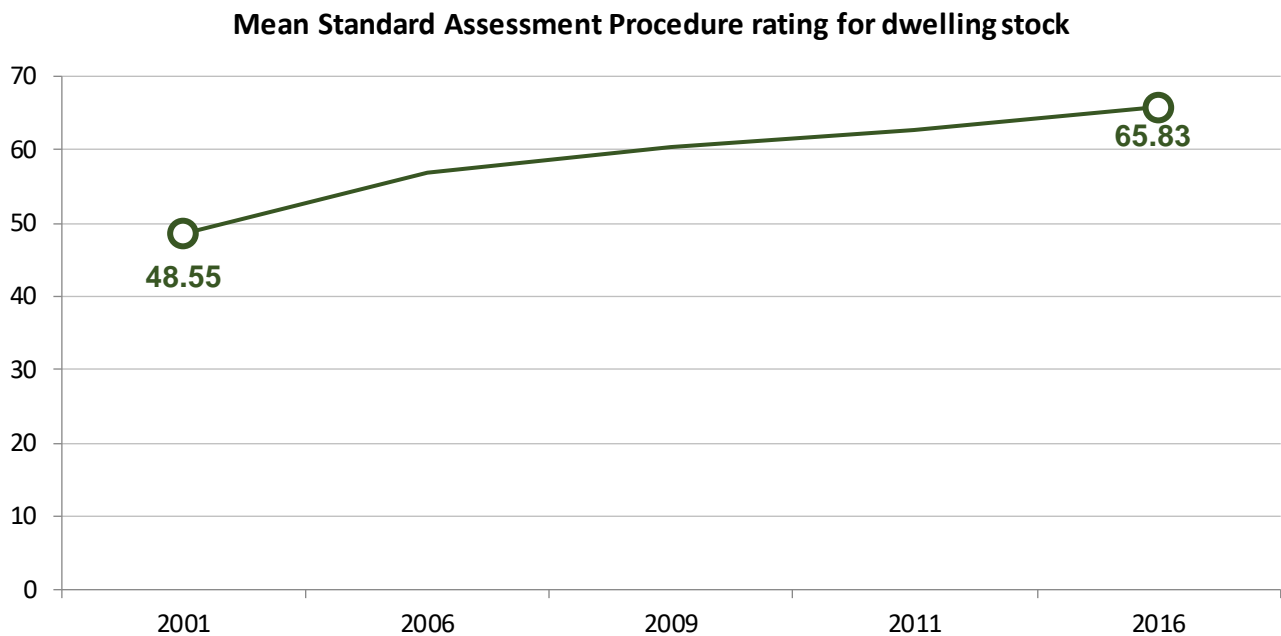
3.2 Housing stock with energy efficiency measure



Source: [House Condition Survey](#)

Notes: No further update, due to Covid-19 the NIHCS 2021 was postponed and the commencement of fieldwork remains under review.

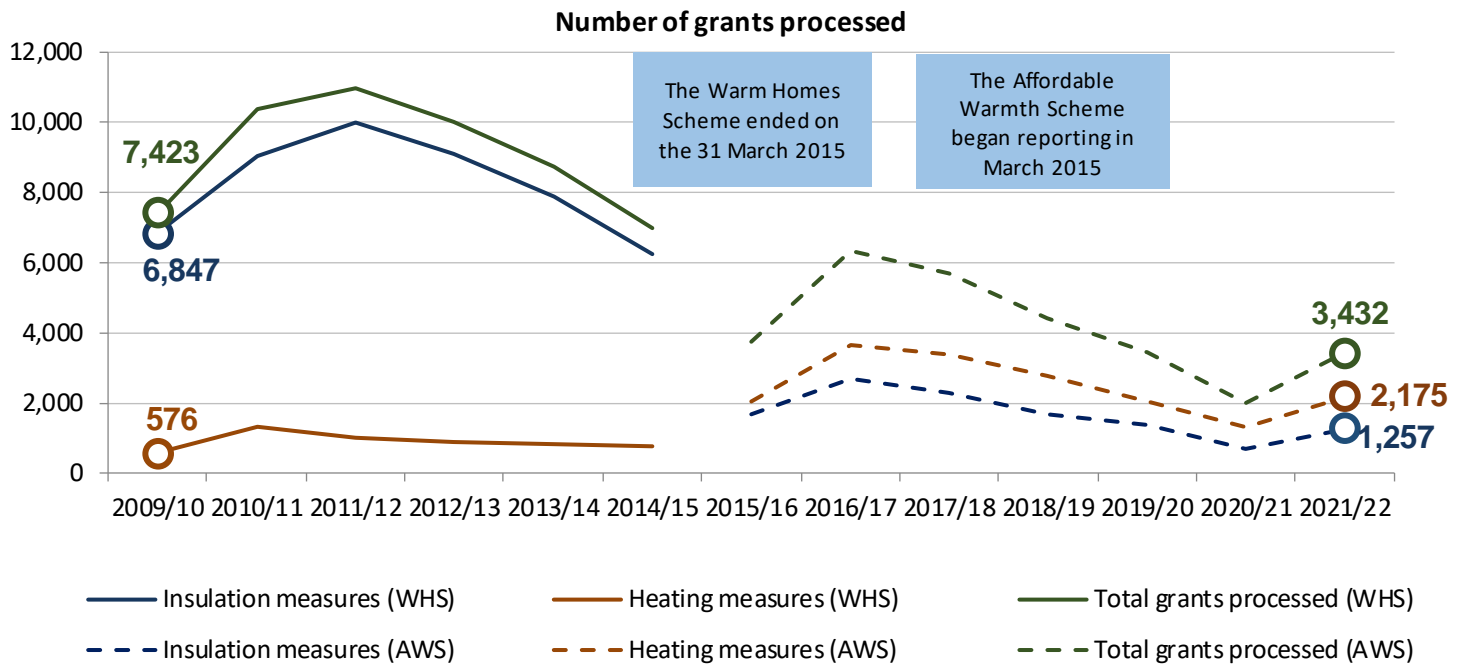
3.3 Mean Standard Assessment Procedure rating for dwelling stock



Source: [House Condition Survey](#)

Notes: No further update, due to Covid-19 the NIHCS 2021 was postponed and the commencement of fieldwork remains under review.

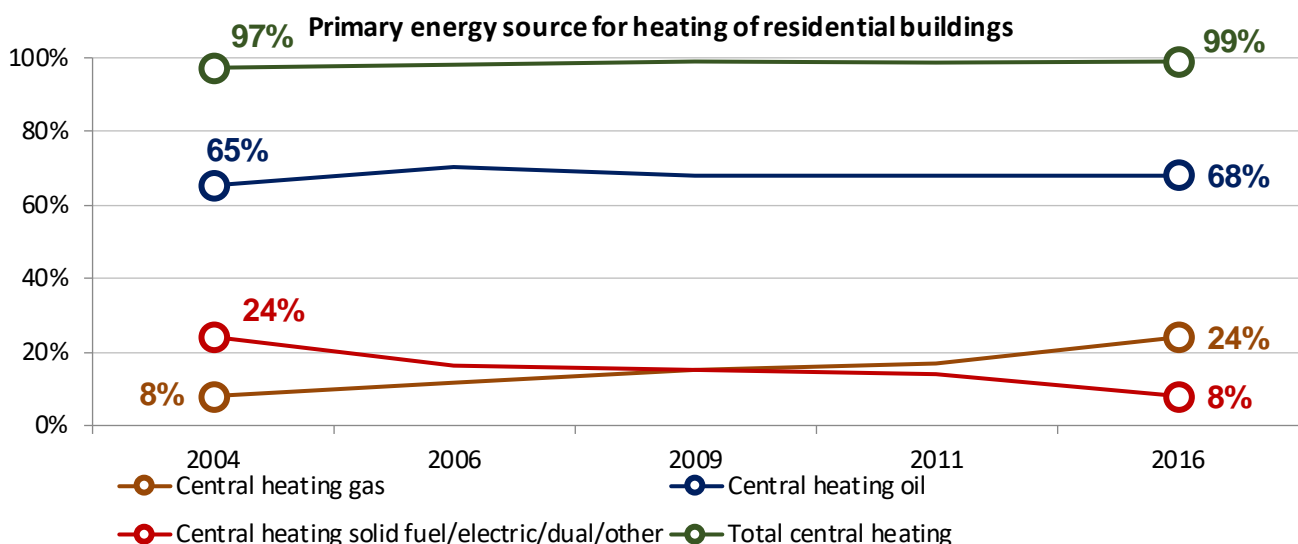
3.4 Grants processed for energy efficiency measures



