Northern Ireland Greenhouse Gas Projections Update

Based on 2019 Greenhouse Gas Inventory

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Northern Ireland Greenhouse Gas Projections Update Based on 2019 Greenhouse Gas Inventory

Key points

- The latest Northern Ireland Greenhouse Gas Inventory estimated 2019 emissions to be 21 million tonnes of carbon dioxide equivalent ($MtCO_2e$). This was an 18% decrease on the 26 $MtCO_2e$ emitted in 1990.

- Projections are produced annually and provide an estimate of emissions of greenhouse gases in Northern Ireland from 2020 to 2030. The latest projection is that greenhouse gas emissions in Northern Ireland will reduce by 32% between 1990 and 2030 to 18 $MtCO_2e$.

Contents

Introduction

This paper details the impact of the annual update to the Northern Ireland (NI) greenhouse gas (GHG) projections. It projects emissions of GHGs in NI from 2020 to 2030 and considers the reduction in emissions from 1990 to 2030. The GHG inventory as well as projections data for energy, agriculture, population and land use change are used to estimate emissions from 2020 to 2030. A list of data sources is available in Annex 1.

This projections tool projects emissions to 2030 as it was initially designed to be consistent with the 2030 Climate and Energy Framework, which had a binding target to cut emissions in EU territory by at least 40% on 1990 levels by 2030. The UK Climate Change Act 2008 introduced a legally binding target to reduce GHG emissions by at least 80% below the 1990 baseline by 2050. This target was made more ambitious in 2019 when the UK committed to a 'net zero' target and the Climate Change Act 2008[1] was amended, requiring the UK to reduce greenhouse gas emissions by at least 100% of 1990 levels by 2050.

To meet these targets, the government has set five-yearly carbon budgets which currently run until 2037. The UK is currently in the third carbon budget period (2018 to 2022) which has a target to reduce emissions by 37% by 2020 (on 1990 levels). The fourth, fifth and sixth carbon budgets have targets of 51% by 2025, 57% by 2030 and 78% by 2035[2] (Figure 1).

All administrations, including NI, contribute to the UK carbon budgets. 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 Committee for Climate Change (CCC) published the Sixth Carbon Budget in December 2020; this being the first carbon budget to be set in line with the new net zero target. The Sixth Carbon

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[1] The Climate Change Act 2008
[2] The CCC - Carbon budgets and targets

Budget requires a 78% reduction in UK territorial emissions between 1990 and 2035. This effectively brought forward the UK's previous 80% target by nearly 15 years.

Figure 1: Reductions in Greenhouse Gas emissions below 1990 levels
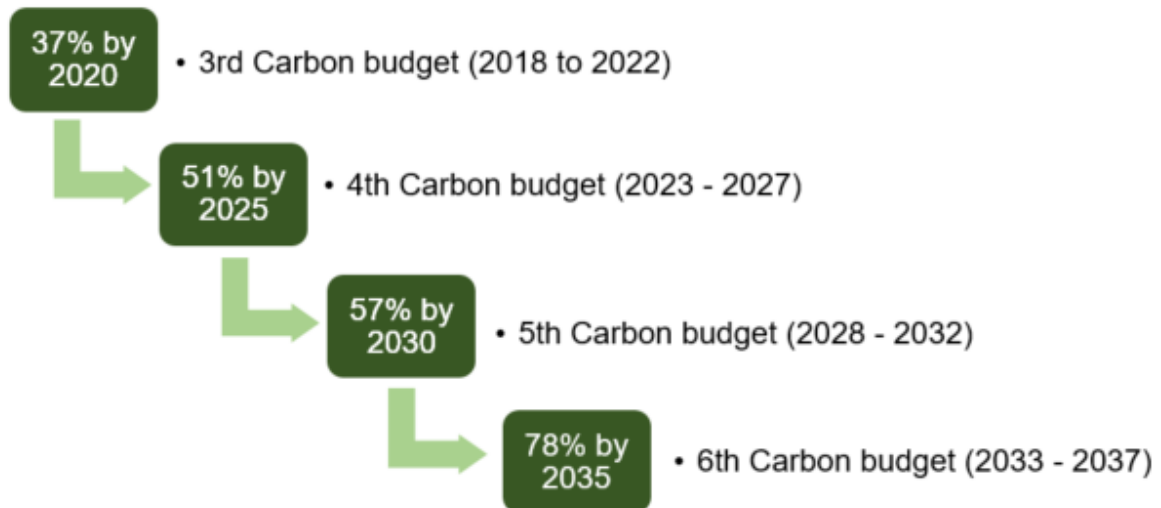
Whilst the UK Climate Change Act 2008, referred to above, extends to NI and it is implicit that NI contributes to the targets within, specific GHG reduction targets for NI are not included in it, or any other legislation. To address this legislative gap, proposals for a Climate Change Bill are currently passing through the NI Assembly[3].

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[3] [Primary Legislation - Bills 2017 - 2022 Mandate (niassembly.gov.uk)](#)

Current Northern Ireland Overview

The main body of this report concentrates on the projected reduction in GHG emissions, based on those policies currently costed in terms of emissions savings. It is recognised that additional policies may need to be incorporated as further initiatives are developed to combat climate change and meet targets set in any new NI specific climate change legislation.

The latest NI GHG Inventory estimated 2019 emissions to be 21 million tonnes of carbon dioxide equivalent ($MtCO_2e$). This was an 18% decrease on the 26 $MtCO_2e$ emitted in 1990. The latest projections estimate a further 18% decrease from 2019 to 2030, with expected emissions of 18 $MtCO_2e$ in 2030. Over the period 1990 to 2030 this would represent a total reduction in GHG emissions of 32%.

