



Ireland's Greenhouse Gas Emissions Projections

2017-2035

May 2018

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Key Insights

- Latest EPA greenhouse gas emissions projections indicate an overall increase in greenhouse gas emissions from most sectors. The projected growth in emissions is largely underpinned by projected strong economic growth and relatively low fuel prices leading to increasing energy demand over the period.
- The positive impact on emissions of existing and planned policies and measures is tempered by the strong economic outlook and associated increase in energy demand.
- Ireland is not projected to meet 2020 emissions reduction targets and is not on the right trajectory to meet longer term EU and national emission reduction commitments.
- Fossil fuels such as coal and peat continue to be key contributors to emissions from the power generation sector and the extent of their use will be a key determinant in influencing future emissions trends from this sector.
- A strong growth in emissions projections from the transport sector is attributed to a rise in fuel consumption particularly for diesel cars and diesel freight up to 2025. A projected accelerated deployment of electric vehicles between 2025 and 2030 does however result in a projected decline in emissions during this period.
- Agriculture emissions are projected to continue to grow steadily over the period. This is based on an updated outlook which sees an increase in animal numbers particularly for the dairy herd.
- The gap between the two scenarios – *With Existing Measures* and *With Additional Measures* – is narrowing over the period to 2020 indicating that mitigation options in the short-term are largely established.
- These projections do not consider the impact of policies and measures that form part of the recently announced National Development Plan or the full impact of policies and measures included in the National Mitigation Plan. It is anticipated that additional impact will be provided to the EPA by relevant Government Departments and Agencies and included in the 2019 Emissions Projections.

Executive Summary

- This report provides an updated assessment of Ireland's total projected greenhouse gas emissions out to 2030, progress towards achieving its emission reduction targets set under the EU Effort Sharing Decision (Decision No 406/2009/EU) up to 2020 and a longer-term assessment based on current projections.
- The EPA has produced two scenarios in preparing greenhouse gas emission projections; a *With Existing Measures* scenario and a *With Additional Measures* scenario.
- Total emissions are projected to increase from current levels by 1% and 4% by 2020 and 2030 respectively under the *With Existing Measures* scenario. Under the *With Additional Measures* scenario emissions are estimated to increase by 2% by 2020 and decrease by 1% by 2030. Ireland is not on the right long-term trajectory in meeting national 2050 targets in the electricity generation, built environment and transport sectors.
- In 2020 the sectors with the largest contribution of emissions are Agriculture, Transport and Energy Industries with 33%, 23% and 18% share in total emissions respectively under the *With Additional Measures* scenario.
- Projected emissions between the *With Existing Measures* and *With Additional Measures* scenario begin to diverge in 2019 with, unusually, higher emissions projected in the *With Additional Measures* scenario out to 2025. This is due to the input assumptions in the energy projections relating to the power generation sector. The Public Service Obligation (PSO) levy that supports peat being used for power generation no longer applies after the end of 2019 under the *With Existing Measures* scenario resulting in a significant reduction in peat used for power generation after 2019. Under the *With Additional Measures* scenario peat continues to be used for co-firing with biomass after 2019. From 2026 the emissions profile changes significantly with higher emissions in the *With Existing Measures* scenario from 2026 out to 2030. This is largely due to the accelerated phase out of coal used for power generation and the introduction of commercial interconnectors (Greenlink and Celtic Interconnector) after 2025 under the *With Additional Measures* scenario, leading to significantly lower domestic power generation.
- In terms of compliance with the EU's Effort Sharing Decision (Decision No 406/2009/EC) 2020 targets, Ireland's non-Emissions Trading Scheme¹ emissions are projected to be 0% and 1% below 2005 levels in 2020 under the *With Existing Measures* and *With Additional Measures* scenarios, respectively. This compares to the target of 20% below 2005 levels by 2020.
- Ireland has exceeded its annual binding limit for the first time in 2016. Over the period 2013-2020 Ireland is projected to cumulatively exceed its compliance obligations by approximately 17 Mt CO₂ equivalent under the *With Existing Measures* scenario and 16.3 Mt CO₂ equivalent under the *With Additional Measures* scenario.
- Agriculture and transport dominate non-ETS sector emissions accounting for 75% of emissions in 2020.