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. Insulation measures includes loft, cavity wall and solid wall insulation. 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

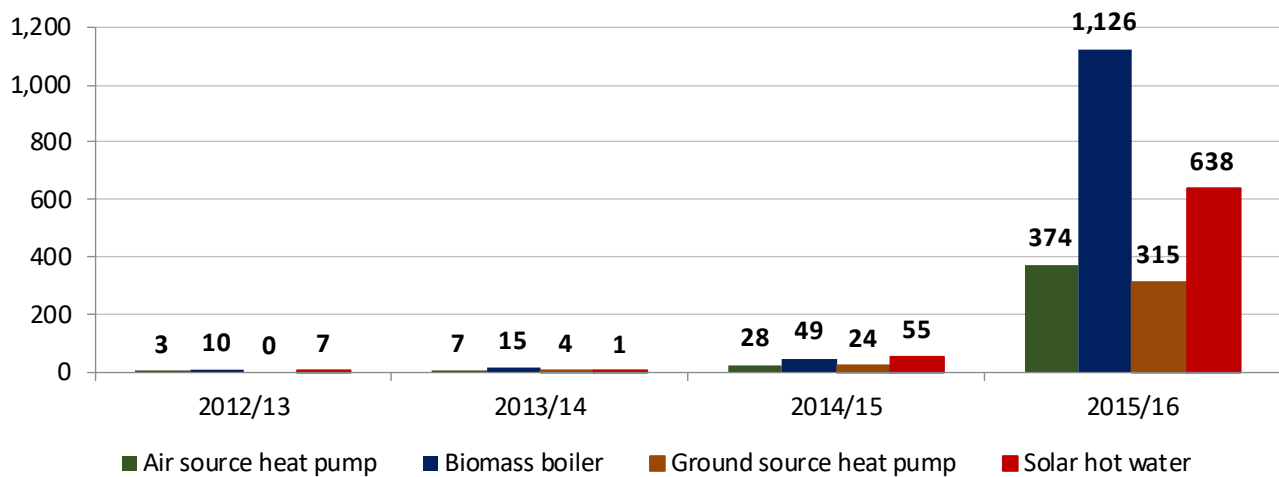


Source: [House Condition Survey](#)

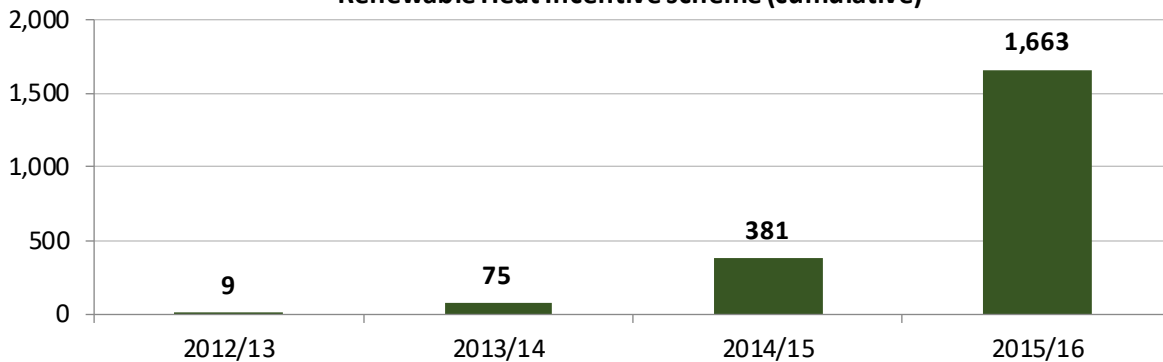
Notes: No further update, due to Covid-19 the NIHCS 2021 was postponed and the commencement of fieldwork remains under review.

3.6 Penetration of renewable heat

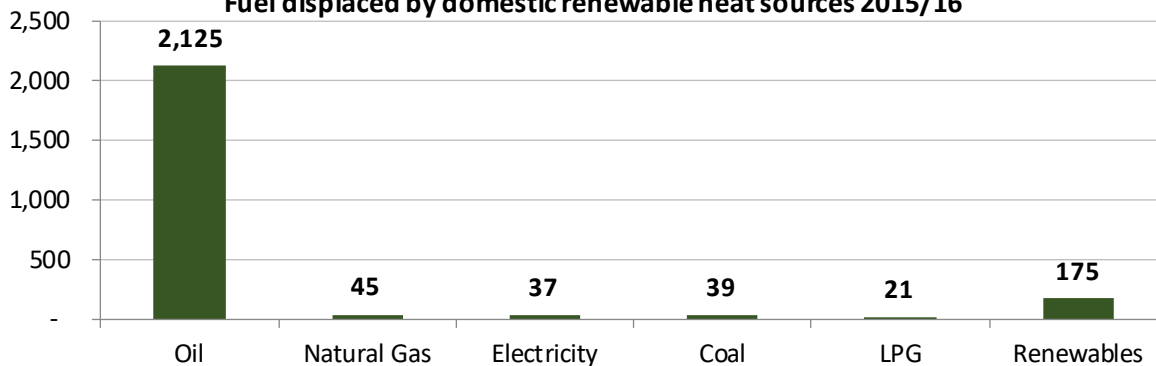
Number of Domestic RHI / RHPP Applications in Receipt of an Upfront Payment



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



Fuel displaced by domestic renewable heat sources 2015/16



Source: Energy Efficiency Branch, Department for the Economy

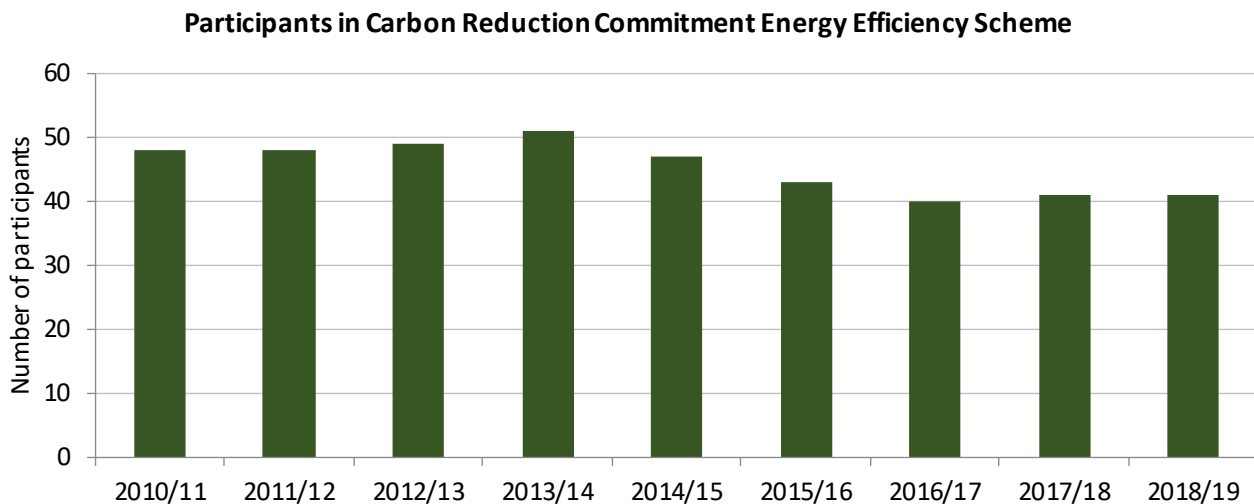
Notes: Figures for the Domestic RHI / RHPP are reported as applications rather than installations as they were in 2016

