Northern Ireland Greenhouse Gas Projections Update

Based on 2017 Greenhouse Gas Inventory

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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 2018 to 2030 and considers the reduction in emissions from 1990 to 2030. The greenhouse gas inventory as well as projections data for energy, agriculture, population and land use change are used to estimate emissions from 2018 to 2030. A list of data sources is available in Annex 1.

Projecting to 2030 is consistent with the 2030 Climate and Energy Framework, which contains a binding target to cut emissions in EU territory by at least 40% on 1990 levels by 2030. The UK Climate Change Act 2008 (hereafter referred to as 'The Act') introduced a legally binding target to reduce GHG emissions by at least 80% below the 1990 baseline by 2050. To meet these targets, the government has set five-yearly carbon budgets which currently run until 2032. 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 and fifth carbon budgets have targets of 51% by 2025 and 57% by 2030[1]. In 2019, The Act[2] was amended to require the UK to have

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[1] https://www.theccc.org.uk/tackling-climate-change/reducing-carbon-emissions/carbon-budgets-and-targets/

[2] http://www.legislation.gov.uk/ukdsi/2019/9780111187654

a 100% reduction in greenhouse gas emissions by 2050 from 1990 levels, commonly referred to as the 'net zero 2050' target[3]. 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.

Reductions in Greenhouse Gas emissions below 1990 levels

37% by 2020	• 3rd Carbon budget (2018 - 2022)
51% by 2025	• 4th Carbon budget (2023 - 2027)
57% by 2030	• 5th Carbon budget (2028 - 2032)
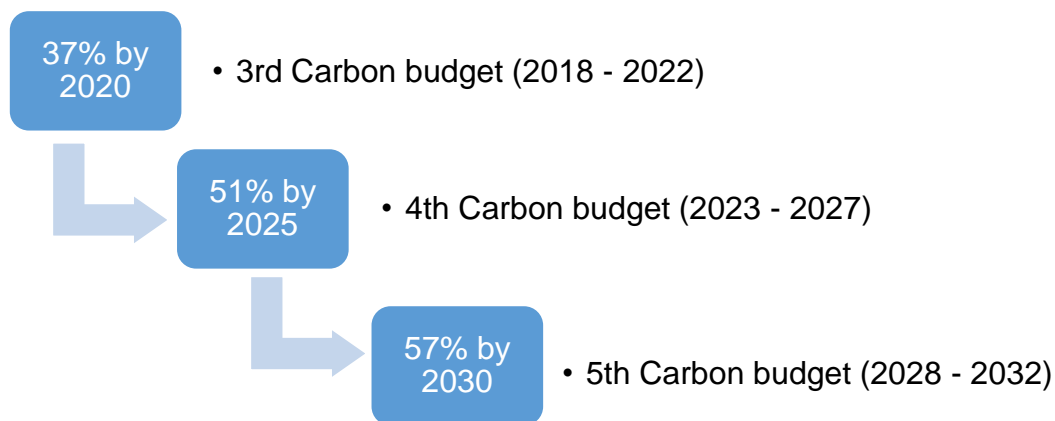
Northern Ireland Overview

The latest NI GHG Inventory estimated 2017 emissions to be 20 million tonnes of carbon dioxide equivalent ($MtCO_2e$). This was an 18% decrease on the 24 $MtCO_2e$ emitted in 1990. The latest projections estimate a further 23% decrease from 2017 to 2030, with expected emissions of 15 MtCO2e in 2030. Over the period 1990 to 2030 this would represent a total reduction in GHG emissions of 37%.

The projected emissions are shown on the line chart in Figure 1. For information about greenhouse gas emissions between 1990 and 2017, see the NI GHG statistical bulletin 1990-2017: https://www.daera-ni.gov.uk/articles/northern-ireland-greenhouse-gas-inventory

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[3] https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/

From 2018 to 2030 there is a gradual reduction in NI's GHG emissions. Emissions are expected to decrease year-on-year until 2025 when they level off. The downward trend is mainly driven by the energy supply sector with Kilroot power station closing in 2024 contributing to the decrease between 2018 and 2025 before levelling off as no further policy savings are included.

