Northern Ireland Greenhouse Gas Projections Update - Methodology Report

Based on 2019 Greenhouse Gas Inventory

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Department of
Agriculture, Environment and Rural Affairs

www.daera-ni.gov.uk

Contents

Overview

The Northern Ireland (NI) projections are estimated using a projection tool developed to monitor progress towards greenhouse gas (GHG) reduction targets within NI. The tool was designed and updated by Ricardo AEA ltd who lead on compiling the UK (and Devolved Administrations) GHG inventory.

The projection tool is used to project emissions from 2020 to 2030 and considers the reduction in emissions from 1990 to 2030. The results inform progress against different strategies across Government, e.g. NI Programme for Government and for UK commitments in relation to Net Zero and Carbon Budgets.

The projections are published on DAERA website[1] and are updated to reflect the annual update to the greenhouse gas inventory statistics[2]. They project future emissions, based on economic, demographic and other drivers – projections which are inputs into the tool, across National Communication (NC) Sectors[3].

The projections take into account the expected impact of Government policies that have been costed in terms of emissions savings. Policy savings included within the tool were provided via the Analysts Sub-group[4] or are estimated as a share of the UK policies (from annex D mentioned below). It is recognised that additional policies may need to be incorporated as further initiatives are developed to contribute towards the delivery of the UK's net zero commitment and meet targets set in any new NI specific climate change legislation. A review to identify further policy savings is due to be carried out to expand those policies currently in the tool.

The method for projections and input data varies by sector and this is detailed in the sections below. Some sectors are more closely aligned than others, e.g. energy, residential, business and public are all driven by energy combustion whilst agriculture is uniquely driven by livestock numbers and agricultural activity.

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[1] https://www.daera-ni.gov.uk/articles/northern-ireland-greenhouse-gas-projections
[2] https://www.daera-ni.gov.uk/articles/northern-ireland-greenhouse-gas-inventory
[3] National Communication sectors are in accordance with international reporting guidelines from the United Nations Framework Convention on Climate Change (UNFCCC). Descriptions of each sector are available on page 16 of the annual greenhouse gas statistics report.
[4] The Analysts sub group was a sub group of the future generations working group. Its main aim was to ensure that relevant data was available for the NI GHG inventory estimates and projections. A form of the group is likely to be revised under the Green Growth Strategy to further consider policies to address climate change.

The NI [greenhouse gas inventory data 1990-2019](#) and the annual [Department for Business, Energy & Industrial Strategy (BEIS) updated energy and emission projections (UEPs)](#)[5] provide the data that underpins the projection tool across all sectors as detailed below. The tool also includes [conversion factors](#) that are largely derived from the inventory.

The BEIS UEPs are a major source of projections data for the tool and provide estimates of future fuel use across various sectors out to 2040. These projections are at the UK level so we use appropriate proportions of these for NI projections. The data updates that are used from the BEIS UEPs are listed below.

- Annex F: Final energy demand
- Annex G: Major power producers' generation by source
- Annex D: Policy savings in the projections
- Annex N: Projected emissions of non-CO_2 greenhouse gases; we request more detailed excel versions of this data for input to our tool.

The annexes above provides different scenarios and the scenarios used in the NI projections are discussed in the relevant sectors below. In the latest update to the NI GHG projections tool, figures from the BEIS UEPs were carried forward from the previous year's GHG projections as a new version was unavailable. It was noted in the 2019 BEIS UEPs, 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.

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

Energy Supply

Definition of National Communication Sector

Emissions are predominantly from power stations but also coal mining, oil refineries and other fuel production. Emissions are significantly affected by abatement technology at power stations and the type of fuel being produced or combusted.

Points to note

- The energy supply sub-model was thoroughly reviewed in 2019, based on 2017 inventory, to enable a more granular understanding of how fuel mix is expected to evolve over the coming decade. Outputs are now produced on an annual basis and utilise capacity projections by fuel type and installation, as well as the expected growth of the renewable sector in NI and any current targets for energy generation.

- As per the [Department for the Economy's Northern Ireland Energy Strategy](#), a renewable energy target of at least 70% electricity consumption from renewable sources by 2030 has been incorporated within the projections. This replaces the previous target of 40% by 2020. There is a UK-wide target for coal used for energy generation to be 0% by 2025, however, this is overwritten by the capacity projections which indicate that coal for electricity production will cease in NI in 2023 with the closure of Kilroot coal powered station.

- The data source for the capacity projections by fuel type and installation is the [annual generation capacity statement](#) published by SONI/EirGrid. The generation capacity statement provides electricity demand forecast to 2030 for three scenarios – low, median and high and the median forecast has been employed in this analysis.