¹ These sectors cover agriculture, transport, built environment (residential, commercial/institutional), waste and non-energy intensive industry

1. Introduction

The Environmental Protection Agency (EPA) produces national greenhouse gas emission projections on an annual basis. These projections are compiled to meet EU reporting obligations (Monitoring Mechanism Regulation No 525/2013²) and to inform national policy development. These projections update those published in April 2017³ by the EPA. The preparation of EPA projections is a collaborative process with input from a range of State bodies and Government Departments. In particular, key data providers Teagasc provide projected animal numbers and other key parameters related to the agriculture sector and the Sustainable Energy Authority of Ireland provide energy projections for the economy.

This report provides an updated assessment of Ireland's total projected greenhouse gas emissions out to 2030, progress towards achieving its emission reduction targets set under the EU Effort Sharing Decision (Decision No 406/2009/EU) up to 2020 and a longer-term assessment based on current projections.

Ireland's 2020 target is to achieve a 20% reduction of non-Emissions Trading Scheme (non-ETS) sector emissions (i.e. agriculture, transport, residential, commercial, non-energy intensive industry, and waste) on 2005 levels with annual binding limits set for each year over the period 2013-2020. A new Effort Sharing Regulation setting out 2030 targets for EU Member States has recently been adopted by the European Council⁴. Ireland's 2030 target is a 30% reduction of emissions compared to 2005 levels by 2030 with binding annual limits over the 2021-2030 period to meet that target. Over the longer-term Ireland's National Policy Position on Climate change has set a target of an aggregate reduction in carbon dioxide (CO₂) emissions of at least 80% (compared to 1990 levels) by 2050 across the electricity generation, built environment and transport sectors. The long-term vision of low-carbon transition is also based on, in parallel, an approach to carbon neutrality in the agriculture and land-use sector, including forestry, which does not compromise capacity for sustainable food production.

2. Approach

Greenhouse gas emissions are projected out to 2035⁵ using two scenarios; *With Existing Measures* and *With Additional Measures*.

The *With Existing Measures* scenario assumes that no additional policies and measures, beyond those already in place by the end of 2016 (latest national greenhouse gas emission inventory), are implemented.

The *With Additional Measures* scenario assumes implementation of the *With Existing Measures* scenario in addition to, based on current progress, further implementation of Government renewable and energy efficiency policies and measures including those set out in the National Renewable Energy Action Plan (NREAP)⁶ and the National Energy Efficiency Action Plan (NEEAP)⁷.

² Regulation (EU) No 525/2013 of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No. 280/2004/EC

³ <http://www.epa.ie/climate/emissionsinventoriesandprojections/nationalemissionsprojections/>

⁴ https://ec.europa.eu/clima/policies/effort/proposal_en

⁵ Latest reporting the Monitoring Mechanism Regulation (Regulation (EU)) No. 525/2013 requires Member States to report greenhouse gas emission projections out to 2035

⁶ <http://www.dcenr.gov.ie/energy/en-ie/Renewable-Energy/Pages/Action-Plan.aspx>

⁷ [https://www.dccae.gov.ie/en-ie/energy/topics/Energy-Efficiency/national-energy-efficiency-action-plan-\(neeap\)/Pages/National-Energy-Efficiency-Action-Plan-\(NEEAP\).aspx](https://www.dccae.gov.ie/en-ie/energy/topics/Energy-Efficiency/national-energy-efficiency-action-plan-(neeap)/Pages/National-Energy-Efficiency-Action-Plan-(NEEAP).aspx)

This year's projections take into account updated projected activity data provided by a number of key data providers including:

- Updated energy projections provided by the Sustainable Energy Authority of Ireland (SEAI) in April 2018. Energy projections were prepared by SEAI in conjunction with the Economic and Social Research Institute (ESRI) and University College Cork. The ESRI use macro-economic projections which are produced using the COSMO model⁸.
- Updated agricultural projections provided by Teagasc in April 2018 which considers the impact of Food Wise 2025⁹ for the agriculture sector.

2018 emission projections do not include the impact of new climate mitigation policies and measures that formed part of the recently announced National Development Plan¹⁰ or the full impact of all policies and measures included in Ireland's National Mitigation Plan¹¹. Technical data associated with such policies and measures will need to be worked out by lead Government Departments and Agencies for inclusion in EPA emissions projections to reflect their mitigating impact, where relevant. It is anticipated that 2019 emission projections will include additional impact of more recently announced policies and measures.