Figure 1: Total GHG emissions from latest GHG inventory (1990 to 2017) and updated projections (2018 to 2030)
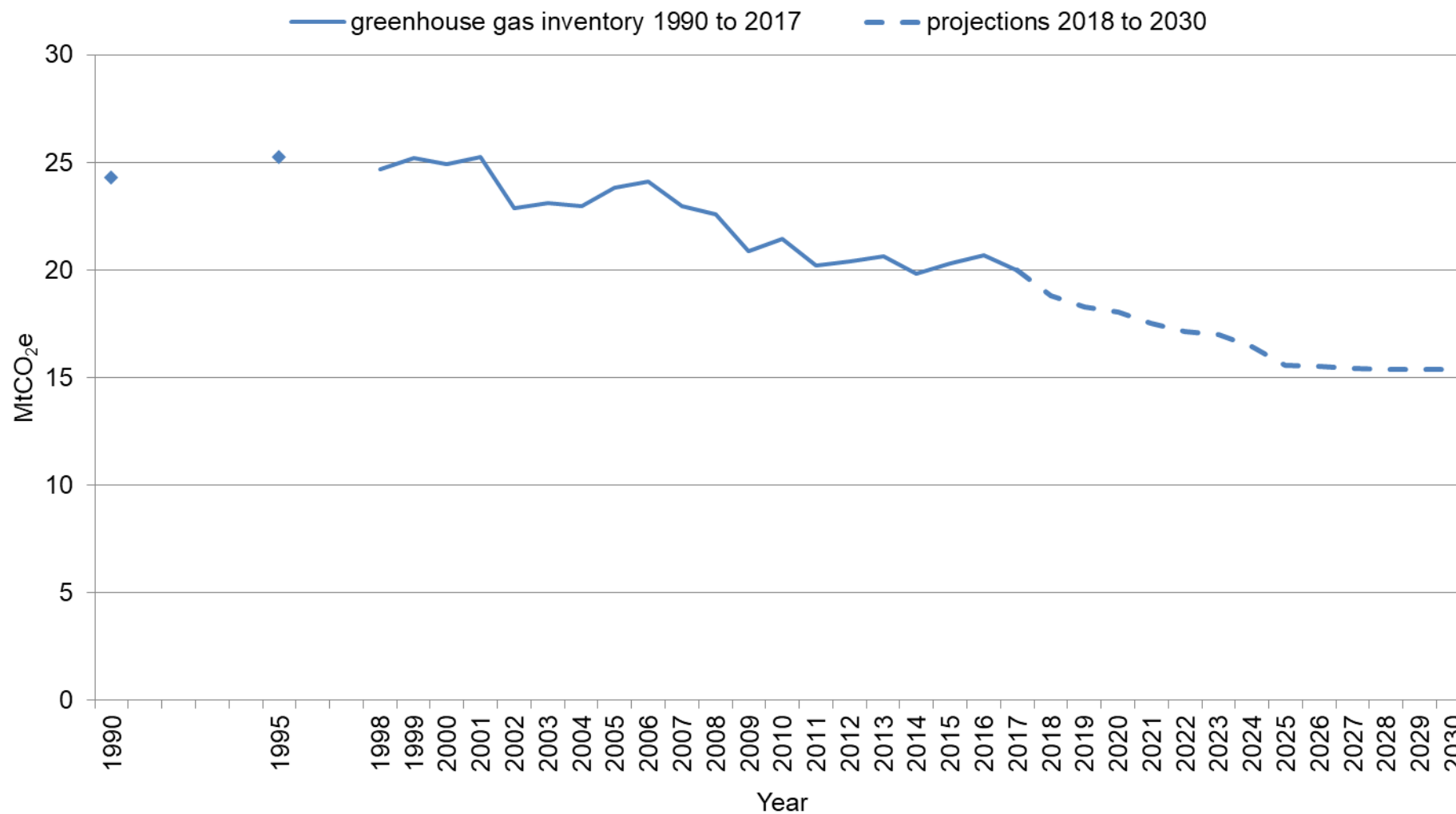
Results by sector

Projected reductions for the five largest National Communication sectors is discussed below. Table 1 shows the estimated projected reduction alongside the 1990-2017 Inventory by sector. The latest NI GHG Inventory (1990-2017) provides the basis for each sector, with emissions projected forward using the available data. All sectors see an improvement in emissions between 1990 and 2030 than changes in emissions to date (1990 to 2017) with the exception of public and industrial processes which are expected to remain similar.