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

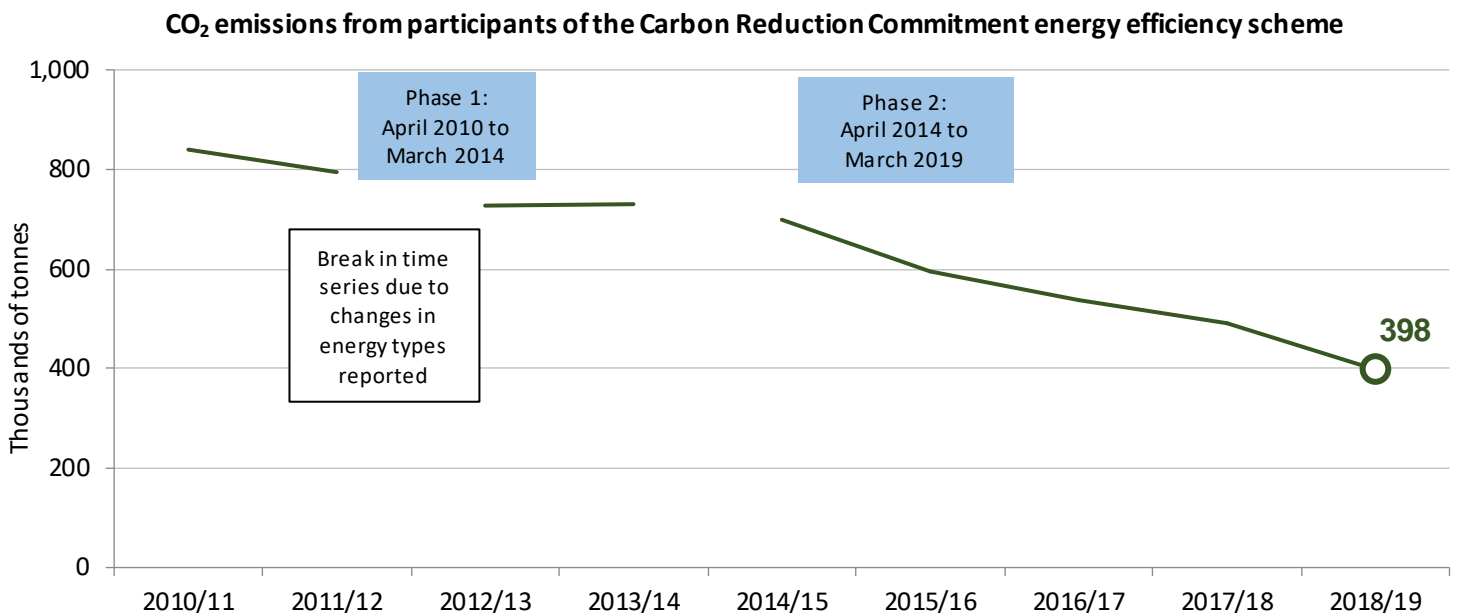
4.1 Number of participants in the Carbon Reduction Commitment Energy Efficiency Scheme



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 CO₂ emissions from participants in 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

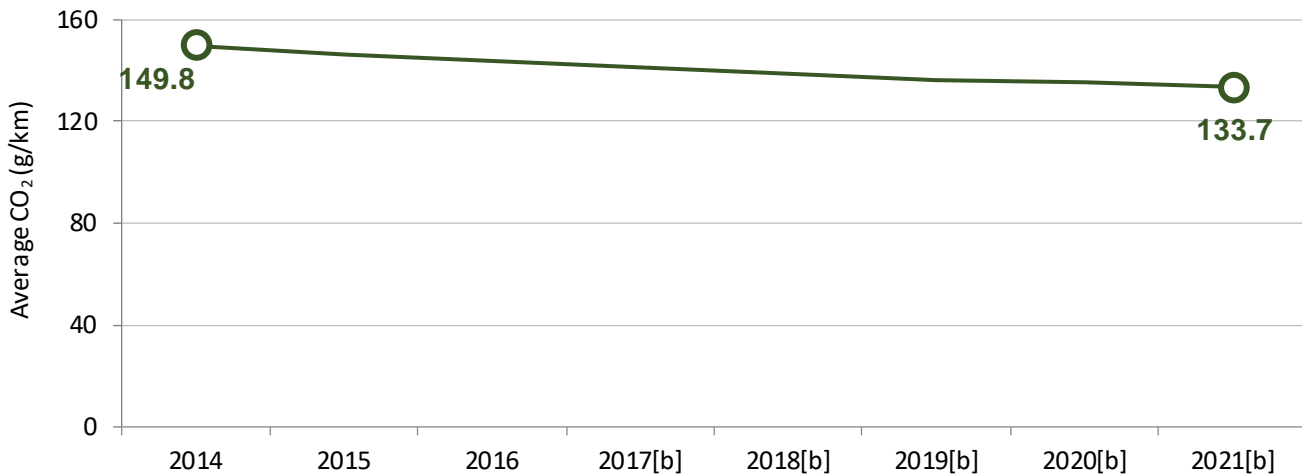
These figures were revised in October 2020 to maintain consistency with the figures published in the annual report, these may be revised as a result of internal review or audit

No further updates available, scheme closed in March 2019

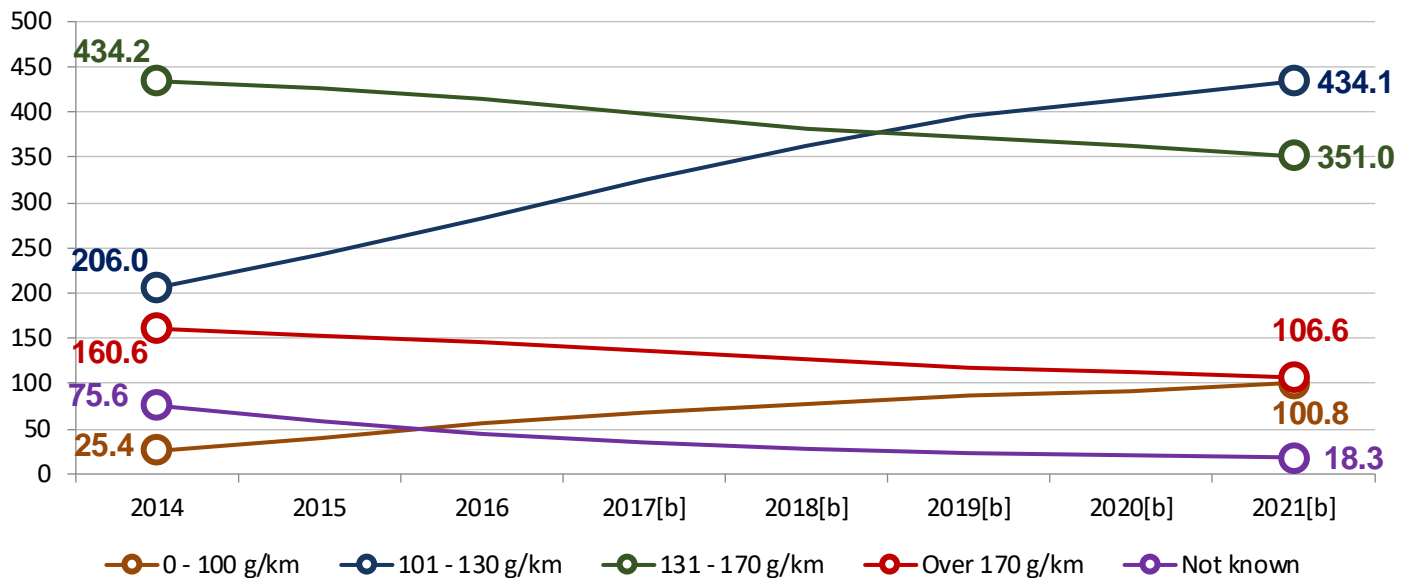
5. Transport Sector

5.1 CO₂ emissions of licenced cars

Average CO₂ (g/km) of licensed cars in Northern Ireland



Licensed cars by CO₂ emissions (Thousands)