The projected emissions are shown on the line chart in Figure 2. For information about greenhouse gas emissions between 1990 and 2019, see the Northern Ireland Greenhouse Gas 1990-2019 statistical bulletin.

From 2019 to 2030 there is a projected gradual reduction in NI's GHG emissions. Emissions are expected to decrease year-on-year with an overall estimated reduction of 18% from 2019 to 2030. The downward trend is mainly driven by the energy supply sector as coal-fired electricity generation comes to an end and electricity generation switches to using more gas and renewables. The business sector also plays a considerable role, contributing to almost a third of the reduction in emissions from 2019 to 2030 with reduced fuel use and increased policy savings across the projected time series.

Figure 2: Total GHG emissions from latest GHG inventory (1990 to 2019) and updated projections (2020 to 2030)
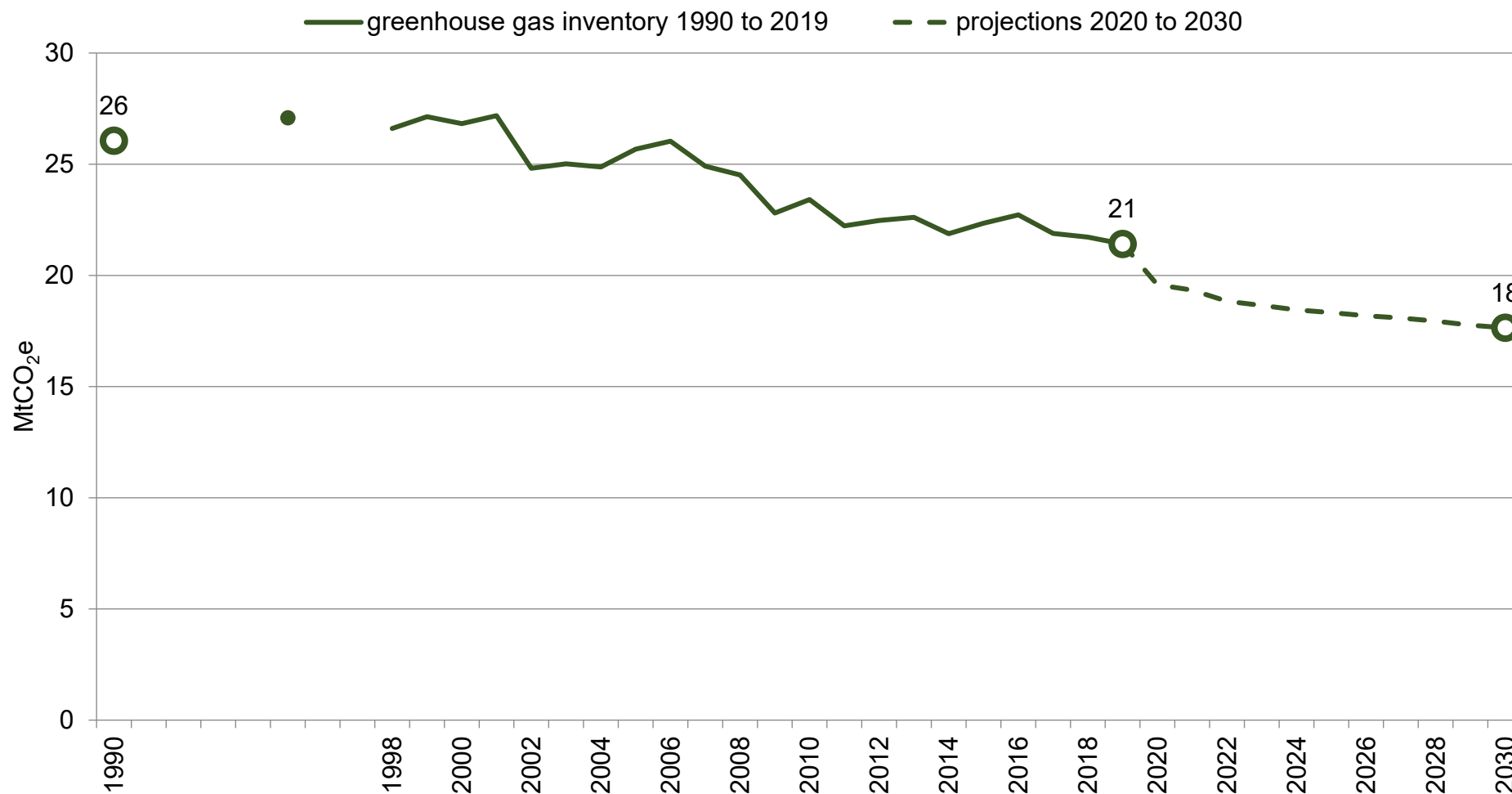
There was a major revision to the GHG inventory in 2019 to better represent peatland emissions. This resulted in an upward shift in overall emissions recorded from 1990-2019 to that previously recorded.

Results by sector

Projected reductions for the six largest National Communication sectors[4] is discussed below. Table 1 shows the estimated projected reduction alongside the 1990-2019 Inventory by sector. The latest NI GHG Inventory (1990-2019) provides the basis for each sector, with emissions projected forward using the available data.

Six sectors, are projected to see a continued improvement. A continued improvement would be a smaller increase or a bigger decrease in emissions between 1990 and 2030 compared to the change between 1990 to 2019. The public and industrial processes sectors are expected to remain similar whilst the land use change sector sees a much bigger increase.