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

Sector	% of total emissions 2017	% change 1990 to 2017	% of total emissions 2030	% projected reduction 1990 to 2030
Agriculture	27	2	33	-3
Business	12	-23	10	-52
Energy supply	17	-36	9	-75
Industrial process	1	-78	1	-78
Land use change	2	23	3	16
Public	1	-61	1	-59
Residential	13	-28	16	-33
Transport	23	30	25	10
Waste management	4	-57	3	-77
Total	**100**	**-18**	**100**	**-37**

Agriculture

Figure 2: Agriculture GHG emissions, 1990-2030

From the latest GHG inventory (1990 to 2017) and updated projections (2018 to 2030)
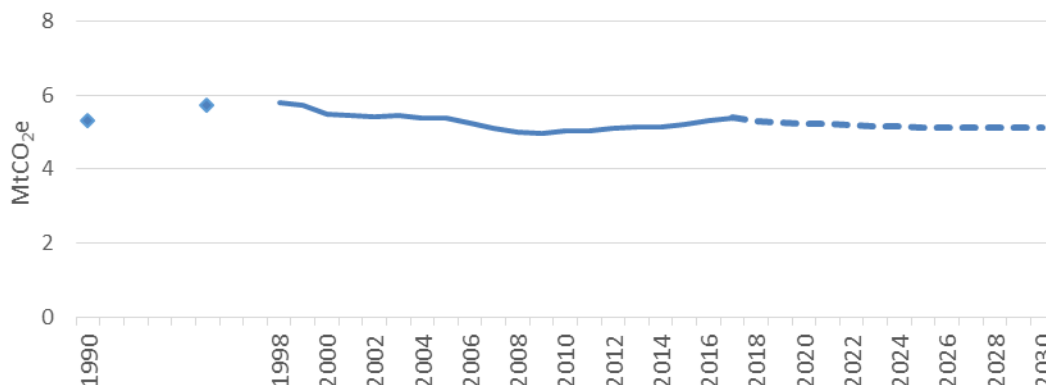
The projections estimate that emissions from the agriculture sector will reduce by 3% between 1990 and 2030. From 1990 to 2017, the agricultural sector increased emissions by 2%. With the current projections, emissions for this sector are expected to reduce by 5% between 2017 and 2030. Agriculture was the largest source of emissions for Northern Ireland in 2017 at 27%. This share is expected to increase to 33% in 2030 as other sector reduce emissions at a faster rate.

This sector is based on agricultural projections produced by the Agri-Food and Biosciences Institute (AFBI) for the UK (called FAPRI-UK). Livestock numbers are expected to decrease across the time series whilst the agricultural soils have remained stable. 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 3: Transport GHG emissions, 1990-2030

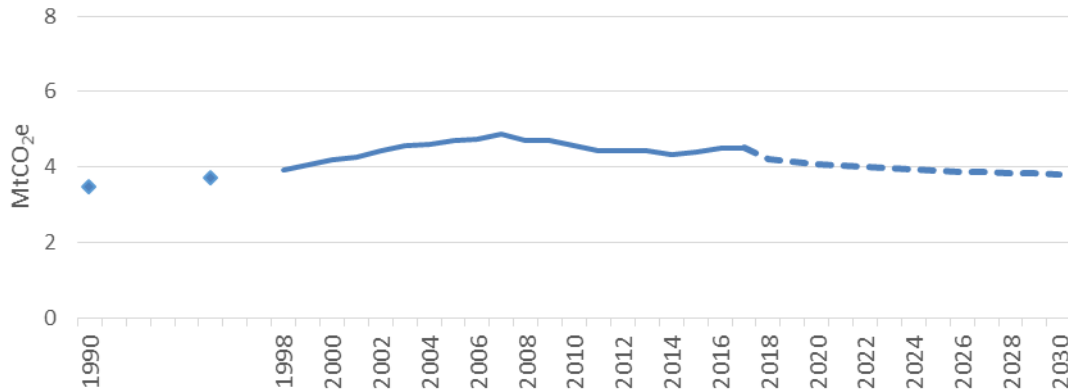**From the latest GHG inventory (1990 to 2017) and updated projections (2018 to 2030)**