Source: [Department for Transport, Licensed Cars \(VEH206\)](#)

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

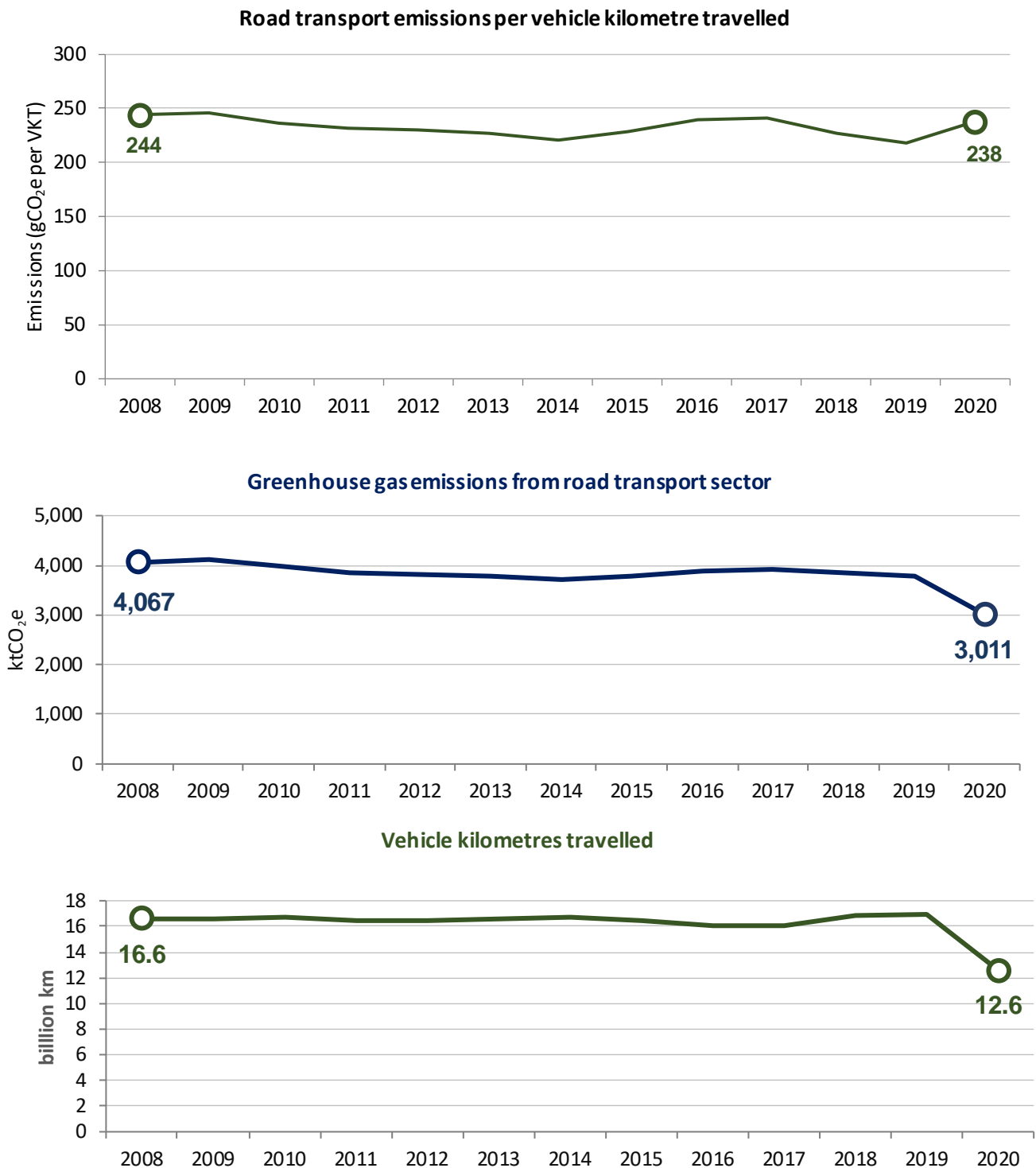
2020 Q2: Cars registered from April 2020 onwards reported a WLTP figure. Whilst the e-NEDC figure was designed to be broadly 'equivalent' with an NEDC figure, the new WLTP figure is typically about 20% higher for petrol and diesel cars

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](#)

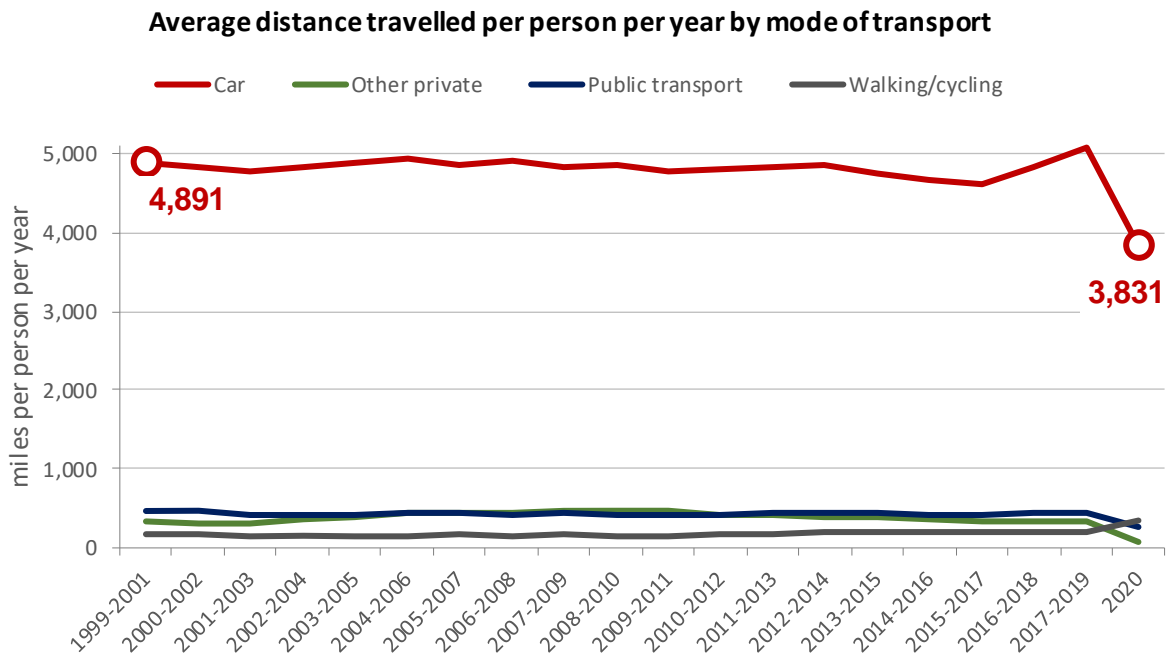
Data are presented where over half of licensed cars have available CO₂ emissions data

5.2 Road transport emissions per vehicle kilometre travelled



Source: [Northern Ireland Road Safety Strategy to 2020 Annual Statistical Report 2021; Table 5](#)
Source: [Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2020](#)
Notes: Figures for greenhouse gas emissions are updated annually due to ongoing improvements to data collection or estimation techniques. The 2020 figure may be reviewed on further published data. The VKT for 2020 is calculated using data from the [Travel Survey for Northern Ireland](#) (Department for Infrastructure). Normally 3 years of data are combined as sample size is relatively small, however, the 2020 data is reported as a single year in the Travel Survey. This is due to methodological changes and because 2020 was an exceptional year with travel restrictions in place in response to the COVID-19 pandemic.