Table 1: Emissions share, reduction and projection reduction by sector

| Sector	% of total emissions 2019	% change 1990 to 2019	% of total emissions 2030	% projected reduction 1990 to 2030
Agriculture	26	8	31	4
Business	11	-24	6	-63
Energy supply	13	-48	8	-74
Industrial process	1	-70	1	-70
Land use change	12	9	17	31
Public	1	-70	1	-69
Residential	14	-21	13	-38
Transport	20	22	20	2
Waste management	3	-60	3	-71
Total*	**100**	**-18**	**100**	**-32**

*Percentages sum to more than 100 due to rounding

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[4] Emissions are reported by National Communication sectors in accordance with international reporting guidelines from the United Nations Framework Convention on Climate Change Greenhouse gas inventory sector definitions

Agriculture

Figure 3: Agriculture GHG emissions, 1990-2030

From the latest GHG inventory (1990 to 2019) and updated projections (2020 to 2030)
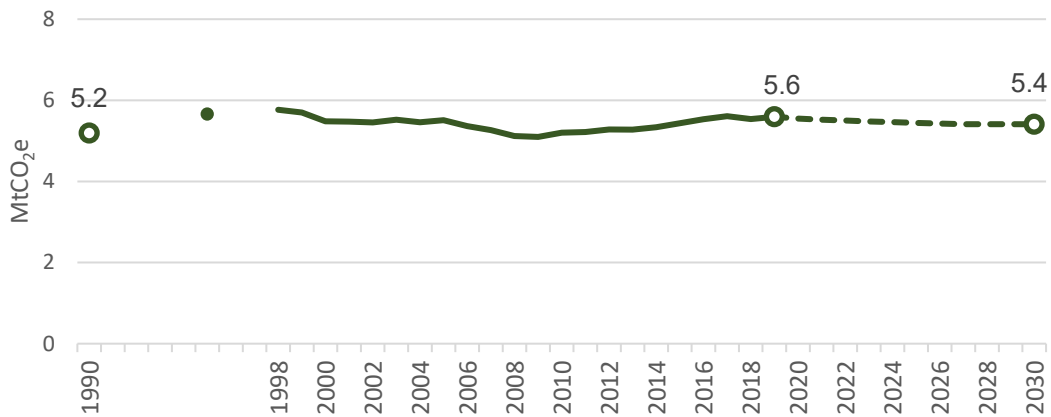

From 1990 to 2019, the agricultural sector increased emissions by 8%. With the current projections, emissions for this sector are expected to reduce by 3% between 2019 and 2030. This gives an overall projected increase in emissions from the agriculture sector of 4% between 1990 and 2030. Agriculture was the largest source of emissions for NI in 2019 at 26%. This share is expected to increase to 31% in 2030 as other sectors reduce emissions at a faster rate.

This sector is based on agricultural projections produced by the Agri- Food and Bioscience Institute (AFBI) for the UK (called FAPRI-UK). The agricultural projections being used in the tool are 2017-based; figures have been carried forward from previous years whilst awaiting more recently modelled projections to become available. Emissions from enteric fermentation, manure management and agricultural soils are all expected to decrease by approximately 2-3% across the projected time-series. There are NI-specific policy savings from the Nitrate Action Plan and Manure Efficiency Technology Scheme which have remained the same as previous years.

Transport

Figure 4: Transport GHG emissions, 1990-2030

From the latest GHG inventory (1990 to 2019) and updated projections (2020 to 2030)
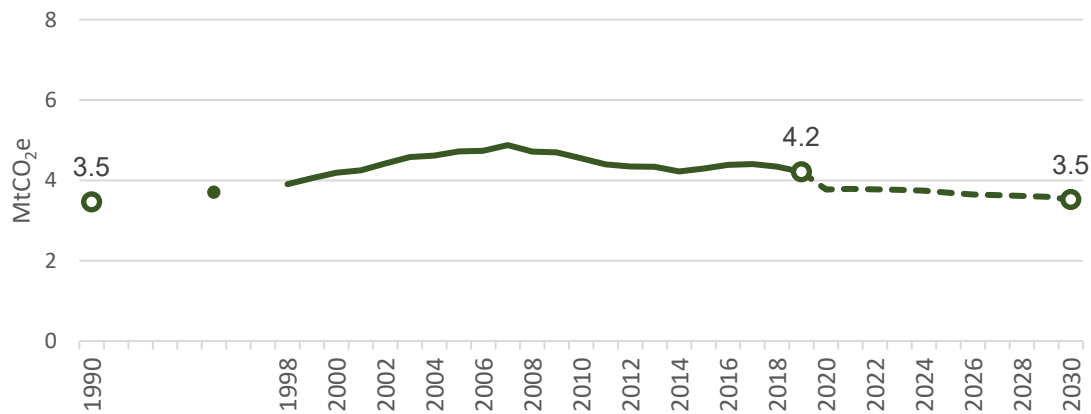
From 1990 to 2019, transport emissions increased by 22% but are projected to decrease by 16% from 2019 to 2030. As a result, between 1990 and 2030, emissions from transport are expected to increase by 2% due to increased demand and fuel use. The share of total NI emissions in 2030 (20%) is expected to remain the same as that of the 2019 share (20%).

Updated aviation forecasts were not available so the figures from previous years were carried forward. As these forecasts were 2017-based, adjustments were made to take into account the impact of COVID-19 on the aviation sector. Department of Transport statistics on vehicle numbers were updated for road transport, however, an updated version of the fuel use projections from the Department of Business, Energy & Industrial Strategy (BEIS) were not available so the figures from previous years were carried forward. These figures indicated that fuel for road transport was expected to increase over the projected time series resulting in increasing emissions between 2019 and 2030. However, this is offset by policy savings which are also projected to rise in this sector.