Emissions from transport are expected to increase by 10% between 1990 and 2030 due to increased demand and fuel use. From 1990 to 2017, transport emissions increased by 30% and are expected to decrease by 16% from 2017 to 2030. The share of total NI emissions in 2030 (25%) is expected to remain similar to the 2017 share (23%).

Department of Business, Energy & Industrial Strategy's (BEIS) energy projections and vehicle numbers were updated for road transport. Updated aviation forecasts were not available so the figures from previous years were carried forward. Fuel for road transport is expected to increase over the projected time series resulting in increasing emissions between 2017 and 2030. This is offset by policy savings 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, van, HGV and PSV) and Transport Biofuels.

Energy Supply

Figure 4: Energy Supply GHG emissions, 1990-2030

From the latest GHG inventory (1990 to 2017) and updated projections (2018 to 2030)

Emissions from energy supply have made the biggest contribution to the NI overall decrease between 1990 and 2017 with a 36% decrease. The emissions from the sector are expected to continue along this trajectory to reduce by 75% by 2030. This includes a reduction of 61% between 2017 and 2030. In 2017, this sector was one of the largest sources of emissions in Northern Ireland with a 17% share of total NI emissions. In 2030, this share is expected to drop to 9% which would mean it moves to the fifth largest source of emissions in Northern Ireland below both business (10% share) and residential (16% share) sectors.

The BEIS' energy trends, SONI (System Operator NI) forecasts and UREGNI (Utility Regulator NI) gas use and demand forecast were updated for this sector. NI data is primarily used to project emissions with updated demand forecasts from the System Operator NI (SONI) increasing the expected demand for power in Northern Ireland from 2022 on. The closure of Kilroot in 2024 is accounted for in the projections with its capacity reducing gradually between 2020 and 2024. The UREGNI gas demand forecasts indicate that gas use at Ballyumford and Coolkeeragh will continue to grow to 2023, after which the new interconnector between SONI and Eirgrid is expected to be completed.

The Northern Ireland Executive's target for renewable consumption remains at 40% by 2020. This is the target that has been used in the projections for 2020 onwards. The programme for government target of 20% by 2015 was met and the official figure for the 12 month period to September 2019 was 44.9%. The Northern Ireland Renewables Obligation closed to all renewables technologies by 31 March 2017, with exceptions in the form of grace periods.

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.

Residential

Figure 5: Residential GHG emissions, 1990-2030

From the latest GHG inventory (1990 to 2017) and updated projections (2018 to 2030)
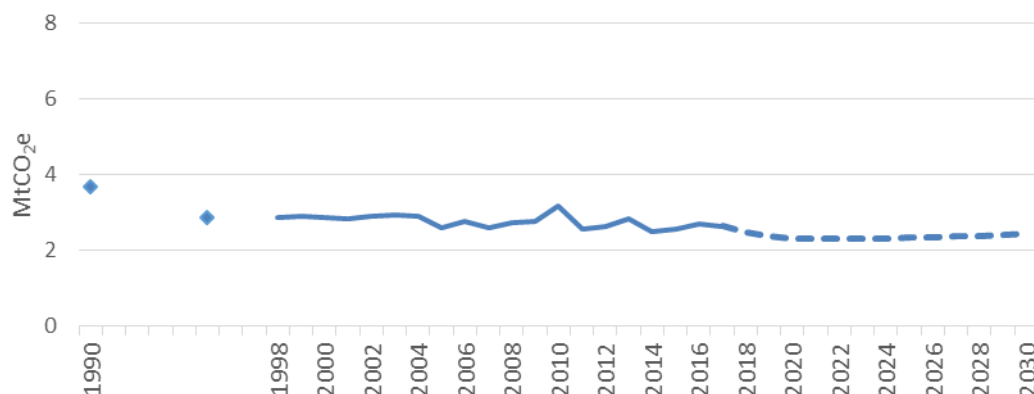
This sector is driven by fuel combustion in homes and therefore follows a similar trend to the energy supply sector with emissions decreasing in the earlier years as NI becomes less carbon intense and a slight increase from 2024 on as policy savings reduce. Residential emissions have fallen by 28% between 1990 and 2017. The projections estimate that this decline will slow with an 8% decrease between 2017 and 2030, resulting in an overall decrease of 33% between 1990 and 2030. The share of total emissions from this sector will increase between 2017 and 2030, from 13% to 16% respectively. It is expected that emissions from the residential sector will become the third largest source in Northern Ireland.