- There is also the option to use BEIS (Annex G) data but given that it is UK data apportioned to NI this would not be recommended. The tool calculates growth rates based on this data rather than using absolute values. Growth rates can be calculated by using the UEPs reference scenario (this is the

default option), UEPs baseline scenario or population projections in order to extend the projections beyond the time series provided by SONI data, i.e. currently available to 2030.

- [Gas Market Operator for NI (GMO NI) forecasts](#) for gas projections are utilised as opposed to forecasts contained within the SONI/EirGrid model.

- Historic power production figures for NI are taken from the BEIS [energy trends publication.](#) Fossil fuel intensity is calculated in the tool using historic data and applied to electricity forecasts to estimate emissions projections.

- Combining GMO NI gas forecasts with the SONI central estimate gives us projections by fuel type in GWh. The emissions factors are applied to these to give us projections in $ktCO_2e$ (kilotonnes of carbon dioxide equivalent).

- Using the data sources above, the fuel mix expected in future is modelled for each year based on the capacity projections from the SONI/EirGrid report. Step changes in the model are smoothed, e.g. projected data will be smoothed over the years to meet the renewable energy target.

There are no policy savings included in this sector as it is believed that the savings from policies will already be included in the data sources used for the modelling and we want to avoid double counting.

Source data

[SONI/EirGrid, All-Island Generation Capacity Statement 2021 - 2030](#)

[GMO NI, Northern Ireland Gas Capacity Statement 2021/22 - 2030/31](#)

[BEIS, sub-national electricity consumption data 2016 - 2020](#)

Limitations

- Given the future developments in this area, it is difficult to forecast energy supply for the future. This will be impacted upon by other areas, e.g. transport for electrification of vehicles, residential and business for heating demand.

- SONI's forecast data on renewables as a fuel for electricity was published prior to the Department for the Economy's energy strategy.

- Furthermore, the SONI and GMO NI forecasts will have uncertainties associated with their own data modelling processes, e.g. economic uncertainty, fuel price fluctuation, plant retirement, weather, large sporting/social events, impact of COVID, holidays. The SONI forecasts are based on an assessment of likely future operating requirements of the plan in light of SEM market conditions, the competitiveness of which is influenced by energy policy. The gas forecasts are the aggregated demand for the two current gas fired power stations (Ballylumford and Coolkeeragh) and the new station planned for Kilroot in 2023, the load of any further new gas fired power stations have not been included.

Transport

Definition of National Communication Sector

Includes road transport, domestic shipping and aviation, and aircraft support vehicles. Road transport is the most significant source therefore emissions are affected by vehicle efficiency, distance travelled and number of vehicles.

Points to note

- Aviation is projected separately to road transport. Remaining emissions, e.g. railways and shipping, are projected using population projections growth rates from the latest year. This accounts for 7% of total transport emissions.

- For aviation, UK aviation forecasts are used to calculate annual growth rates which are applied to the latest emissions data for NI aviation. As these

forecasts were 2017-based, adjustments were made to take into account the impact of COVID-19 on the aviation sector. There are no policy savings for this part of the transport sector.

- For road transport, UK growth rates are calculated using the UEPs baseline scenario and applied to NI emissions data for the latest year.

Savings for policies, named below, are removed from this sector

Policy	NI-specific data available	NI share of UK impact (and calculation of that share)
Transport biofuels (RTFO 5%)		✓ (NI/UK ratio of cars/vans)
Car fuel efficiency policies		✓ (NI/UK ratio of cars/vans)
HGV fuel efficiency policies		✓ (NI/UK ratio of road transport emissions)
LGV fuel efficiency policies		✓ (NI/UK ratio of road transport emissions)
PSV fuel efficiency policies		✓ (NI/UK ratio of road transport emissions)
Transport biofuels (RTFO 8%)		✓ (NI/UK ratio of road transport emissions)
Travelwise (2005 level)	✓	
Travelwise (full implementation by 2010)	✓	

Source data

[Department for Transport, UK Aviation Forecasts](#)

Limitations

- The method for this sector applies UK growth rates to NI emissions data. The road transport sector in NI varies from UK. There are less ultra-low emissions vehicles in NI than the UK (0.5% compared to 1.3%[6]), more diesel cars (57% compared to 38%[7]) and the average CO_2 emissions from licensed cars varies (135.4g/km in NI[8] compared to 138.4g/km in the UK, in 2020[6]).

- Unfortunately there is no up-to-date data for NI on vehicle kilometres travelled (vkt) but looking at data from 2014, there was less motorway driving and more rural driving in NI (14% and 54% of total vkt respectively) than the UK (20% and 42% respectively). Therefore, using UK growth rates increases the uncertainty associated with the projected emissions for this sector. Policy savings for NI are also limited.