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

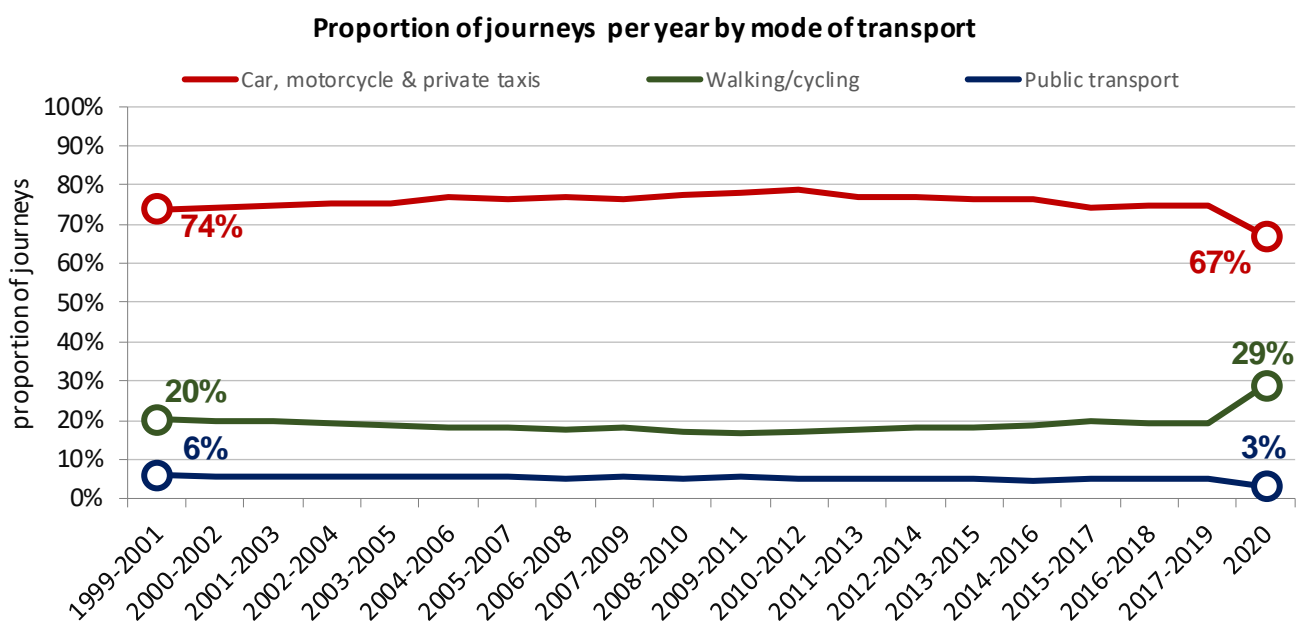


Source: [Travel Survey for Northern Ireland headline report 2020](#)

Notes: There were a number of significant changes to the survey methodology in 2020 due to the COVID-19 pandemic. These changes, and the fact that 2020 was an exceptional year, mean that data is reported as a single year and not directly comparable to previous years.

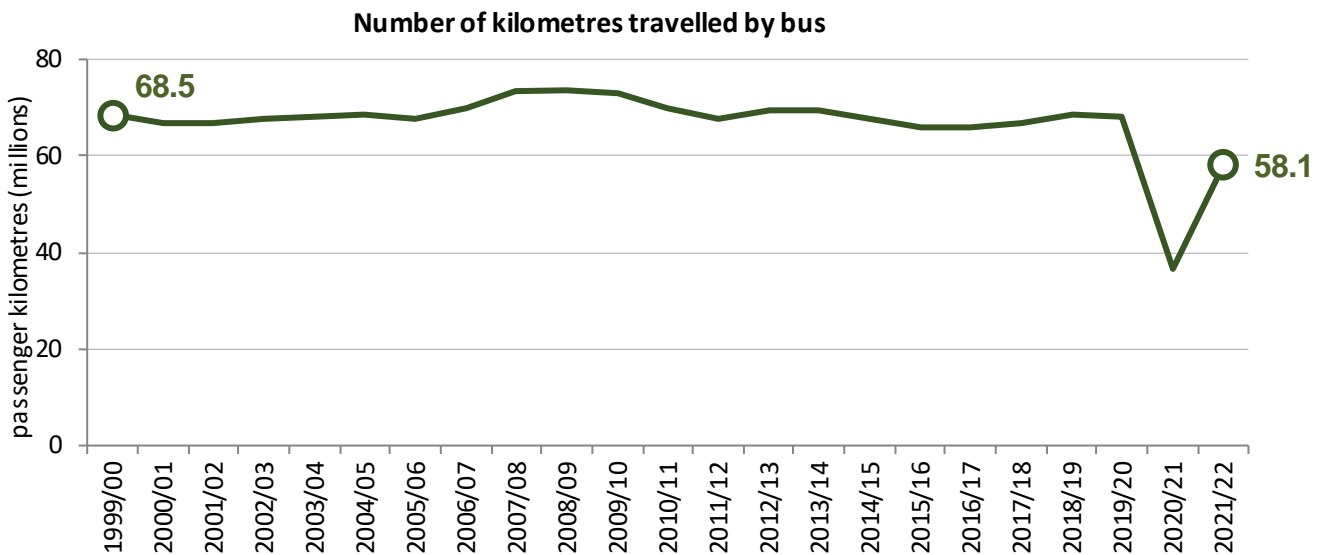
5.4 Mode of transport

Source: [Travel Survey for Northern Ireland headline report 2020](#)



Notes: There were a number of significant changes to the survey methodology in 2020 due to the COVID-19 pandemic. These changes, and the fact that 2020 was an exceptional year, mean that data is reported as a single year and not directly comparable to previous years.

5.5 Bus passengers, distanced travelled



Source: 2021/22 data Statutory Accounts and management information from Translink. Previously, [Northern Ireland Transport Statistics](#)

Notes: These data are supplied by Translink and should be viewed as management information rather than Official Statistics

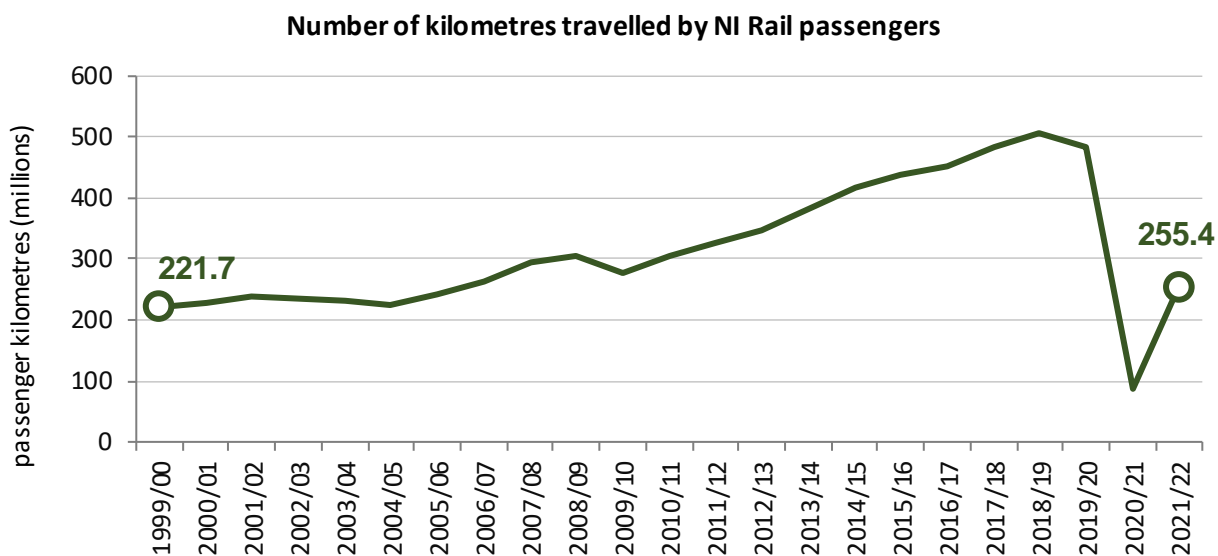
CityBus became Metro with effect from 2005. Glider was introduced in September 2018