This sector has been updated including updated gas forecasts from the Utility Regulator, revised UK-level energy projections and revised policy savings. For this sector, 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), 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.

Business

Figure 6: Business GHG emissions, 1990-2030

From the latest GHG inventory (1990 to 2017) and updated projections (2018 to 2030)
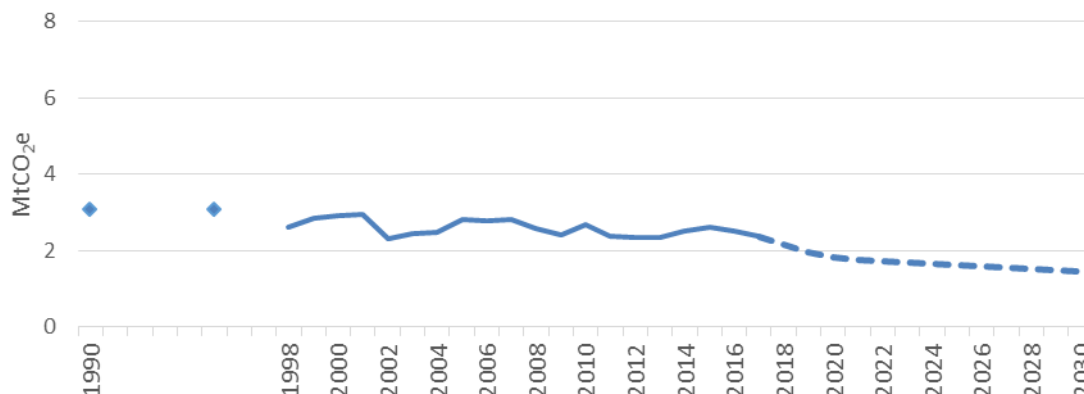
Emissions from the business sector have fallen by 23% between 1990 and 2017. The projections estimate that this decline will continue with a 38% decrease between 2017 and 2030, resulting in an overall decrease of 52% between 1990 and 2030. The share of total emissions from this sector will remain similar in 2030 (10% share) to 2017 (12% share).

Updated projections from BEIS' final energy demand and UREGNI gas and oil demand forecasts suggest that emissions will continue decreasing from 2016 onwards. Again, this is primarily fuel combustion and therefore follows a similar trend to the energy supply and residential sectors.

For this sector a share of UK savings are taken for National Products Policy, Carbon Reduction Commitment Energy Efficiency Scheme, F-gas regulations and Energy Performance of Buildings Directive. 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 Northern Ireland'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. the Strategic Energy Framework renewable energy targets. Where possible, NI-specific savings are used, but often no such data exist and an NI share of UK savings is used. UK policy savings are taken from BEIS' updated energy and emission projections publication[4].

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[4] https://www.gov.uk/government/collections/energy-and-emissions-projections

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	Transport		✔	1.8
Products Policy	Business, Residential and Public		✔	0.1
Transport Biofuels	Road transport		✔	0.8
Part F - Building Regulations	Business and Residential	✔		1.1
Renewable Heat Incentive	Business and Residential	✔		1.0
Gas Extension to West and to East Down	Business and Residential	✔		0.5
LGV Fuel Efficiency Policies	Road transport		✔	0.5
HGV Fuel Efficiency Policies	Road transport		✔	0.1
Warm Homes Scheme	Residential	✔		0.2
Boiler Replacement Scheme	Residential	✔		0.1
Heating Replacement Programme	Residential	✔		0.1
Travelwise Initiative	Road transport	✔		0.0
Carbon Reduction Commitment	Business and Public		✔	0.0
SECR[1] framework for business	Business		✔	0.0
NAP and METS[2]	Agriculture	✔		0.0
Code for Sustainable Homes	Residential	✔		0.0