In terms of policy savings included in this sector, there is NI-specific policy savings for the Travelwise schemes and a share of UK policy savings for Fuel Efficiency Policies (for car, LGV, HGV and PSV) and Transport Biofuels.

Residential

Figure 5: Residential GHG emissions, 1990-2030

From the latest GHG inventory (1990 to 2019) and updated projections (2020 to 2030)
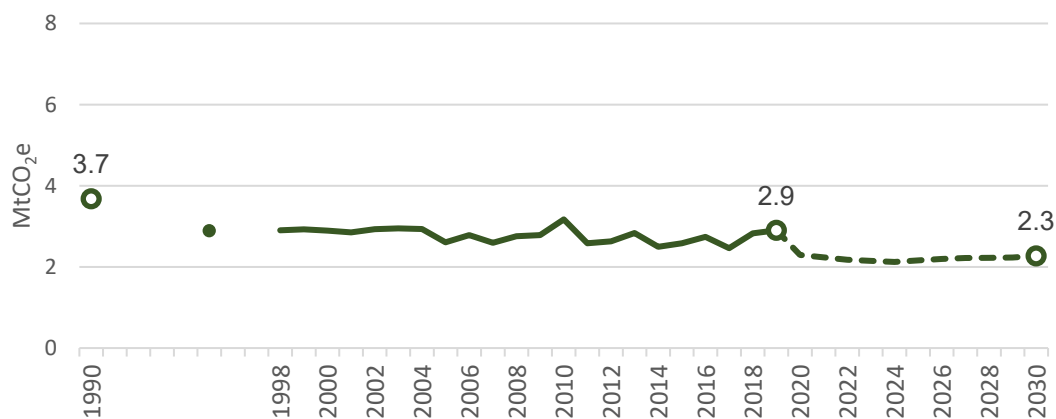
This sector is driven by fuel combustion in homes; in the earlier projected years emissions are shown to decrease as NI becomes less carbon intense but will have a slight increase from 2025 on as policy savings reduce.

Residential emissions have fallen by 21% between 1990 and 2019. The projections estimate that this decline will be maintained with a 22% decrease between 2019 and 2030, resulting in an overall decrease of 38% between 1990 and 2030. The share of total emissions from this sector will remain similar between 2019 and 2030, 14% compared to 13%. By 2030, it is expected that emissions from the residential sector will become the fourth largest source in NI.

Updates to this sector include gas forecasts from GMO NI (Gas Market Operator NI), revised UK-level energy projections and policy savings from BEIS were not available so the figures from previous years were carried forward. A share of UK policy savings were taken for National Products Policy and F-gas regulations. NI-specific policy savings were included for Boiler Replacement Scheme, Code for Sustainable Homes, Heating Replacement Programme (heating, insulation/glazing), Warm Homes Scheme, Renewable Heat Incentive, Gas Extension to West, Gas

Extension to East Down and Uplift of Part F (Conservation of Fuel and Power) of The Building Regulations (Northern Ireland) 2012.

Energy Supply

Figure 6: Energy Supply GHG emissions, 1990-2030

From the latest GHG inventory (1990 to 2019) and updated projections (2020 to 2030)
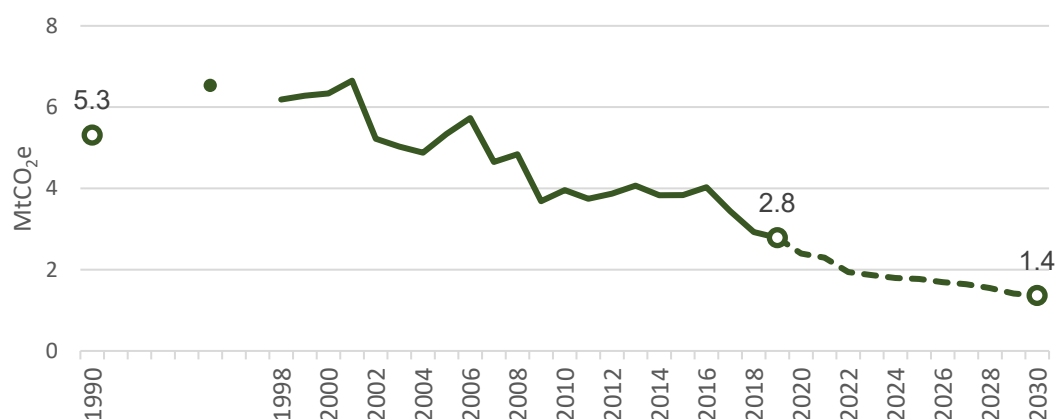
Emissions from energy supply have made the biggest contribution to the NI overall decrease between 1990 and 2019 with a 48% decrease. The emissions from the sector are expected to continue along this trajectory with a projected reduction of 51% between 2019 and 2030. This results in a total projected decrease in emissions from this sector of 74% by 2030.

In 2019, this sector was the fourth largest source of emissions in NI with a 13% share of total NI emissions. In 2030, this share is expected to drop to 8% which would mean it moves to the fifth largest source of emissions in NI below that of the residential sector (13% share).

The BEIS' energy trends, SONI (System Operator NI) forecasts and GMO NI gas use and demand forecasts were updated for this sector. The closure of the Kilroot coal powered station in 2023, along with the opening of two new gas units is accounted for in the projections.