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

During 2020/21 there were movement restrictions in place across NI due to COVID-19

5.6 NI Rail service passengers, distance travelled



Source: 2021/22 data Statutory Accounts and management information from Translink. Previously, [Northern Ireland Transport Statistics](#)

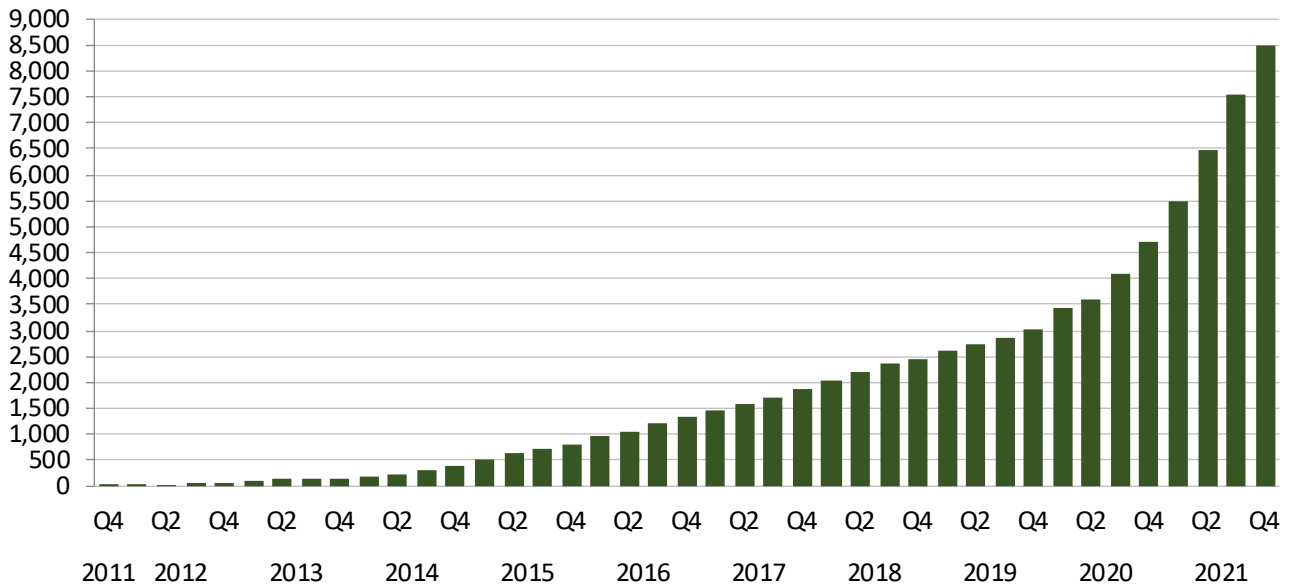
Notes: These data are supplied by Translink and should be viewed as management information rather than Official Statistics

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

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](#)

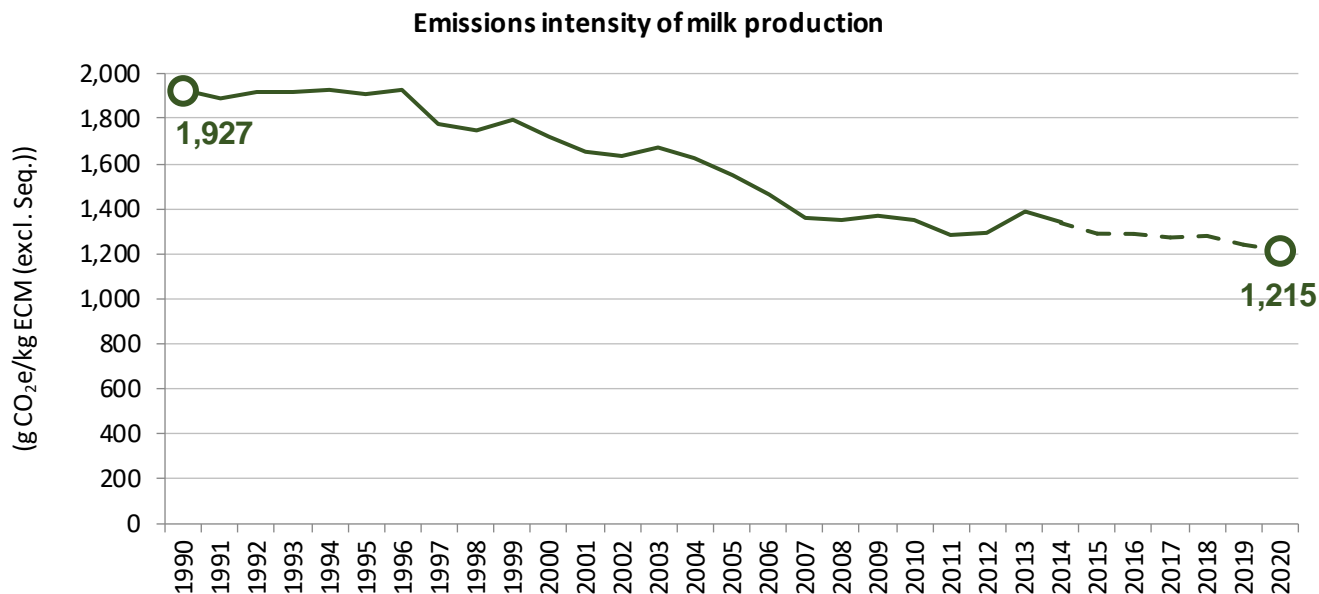
Notes: Figures include all models identified as being battery electric, plug-in hybrid electric, or range-extended electric, most but not all of these will be models eligible for the Department for Transport Plug In Car or Van grants

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

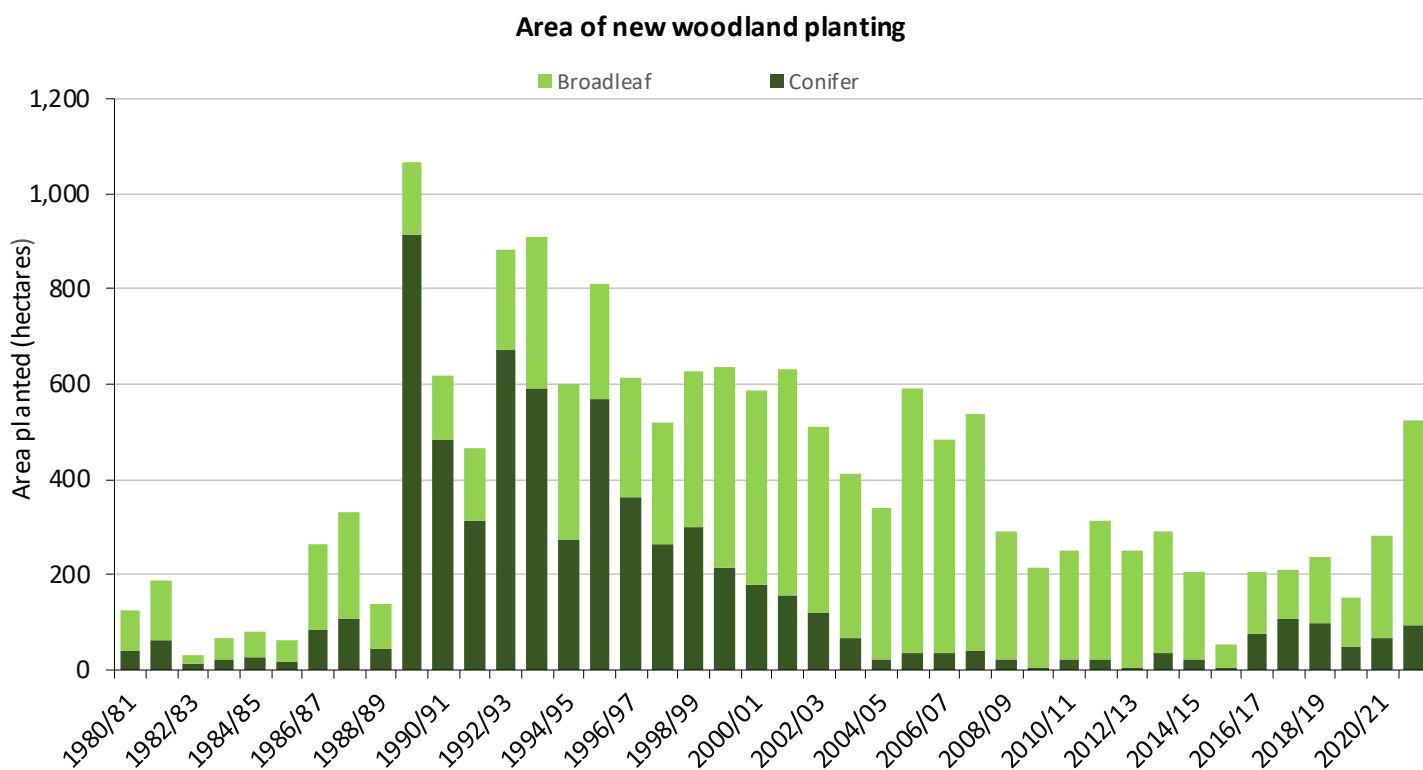
6.1 Emissions intensity of milk production