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

Changes since previous projection

The previous update to the NI GHG projections was produced in March 2019. It was the second report presented by National Communication (NC) sector and was 'built' on an older version of codes and sectors which meant comparisons were limited. The methodology and model used for the projections has been updated this year so it is now built on the most recent version of the codes and aligned with the NC sectors.

Further details on NC sectors and the different versions is included in the projections report published in 2018: https://www.daera-ni.gov.uk/sites/default/files/publications/daera/ni-ghg-projection-tool-update-2017.pdf

Table 3 compares the previous (based on 2016 greenhouse gas inventory) and current projections (based on 2017 greenhouse gas inventory) updates by sector. Some change, e.g. in transport, public and residential, is a result of the updated inventory data whilst other changes, e.g. in agriculture and business, are due to changes to the projections data. The updated projections also incorporated some new modelling assumptions, e.g. in energy supply and waste management, which have changed the level of emissions reductions for these sectors.

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

Sector	2016-based projection	2017-based projection	Reason for change
Agriculture	1%	-3%	FAPRI projections have been updated which no longer anticipate such large increases in emissions from 2018-2027. Livestock numbers are expected to decrease and emissions from agricultural soils are expected to remain stable.
Business	-46%	-52%	Greater reductions are driven by updates to the UEP (updated energy and emissions projections) data, which now forecast a more pronounced reduction in energy demand over the time-series (2018-2030). As trends are driven by the annual growth (or decline) of energy demand, this is reflected in the results.
Energy Supply	-57%	-75%	This sector of the model was overhauled to utilise capacity statement data as published by SONI (Systems Operator Northern Ireland) and UREGNI (Utility Regulator Northern Ireland), i.e. NI data, as well as the growth of renewable capacity improves the outlook trend for NI's energy supply sector.
Industrial Process	-78%	-78%	Very similar trends, any change is influenced by the update of 2017 projections with actual data from the DA GHG inventories.
Land Use Change	37%	16%	Updates to the latest version of LULUCF trends (based on 2016 greenhouse gas inventory) has caused recalculations throughout the time series, decreasing the percentage growth during the projected period.
Public	-74%	-59%	The previous version of the model had forecast a large drop in emissions from the public sector in 2017 that wasn't apparent in the final DA GHG inventory for Northern Ireland. As a result, the overall trend changed but still remains a large percentage reduction.
Residential	-38%	-33%	The previous version of the model had forecast a large drop in emissions from residential emissions for 2017 that wasn't apparent when the NI GHGI was calculated. Therefore the overall trend has reduced a little in response to that.

Sector	2016-based projection	2017-based projection	Reason for change
Transport	11%	10%	Again, 2017 forecasts were too ambitious when compared to actual data and so expected trends reflect this by showing a slight increase in projected trend to 2025. The UK policies were revised downwards compared to last year's projections due to methodological changes which also contributed to a smaller percentage change compared to last year.
Waste Management	-78%	-77%	Related to the 2017 inventory figures again, which demonstrated that landfill emissions had not reduced in line with landfilled quantities due to reductions in methane utilisation or flaring which offset the reduction. Therefore trends are reduced compared to the previous version.
TOTAL	**-32%**	**-37%**	

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. We attempt to carry out a sensitivity analysis on the updated projection each year which gives an idea of the expected level of uncertainty. There was no sensitivity analysis undertaken on the 2016-based projections, however, the 2015-based projected reduction of 31.2% was presented alongside a possible range of 17.9% to 43.9%[5].

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 Northern Ireland GHG emissions for the latest year (2017) at the 95% confidence interval is ±7%.