Residential

Definition of National Communication Sector

Includes fuel combustion for heating, cooking, garden machinery, gases released from aerosols and inhalers, and emissions released from the breakdown of products such as detergents. Emissions are affected by energy efficiency, heating and hot water demands, and the fuel type for domestic combustion.

Points to note

- UK growth rates are calculated using the UEPs baseline scenario. NI emissions data for the latest year are converted into fuel use (GWh) using the Digest of UK Energy Statistics (DUKES) conversion factors and then

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[6] [VEH0206 Licensed cars at the end of the year by CO2 emission and VED band](#)
[7] [VEH0203 Licensed cars by propulsion type](#)
[8] [Indicator 5.1 NI Carbon Intensity Indicators Data tables](#)

projected using the UK growth rates. GMO NI projections data, taken from the [NI gas capacity statement](), is substituted for gas.

- [UREGNI's Final price determination for 2017]() has been used to split projections by domestic and business. Non-CO_2 projections are taken from BEIS UEPs data at the UK-level, growth rates are calculated from these. All growth rates calculated are applied to the latest inventory data to project emissions into the future.

Savings for policies, named below, are removed from this sector.

Policy	NI-specific data available	NI share of UK impact (and calculation of that share)
Products policy - Pre-LCTP		✓ (NI/UK ratio of residential emissions)
F-gas regulation (2015)		✓ (NI/UK ratio of residential emissions)
Products policy - Planned		✓ (NI/UK ratio of residential emissions)
Boiler Replacement Scheme		✓ (NI/UK ratio of residential emissions)
Heating Replacement Programme (heating)	✓	
Heating Replacement Programme (insulation/glazing)	✓	
Warm Homes Scheme	✓	
Renewable Heat Incentive	✓	

	✓	
Gas Extension to West	✓	
Gas Extension to East Down	✓	
Uplift of Part F (Conservation of Fuel and Power) of The Building Regulations (Northern Ireland) 2012.	✓	
Boiler Replacement Scheme	✓	
Code for Sustainable Homes	✓	

Source data

UREGNI, Final Determination, 2017

GMO NI, Northern Ireland Gas Capacity Statement

Limitations

- UK growth rates applied to NI emissions data will increase uncertainty within the projections since there are variations between the UK and NI, e.g. the NI gas network is less developed than the UK.

- The same limitations will apply here as did in the energy sector since the same data sources are used for gas projections. Furthermore the data used to split the gas forecasts between domestic and business is not regularly updated, the current final price determination is from 2017 and an update is expected in 2023.
- This sector doesn't account for changes to renewable energy or alternative energies for heat in the future.

- The NI policy savings are not updated, with no savings calculated/included for affordable warmth scheme and NI sustainable energy programme.

Business

Definition of National Communication Sector

Includes emissions from stationary combustion in the industrial and commercial sectors, industrial off-road machinery, and refrigeration and air conditioning.

Points to note

- UK growth rates are calculated using the UEPs baseline scenario. NI emissions data for the latest year are converted into fuel use (GWh) using DUKES conversion factors and then projected using the UK growth rates. GMO NI projections data, taken from the NI gas capacity statement, is substituted for gas.

- UREGNI's Final price determination for 2017 has been used to split projections by residential and business. Non-CO_2 projections are taken from BEIS UEPs data at the UK-level, growth rates are calculated from these. All growth rates calculated are applied to the latest inventory data to project emissions into the future.

Savings for policies, named below, are removed from this sector.

Policy	NI-specific data available	NI share of UK impact (and calculation of that share)
Products policy - Pre-LCTP		✓ (NI/UK ratio of business emissions)
CRC-ees		✓ (NI/UK ratio of business emissions)
F-gas regulation (2015)		✓ (NI/UK ratio of business emissions)
Products policy - adopted		✓ (NI/UK ratio of business emissions)
Products policy - Implemented, post-LCTP		✓ (NI/UK ratio of business emissions)
Streamlined energy and carbon reporting framework for business (SECR)		✓ (NI/UK ratio of business emissions)
Renewable Heat Incentive	✓	
Uplift of Part F (Conservation of Fuel and Power) of The Building Regulations (Northern Ireland) 2012.	✓	
Gas Extension to West	✓	
Gas Extension to East Down	✓	

Source data

UREGNI, Final Determination, 2017

GMO NI, Northern Ireland Gas Capacity Statement

Limitations

- UK growth rates applied to NI emissions data will increase uncertainty within the projections since there are variations between the UK and NI, e.g. the NI gas network is less developed than the UK.