On 16 December 2021, the Department for the Economy (DfE) published the [Northern Ireland Energy Strategy - the Path to Net Zero Energy.](#) Within the strategy, a target was set to meet at least 70% of electricity consumption from renewable sources by 2030. This renewables target has been included in the projections. The previous NI target of 40% by 2020 was achieved ahead of schedule[5]. It was considered that the main policy driver behind this success was the Northern Ireland Renewables Obligation (NIRO), a government support mechanism for renewable technologies operating from 2005 to 2017. The latest figures show that 42.1% of total electricity consumption in NI was generated from renewable sources located in NI in the 12 months to September 2021[6].

With the exception of a small decrease due to Covid-19 lockdown restrictions, demand for power in NI has been relatively consistent over the last number of years and the expectation is that it will remain reasonably stable in the future. SONI's median forecast scenario estimates an increase in demand of 5% in the 10 year period from 2020 to 2030[7]. There is an expected growth of renewable energy sources capacity of 20% by 2025, however, this was in the absence of DfE's Energy Strategy.

Over the years there has been a general decline in power sector gas demand and GMO NI in their 2021/22 to 2030/31 forecast predict this decline will continue[8]. Over the forecasted period, power sector gas demand is expected to decline by 9%. However, GMO NI forecasts the decline to be non-linear with power sector gas demands growing between 2021/22 and 2023/24, after which there will be a decline to the end of the forecast period. The gas forecasts used in the projections consider the two current gas fired power stations, Ballylumford and Coolkeeragh, and the new gas fired power station that EPUKI proposes to bring into operation in Kilroot in 2023.

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[5] [Department for the Economy news article on renewables target](#)
[6] [Electricity consumption and renewable generation in Northern Ireland: October 2020 - September 2021](#)
[7] [All-Island Generation Capacity Statement 2021-2030](#)
[8] [Northern Ireland Gas Capacity Statement 2021/22 - 2030/31](#)

There are no policy savings accounted for in this sector's emissions as it is assumed that policy savings are included in the projection sources used for this sector.

Land Use, Land Use Change and Forestry (LULUCF)

Figure 7: Land Use, Land Use Change and Forestry GHG emissions, 1990-2030

From the latest GHG inventory (1990 to 2019) and updated projections (2020 to 2030)
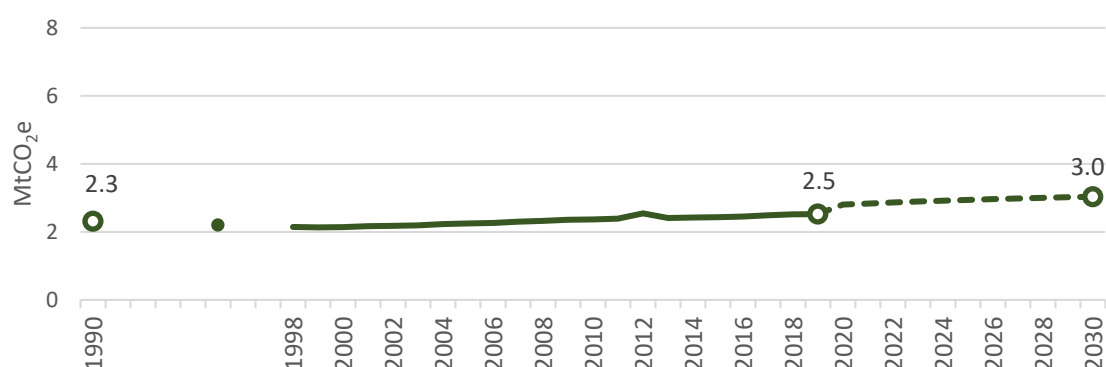
There were major changes to the LULUCF sector in the 2019 inventory to better represent emissions from peatlands and to bring reporting in line with the 2013 IPCC Wetlands Supplement[9]. As a result of these changes, LULUCF has now become one of the larger National Communication sectors in the NI GHG inventory, making up 12% of total emissions in 2019 in comparison to 3% in the 2018 GHG inventory. For further details on the impact of these changes see Appendix A in the [Northern Ireland Greenhouse Gas Emissions 2019](#) report.

LULUCF emissions have risen by 9% between 1990 and 2019. The projections estimate that there will be further increases in emissions from this sector. An increase of 20% is expected between 2019 and 2030, resulting in an overall increase of 31% between 1990 and 2030. The share of total emissions from this sector will also see an increase between 2019 and 2030, from 12% to 17%, making it the third largest source in NI.

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[9] [2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands](#)

In this sector, projections of GHG emissions and removals from LULUCF activities were updated, these projections are derived by UK Centre for Ecology and Hydrology (UKCEH) for BEIS and are consistent with the 2019 GHG inventory. There are no policy savings accounted for in this sector's emissions.