Source: [Greenhouse Gas Emissions on NI Dairy Farms, Department of Agriculture, Environment and Rural Affairs](#)

Notes: Due to minor updates to the Dairy Greenhouse Gas calculator used to calculate figures for this indicator, caution should be applied when making comparisons between 2020 and the previous five years - see user guidance document for further details.

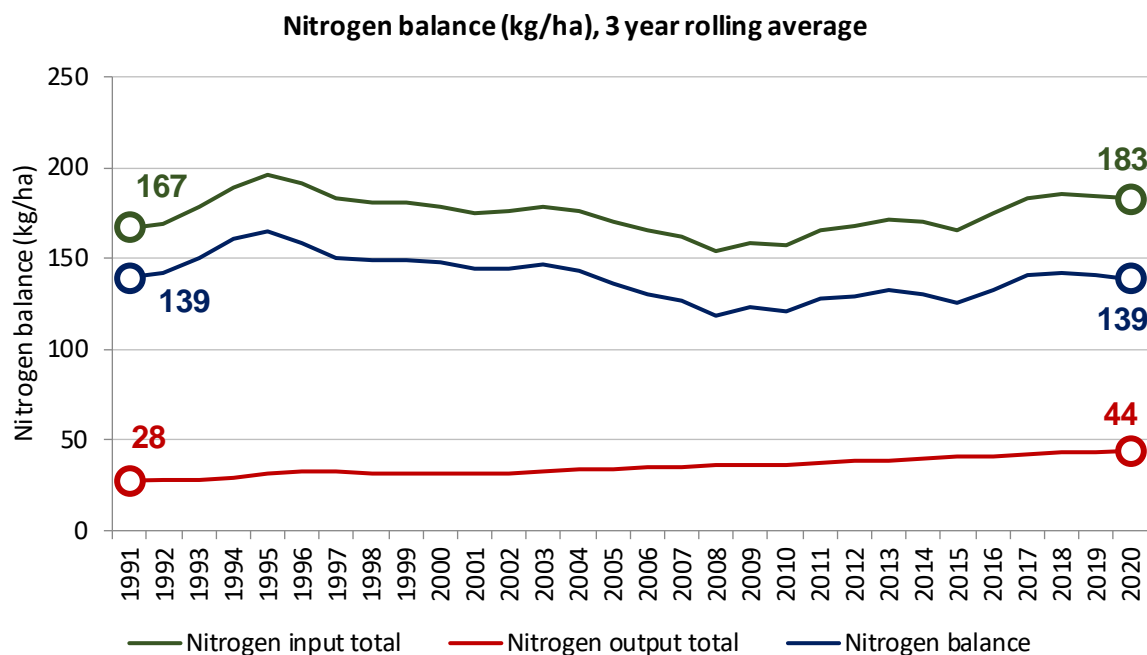
6.2 Area of new woodland planting



Source: [Woodland Statistics - new planting and restocking](#)

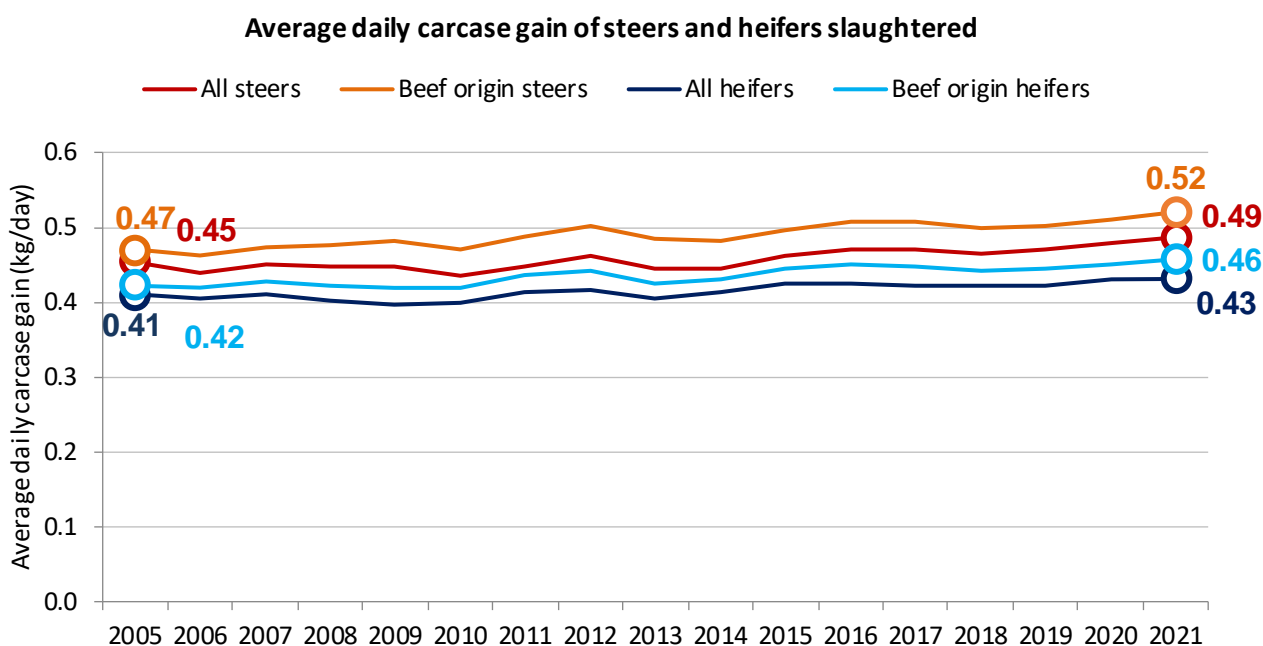
Notes: Based on areas for which grants were paid during the year. Data for 2021/22 is provisional