- The same limitations will apply here as did in the energy sector since the same data sources are used for gas projections. Furthermore the data used to split the gas forecasts between domestic and business is not regularly updated, the current final price determination is from 2017 and an update is expected in 2023.

- This sector doesn't account for changes to renewable energy or alternative energies for heat in the future.

Public

Definition of National Communication Sector

Includes emissions from fuel combustion in public sector buildings (e.g. public administration, defence, education and health and social work). Emissions are predominantly affected by fuel type.

Points to note

- UK growth rates are calculated using the UEPs baseline scenario. NI emissions data for the latest year are converted into fuel use (GWh) using DUKES conversion factors and then projected using the UK growth rates. Growth rates calculated are applied to the latest inventory data to project emissions into the future.

Savings for policies, named below, are removed from this sector.

Policy	NI-specific data available	NI share of UK impact (and calculation of that share)
Products policy - Pre-LCTP		✓ (NI/UK ratio of commercial emissions)
CRC-ees		✓ (NI/UK ratio of commercial emissions)
Products policy - Implemented, post-LCTP		✓ (NI/UK ratio of commercial emissions)

Limitations

UK growth rates applied to NI emissions data will increase uncertainty within the projections since there are variations between the UK and NI, e.g. the NI gas network is less developed than the UK.

No NI policies are included for this sector.

Industrial process

Definition of National Communication Sector

Includes all emissions from industry except fuel combustion and therefore includes chemical and metal production, and mineral products (e.g. cement and lime). Emissions are significantly affected by abatement technology.

Points to note

- This sector is projected solely in the remaining sources tab of the projection tool. The majority of projections (99%) are flattened based on the latest year of the inventory. The remaining emissions are projected from the latest inventory year using GDP projections growth rates.

Limitations

- Consideration needs to be given as to whether we really expect parts of this sector to flatten in terms of emissions. A better estimation of emissions in future might be to continue along a similar trajectory to the historic emissions.

Agriculture

Definition of National Communication Sector

Includes emissions from livestock, agricultural soils, stationary combustion, and off-road machinery. Emissions are affected by the number of livestock, the quantity of fertiliser applied to land, and the intensity of activity.

Points to note

- As with other sectors, the starting point is the latest inventory year. Projections for most agricultural emissions, excluding fuel use, are provided to us from Defra/AFBI based on the FAPRI-UK modelling. Fuel use projections are taken from the UEPs baseline scenario. Growth rates are calculated for all sources of agricultural projections and applied to the latest inventory year emissions.

Savings for policies, named below, are removed from this sector.

Policy	NI-specific data available	NI share of UK impact (and calculation of that share)
Nitrate Action Plan and Manure Efficiency Technology Scheme	✓	

Limitations

- The UK projections are moving from using FAPRI to model emissions projections to a UK-based model (namely UK Agriculture Market Model (UKAMM)). An important difference between FAPRI and UKAMM is that the latter works at the UK level and therefore does not provide NI specific activity

data. Instead, scaling factors are applied to provide estimates for NI. 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. Between the 2017 and 2019 greenhouse gas inventories, there have been some revisions such that emissions have been revised up by approximately 4% in the more recent years.

- Projections are not included in the tool by animal type.

- Any impacts of leaving the EU will not be included in the projections data currently used for this sector.

Land Use Change

Definition of National Communication Sector

This covers sinks and sources of emissions from land use, land use change and forestry. Sinks remove GHGs from the atmosphere whilst sources emit GHGs. Emissions are affected by deforestation rates and land management.

Points to note

- Projections for the land use, land use change and forestry (LULUCF) sector are taken from BEIS/Centre for Ecology & Hydrology (CEH)/Forest Research (FR) projections that are updated annually to align with the inventory calculations. We take a central scenario from those and use the projections to calculate growth rates which are applied to the latest inventory emissions for NI.

- There are no policy savings included in this sector as it is believed that the savings from policies will already be included in the data sources used for the modelling and we want to avoid double counting.

Source data

LULUCF projections: provided directly from BEIS

Limitations

Limitations for this sector will be updated when information is publically available on 2019 inventory based LULUCF projections. Previous limitations relating to the [2017 inventory based LULUCF projections](#) were as follows:

- The LULUCF projections assume that the UK land area remains constant.

- The central LULUCF projection is used for the central NI projections and uses forest planting rates according to funding secured for grants within each country. After 2021, planting rates drop to 10% of the 2008-2009 average planting rate reflecting the lack of secured funding that time horizon as of June 2019. This aligns with the 'forests of our Future' pledge.