3. Key Trends – Emissions projections out to 2030

2018 greenhouse gas emissions projections show total emissions increasing from current levels by 1% and 4% by 2020 and 2030 respectively under the *With Existing Measures* scenario. Under the *With Additional Measures* emissions are estimated to increase by 2% by 2020 and decrease by 1% by 2030.

This year's emissions projections are underpinned by strong economic growth and relatively low fuel prices which is particularly notable in relation to the oil price. This results in higher fuel demand and therefore higher emissions. See Table 2.1 in the Appendix to this report for further information.

Figure 1 shows the expected trend in total greenhouse gas emissions under both scenarios. The fluctuating trend, particularly after 2020, is significantly influenced by the changing profile of the energy industries sector and associated changes in fuel type and level of power generation. This is described in more detail further below.

⁸ <https://www.esri.ie/projects/modelling-the-irish-economy/>

⁹ <http://www.agriculture.gov.ie/foodwise2025/>

¹⁰ <http://www.per.gov.ie/en/national-development-plan-2018-2027/>

¹¹ <https://www.dccae.gov.ie/documents/National%20Mitigation%20Plan%202017.pdf>

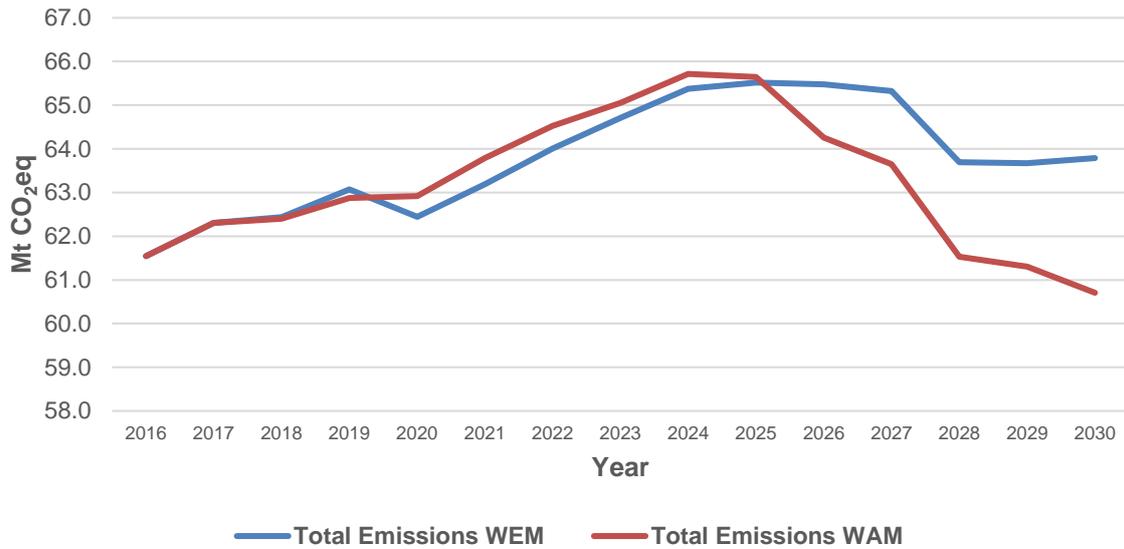


Figure 1 – Total Greenhouse Gas Emissions under the *With Existing Measures (WEM)* and *With Additional Measures (WAM)* scenario out to the year 2030

Figure 2 shows the sectoral percentage share throughout the projected time period under the *With Additional Measures* scenario. In 2020 the sectors with the largest contribution of emissions are Agriculture, Transport and Energy Industries with 33%, 23% and 18% share in total emissions respectively. In 2030 there is a similar pattern except for energy industries which reduces its contribution to 12% as shown in Figure 3.