Business

Figure 7: Business GHG emissions, 1990-2030

From the latest GHG inventory (1990 to 2019) and updated projections (2020 to 2030)
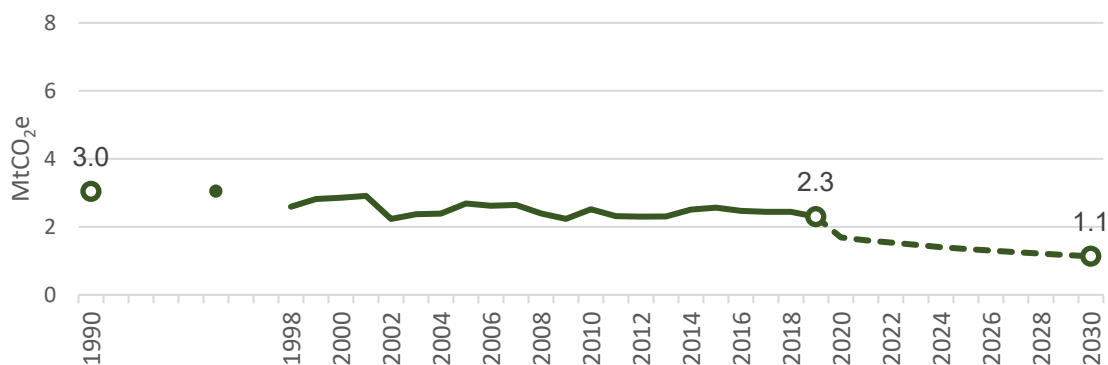
Emissions from the business sector have fallen by 24% between 1990 and 2019. The projections estimate that this decline will continue at a steeper rate with a 51% decrease between 2019 and 2030, resulting in an overall decrease of 63% between 1990 and 2030. The share of total emissions from this sector will fall from 11% in 2019 to 6% in 2030.

In this sector, gas forecasts from GMO NI were updated, revised UK-level energy projections and policy savings from BEIS were not available so the figures from previous years were carried forward. Projections indicate that emissions from the business sector will decrease across the time series, thus continuing the decreasing trend in this sector observed from 2015 onwards.

The fuel use trends from BEIS's Updated Energy and Emissions Projections: 2019[10] indicate that fuel for business use will gradually decline over the projected time

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[10] Updated Energy and Emission projections publication

series resulting in decreasing emissions between 2019 and 2030. Emissions from this sector are further reduced by policy savings which show a steady increase over the same period.

For this sector a share of UK savings are taken for National Products Policy, Carbon Reduction Commitment Energy Efficiency Scheme, F-gas regulations and the Streamlined energy and carbon reporting framework for businesses. NI-specific policy savings are included for Renewable Heat Incentive, Gas Extension to West, Gas Extension to East Down and Uplift of Part F (Conservation of Fuel and Power) of The Building Regulations (Northern Ireland) 2012.

Impact of Policy on Projections

Table 2 shows the impacts of the separately-costed policies on NI's overall projected emissions. The term 'separately-costed' refers to policies for which carbon savings have been estimated, either at NI or UK level. There are some policy impacts that are embedded within the sector calculations themselves e.g. in the energy sector. Where possible, NI-specific savings are used, but often no such data exist and a NI share of UK savings is used. UK policy savings are taken from BEIS' updated energy and emission projections publication[11], the figures were carried forward from the previous year as no further update was available.

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[11] Updated Energy and Emission projections publication

Table 2: Impact of separately-costed policies on projected GHG emissions

Policy	Sector impacted	NI-specific data available	NI share of UK impact	Impact on NI central projection (percentage points)
Car Fuel Efficiency Policies	Road transport		✔	2.0
Part F - Building Regulations	Business and Residential	✔		1.0
F-gas Regulation	Business and Residential		✔	0.9
Renewable Heat Incentive	Business and Residential	✔		0.8
Transport Biofuels	Road transport		✔	0.8
LGV Fuel Efficiency Policies	Road transport		✔	0.4
Gas Extension to West and to East Down	Business and Residential	✔		0.4
Products Policy	Business, Residential, Public		✔	0.2
Warm Homes Scheme	Residential	✔		0.2
HGV Fuel Efficiency Policies	Road transport		✔	0.2
Boiler Replacement Scheme	Residential	✔		0.1
Heating Replacement Programme	Residential	✔		0.1
Travelwise Initiative	Road transport	✔		0.1
PSV Fuel Efficiency Policies	Road transport		✔	0.0
NAP and METS2	Agriculture	✔		0.0
SECR1 framework for business	Business		✔	0.0
Carbon Reduction Commitment	Business and Public		✔	0.0
Code for Sustainable Homes	Residential	✔		0.0

[1] Nitrate Action Plan and Manure Efficiency Technology Scheme
[2] Streamlined energy and carbon reporting

Previous NI GHG Projections Publications

The previous update to the NI GHG projections was produced in February 2021. It was the fourth report presented by National Communication (NC) sector. The methodology and model used for the projections were updated in 2019 so that the model was built on the most recent version of NC codes and aligned with the NC sectors. Prior to the 2019 publication, the projections model was built on an older version of NC codes and sectors limiting comparisons.

Further details on NC sectors and the different versions is included in the projections report published in 2018: [Northern Ireland Greenhouse Gas Projections Update (based on 2015 greenhouse gas inventory)](#)

Table 3 compares the previous (based on 2018 greenhouse gas inventory) and current projections (based on 2019 greenhouse gas inventory) updates by sector. Some change is a result of the updated inventory data whilst other changes are due to changes to the projections data.

Table 3: Impact of updates on projected GHG emissions by sector, 1990-2030 trend (%)

Sector	2018-based projection	2019-based projection	Reason for change
Agriculture	-3%	4%	The FAPRI data has not been updated; therefore projections for agriculture remained the same as in previous years. There have been a number of revisions to the enteric fermentation, manure management and agricultural soils sections of the the GHG inventory resulting in an overall increase in emissions across the time series, typically between 1% and 4%.
Business	-66%	-63%	Fuel use projections and policy savings have not been updated since last year. Some revisions to the GHG inventory, mainly affecting the latter years and not the base year, has resulted in a slightly smaller projected reduction.
Energy Supply	-76%	-74%	The projected reduction is similar to last year. The source data for projections has showed a similar trend to the previous year and the inventory has revisions for this sector were minimal.
Industrial Process	-77%	-70%	Smaller projected reduction. All changes are influenced by the update of the projections model with the latest (2019 based) actual data from the DA GHG inventories.
Land Use Change	25%	31%	Updates to the latest version of LULUCF trends to take account of peatland emissions have caused significant recalculations throughout both the actual time-series, and the projections within this sector.