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[5] https://www.daera-ni.gov.uk/publications/sensitivity-analysis-around-2015-based-ni-greenhouse-gas-emissions-projections
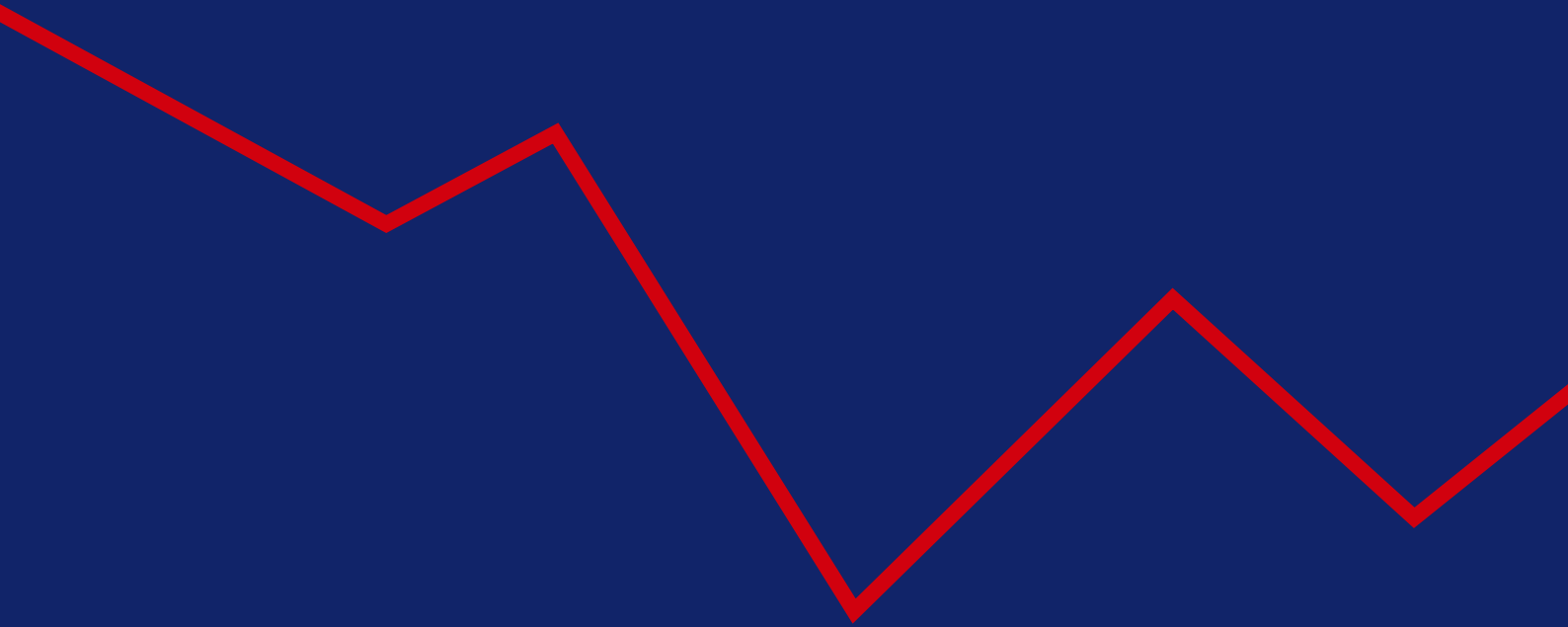
Annex 1: Key data sources for the latest update to the NI GHG projections

Dataset	Sector	Source	Latest version
NI GHG Inventory	All sectors	Ricardo Energy & Environment	1990 to 2017
DUKES (Digest of UK Energy Statistics) conversion factors	All sectors	BEIS	2019
Revised energy projections	All sectors	BEIS	2018 to 2035
Power generation (historical)	Energy supply	BEIS	2014 to 2017
Power capacity and demand forecasts	Energy supply	SONI / Eirgrid	2018 to 2027
Gas demand forecasts	Energy supply, business, residential	UREGNI	2017/18 to 2026/27
FAPRI-UK projections for NI	Agriculture	AFBI / DEFRA	2018 to 2027
LULUCF projections	LULUCF	Centre for Ecology and Hydrology / BEIS	2017 to 2050
UK non-CO_2 GHG projections	Business, residential, public waste	BEIS	2014 to 2035
Population estimates and projections	Other	NI Statistics and Research Agency	2017-based