- Deforestation is estimated using a rate of conversion to settlement at the 2009-2018 average. The share of private woodland managed for production remains constant. Cropland management, grassland management and peat extraction remain constant from 2018.

Waste Management

Definition of National Communication Sector

Emissions include those from waste disposed at landfills, wastewater treatment, and waste incineration. Emissions are affected by regulation of landfills and the proportion of waste that is recycled.

Points to note

- Detailed non-CO_2 emissions projections (part of BEIS UEPs) are sent to us via email each year. This outlines UK-level projections by gas and activity name, growth rates are calculated using that data. For landfill methane

emissions, a share of the UK projections is taken using the NI/UK Split in waste emissions from the Defra model (called Melmod) which is used for the inventory emissions estimates. This is provided directly to SASB from the inventory consultants. Growth rates are calculated using the projections data and are applied to the latest inventory emissions data for NI

There are no policy savings included for this sector.

Limitations

- UK growth rates applied to NI emissions data will increase uncertainty within the projections since there may be variations between the UK and NI, e.g. there is less methane capture at landfills in NI.

- The non-combustion related projections use the 1990-2017 inventory as the baseline for BEIS' energy and emissions projections. They state that the impact of the differing baselines should be limited as the estimation of historical non-CO2 emissions has not changed significantly.

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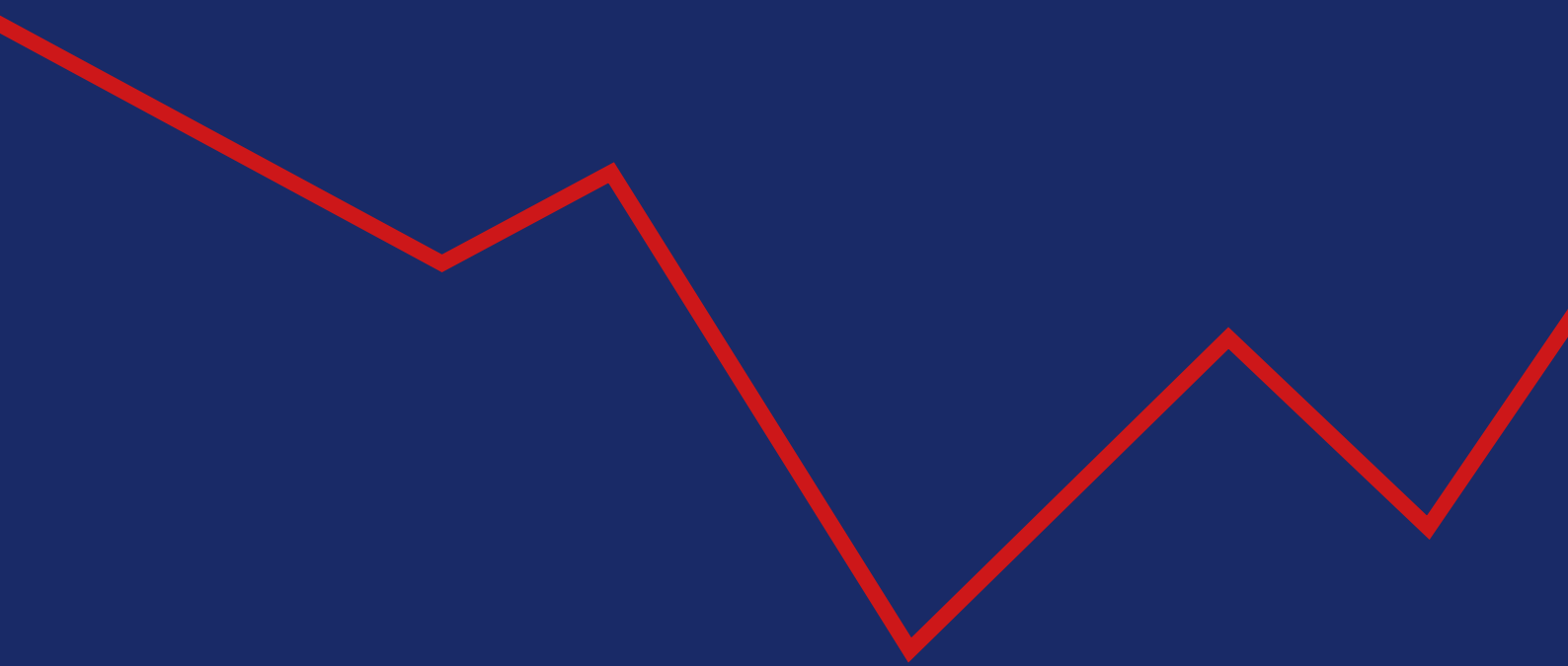
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