Table 3 cont'd: Impact of updates on projected GHG emissions by sector, 1990-2030 trend (%)

Sector	2018-based projection	2019-based projection	Reason for change
Public	-67%	-69%	Inventory revisions have meant that emissions in the later part of the time series (2017 to 2019) have decreased slightly therefore emissions have a lower start point (in 2019) than previously and the emissions reduction is projected to be slightly higher than previously estimated.
Residential	-43%	-38%	Revisions to the inventory effecting the amount of gas combusted in the domestic sector from 2016 onwards meant a higher start point in 2019 compared to that used in the 2018 projections tool, therefore trends are reduced.
Transport	10%	2%	Road transport emissions are projected to be lower, following revisions to data provided by Department for Transport, in the inventory.
Waste Management	-72%	-71%	Landfill emissions were projected to be more in the 2019 model than the 2018 model, however, this was offset by a lower starting point in 2019 waste sector emissions than in 2018. This was linked to revised methodology for estimating industrial wastewater treatment emissions which resulted in emissions being reduced across the inventory time series. The overall effect being a similar projected reduction.
TOTAL	**-39%**	**-32%**	

Statistical Uncertainty

The uncertainty around this projection is not assessed in a statistically rigorous way. It is not possible for example, to provide a 95% confidence interval around the projection.

The GHG projections are estimated using various forecasted data such as energy, gas, aviation and agriculture projections. All modelled forecasts will have a level of uncertainty and are best estimates with underlying assumptions based on expert knowledge at a particular point in time. Events such as the Covid-19 pandemic and Brexit introduce further uncertainty and can make it more difficult to accurately predict future situations.

A primary source for the GHG projections is the BEIS Updated Energy and Emissions Projections was unavailable this year meaning figures were carried forward from the previous year's GHG projections. It was noted in the 2019 projections, published in December 2020, that the analysis was completed before the Covid-19 pandemic and that the assumptions and modelling therefore did not take into account any impacts the pandemic may have on future energy demand or emissions.

It also should be noted that the GHG projections are based on the 2019 GHG inventory and the effects of the Covid-19 pandemic will not be apparent until the 2020 inventory data is available for NI later this year

The greenhouse gas emission estimates which provide a foundation for projections 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. Uncertainty estimates for NI GHG emissions for the latest year (2019) at the 95% confidence interval is ±6%.
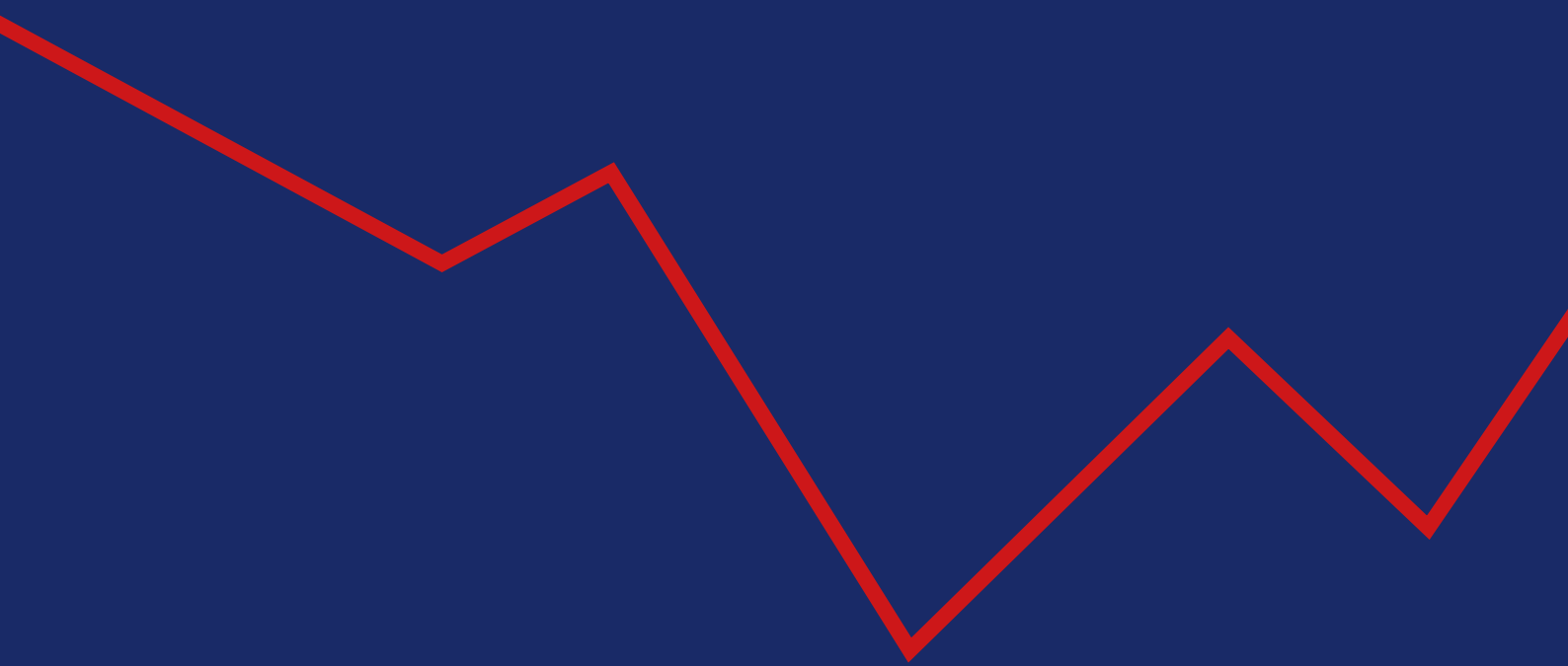
Annex 1: Key data sources for the latest update to the NI GHG projections