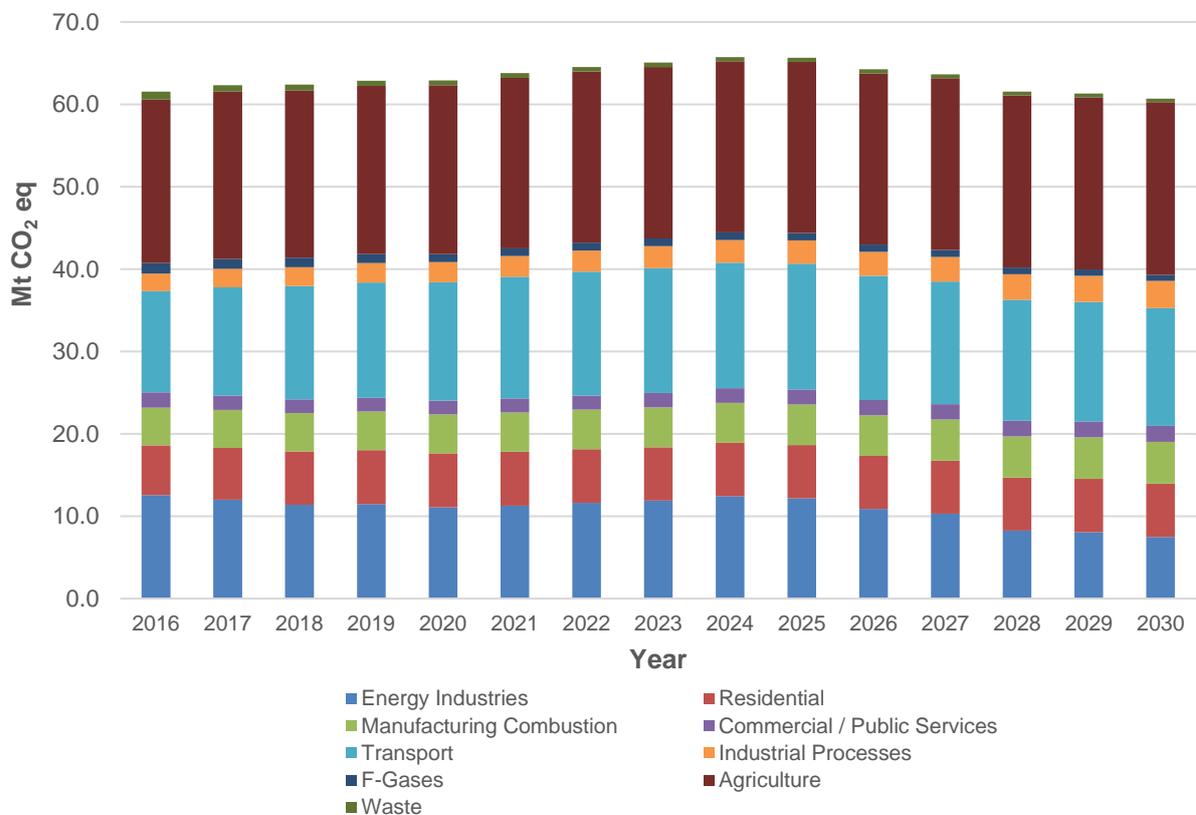


Figure 2 – Total Greenhouse Gas Emissions Projections by sector out to the year 2030 under *With Additional Measures* scenario