Annex 2: Northern Ireland Greenhouse gas emissions projections by sector (in MtCO2e)
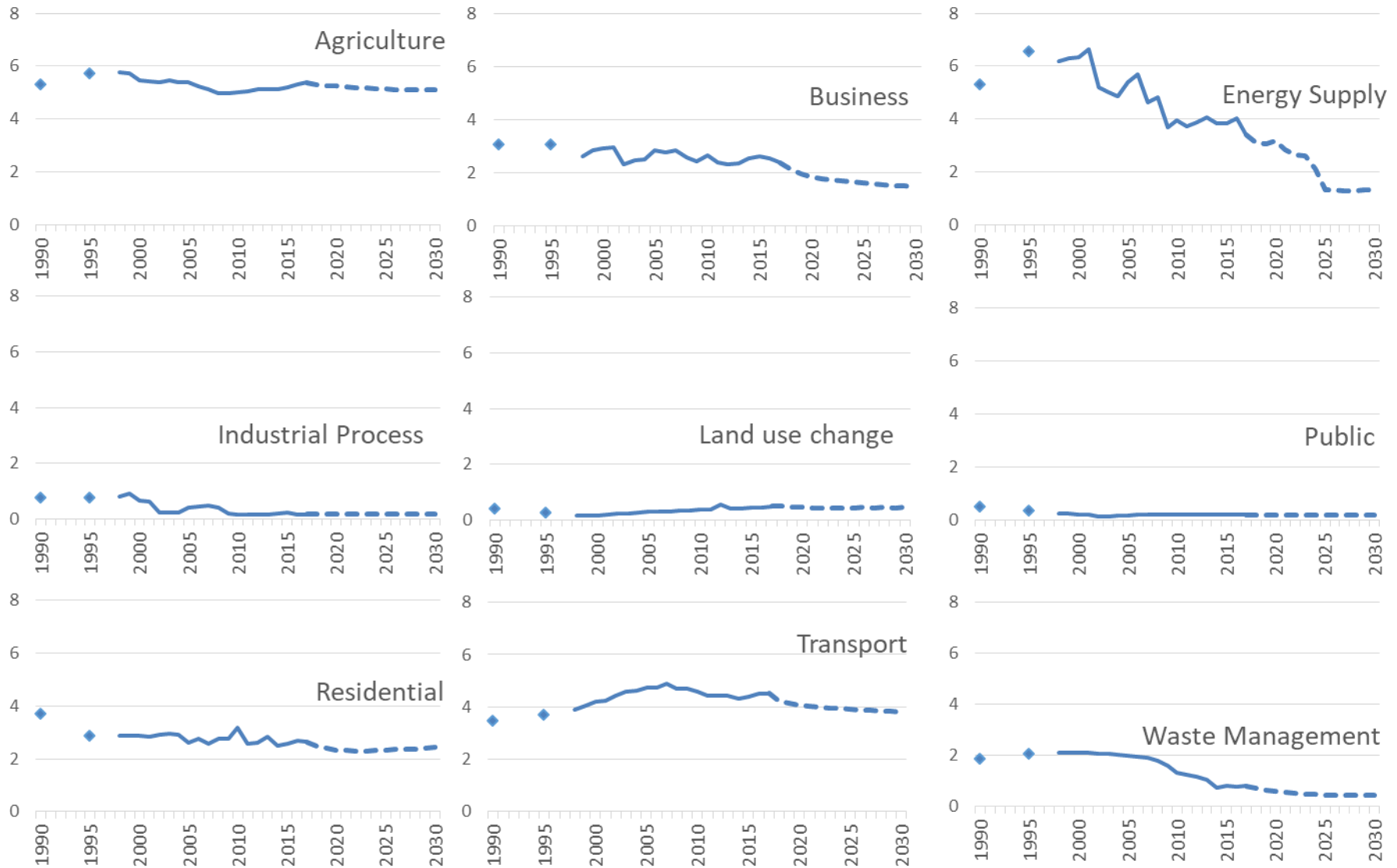
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