Dataset	Sector	Source	Latest version
NI GHG Inventory	All sectors	Ricardo Energy & Environment	1990 to 2019
DUKES (Digest of UK Energy Statistics) conversion factors	All sectors	BEIS	2021
Updated energy and emissions projections	All sectors	BEIS	2019 to 2040
Power generation (historical)	Energy supply	BEIS	2004 to 2020
Power capacity and demand forecasts	Energy supply	SONI / EirGrid	2021 to 2030
Gas demand forecasts	Energy supply, business, residential	GMO NI	2021/22 to 2030/31
FAPRI-UK projections for NI	Agriculture	AFBI / Defra	2018 to 2027
LULUCF projections	LULUCF	Centre for Ecology and Hydrology / BEIS	2020 to 2050
UK non-CO_2 GHG projections	Business, residential, public waste	BEIS	2019 to 2040
Population projections	Other	NISRA (NI) / ONS (UK)	2020-based
UK Aviation Forecasts	Transport	DfT	2017 to 2050

Annex 2: Northern Ireland Greenhouse gas emissions projections by sector (in MtCO$_2$e)
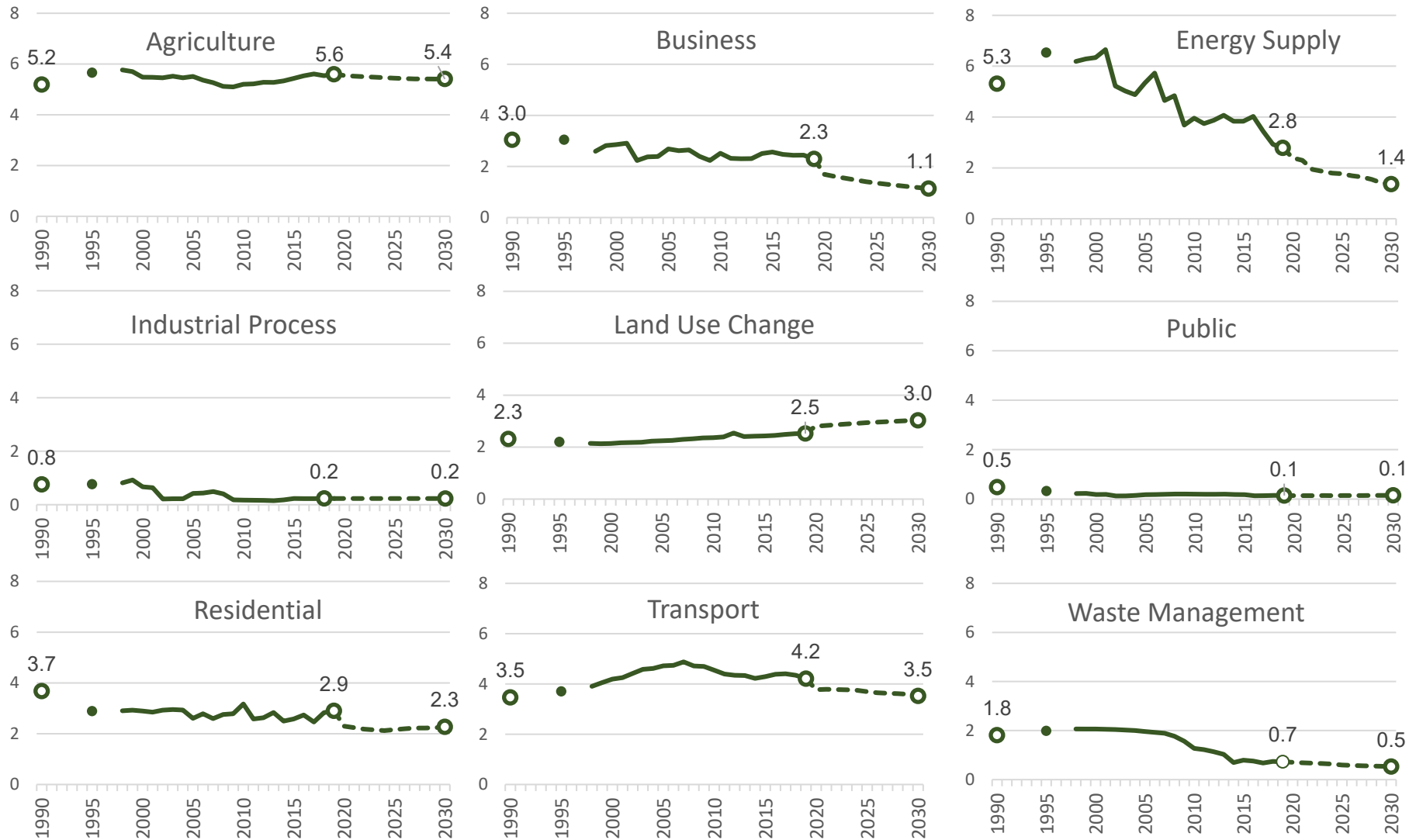
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