6.3 Soil nitrogen balance (3 year average)



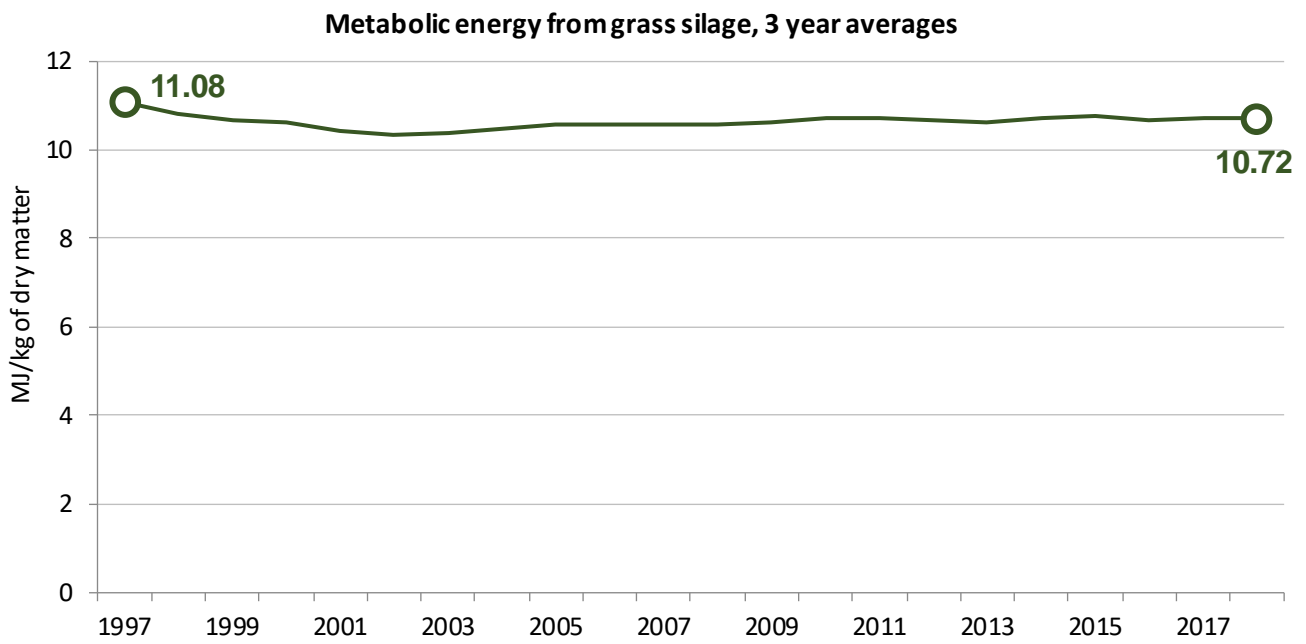
Source: Department of Agriculture, Environment and Rural Affairs Northern Ireland

6.4 Average daily carcass gain of beef cattle



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

6.5 Metabolic energy from grass silage

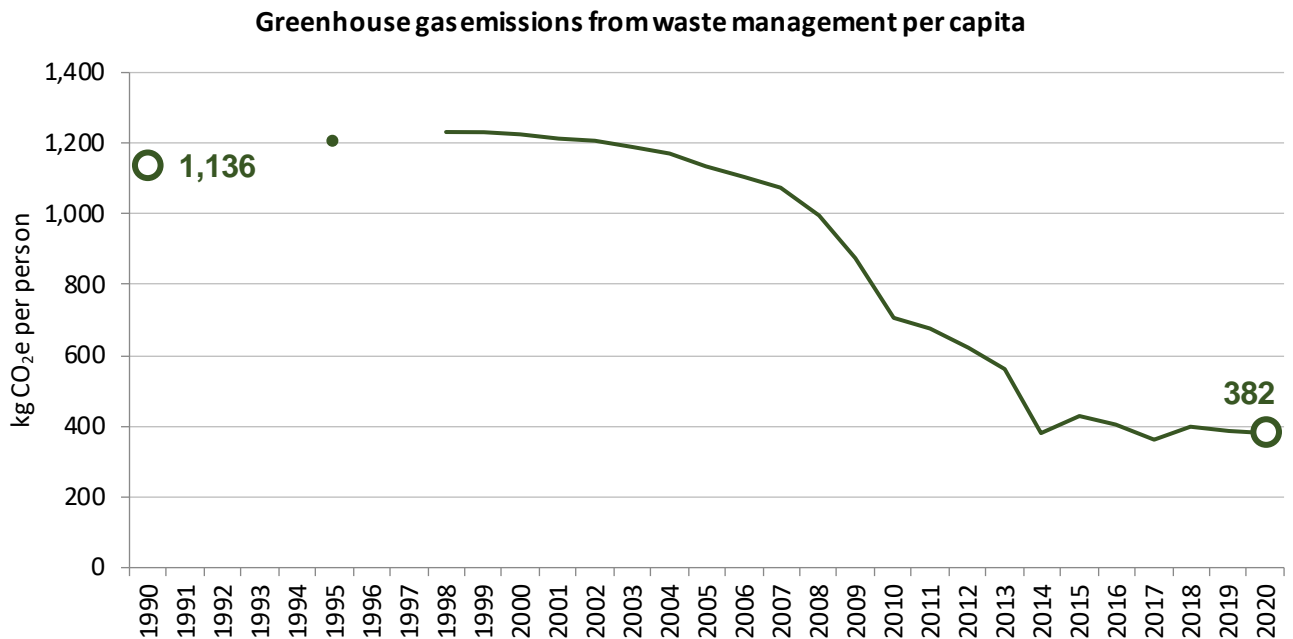


Source: Department of Agriculture, Environment and Rural Affairs Northern Ireland

Notes: No further updates available

7. Waste Sector

7.1 Greenhouse gas emissions from waste management per capita

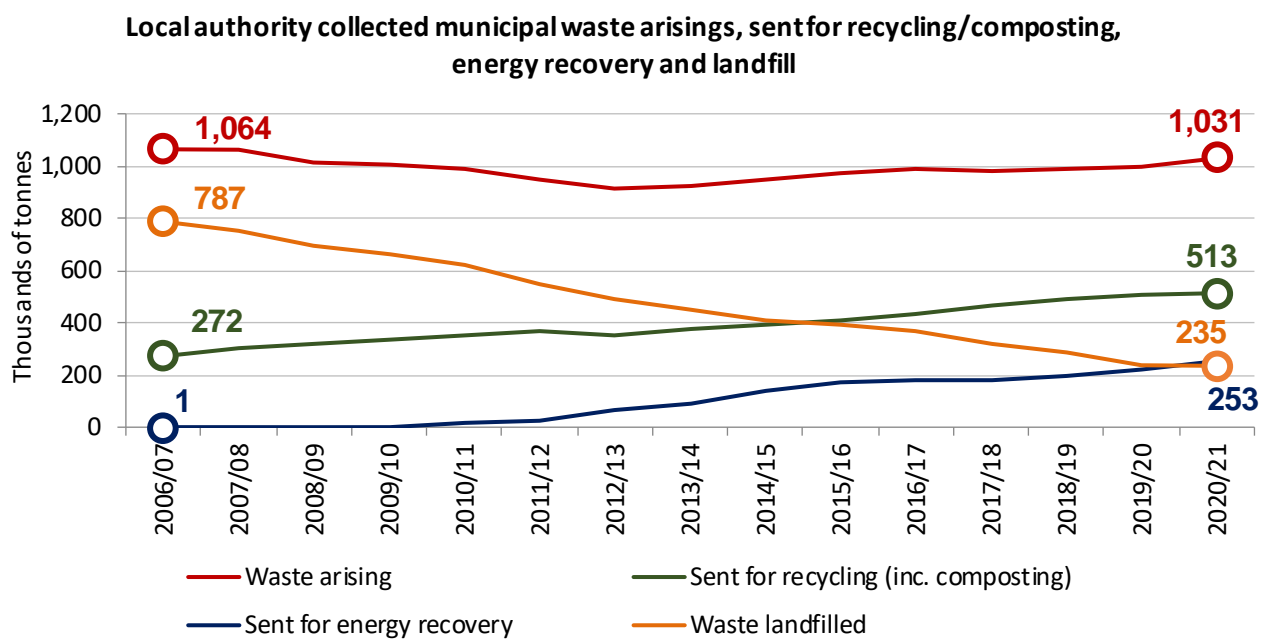


Source: [Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2020](#)

Source: [NISRA, 2020 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



Source: [Northern Ireland LAC Municipal Waste Management Statistics](#)

Policy, Economics and Statistics Division
Department of Agriculture, Environment
and Rural Affairs
Dundonald House
Upper Newtownards Road
Ballymiscaw
BELFAST
BT4 3SB

Copies of this booklet can be made available on
request in alternative formats.
Please telephone 028 9052 4063



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

www.daera-ni.gov.uk



**INVESTORS
IN PEOPLE**