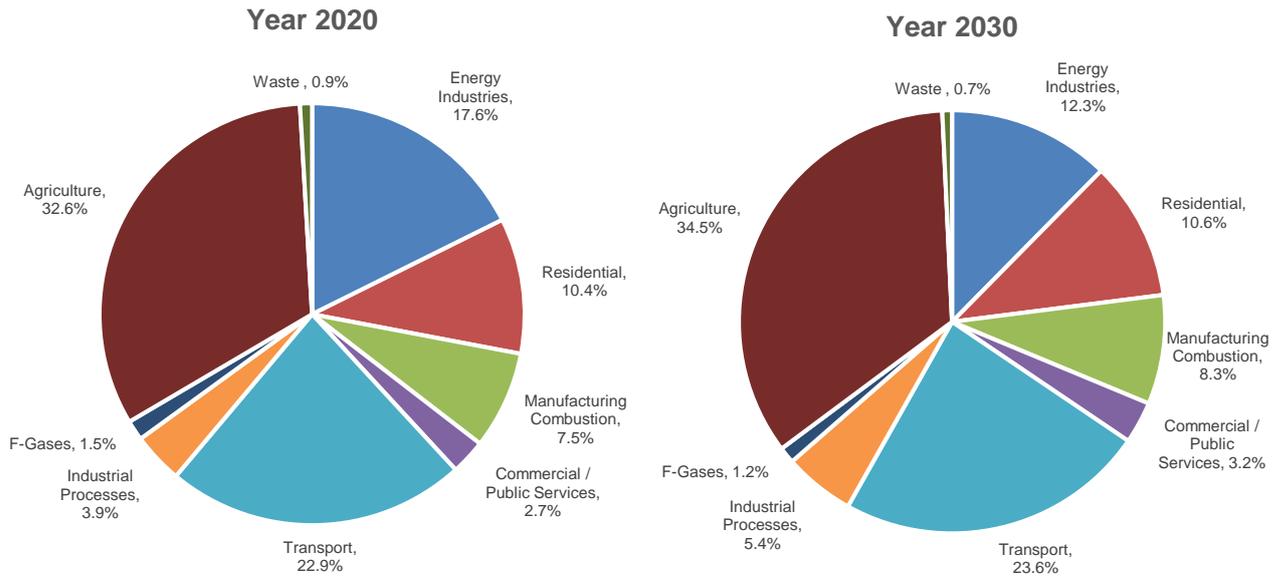


Figure 3 – Total Greenhouse Gas Emissions Projections by sector share under the *With Additional Measures* scenario in the year 2020 and 2030

Energy Industries

- Energy industries covers public electricity and heat production, solid fuels and other energy industries, petroleum refining and fugitive emissions. The majority of emissions come from power generation and are largely covered by the Emissions Trading Scheme (ETS) sector. Figure 4 below shows the projected trend in emissions from energy industries out to 2030 under the *With Existing Measures* and *With Additional Measures* scenario.

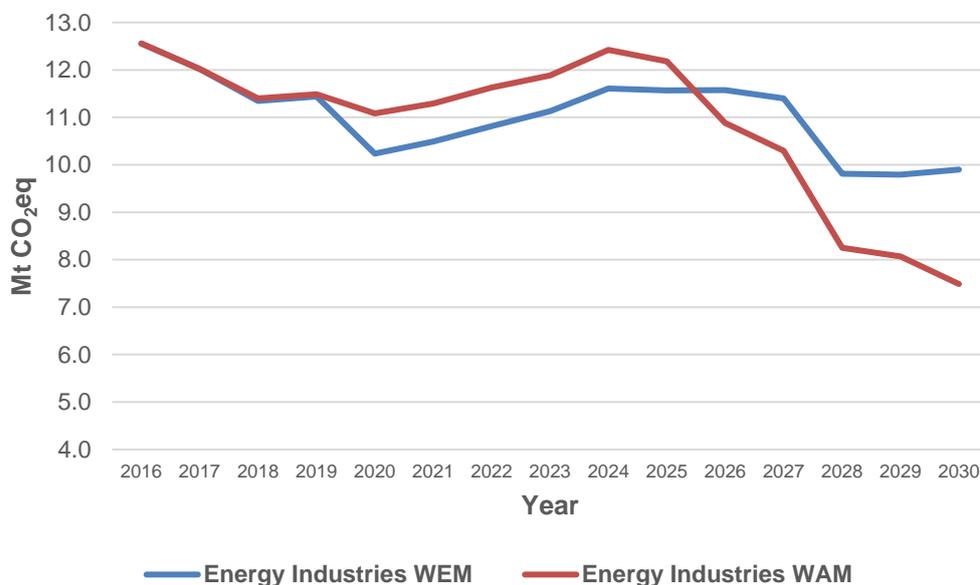


Figure 4 – Greenhouse Gas Emissions Projections from the Energy Industries Sector under the *With Existing Measures* (WEM) and *With Additional Measures* (WAM) scenario out to 2030

- As shown in Figure 4, projected emissions between the *With Existing Measures* and *With Additional Measures* scenario begin to diverge in 2019. The Public Service Obligation (PSO) levy that supports

peat being used for power generation no longer applies after the end 2019 under the *With Existing Measures* scenario and consequently peat used for power generation significantly reduces. Thereafter the fuel type used for electricity generation is influenced by fuel price and in this case gas largely replaces peat as one of the main fuels used for power generation leading to lower emissions. Emissions are higher in the *With Additional Measures* scenario on the basis of the assumption that Ireland's peat power plants are assumed to receive the necessary planning permission and run on the basis of supports provided for under the REFIT III scheme¹². This scheme includes the co-firing of peat and biomass for power generation which means more peat is needed after 2019 to co-fire with biomass. There will be a biomass co-firing share of 30% up to and including 2026. The peat share will then decrease linearly year-on-year to 0% by 2030. This assumption is not included in the *With Existing Measures* scenario as the REFIT III decision for co-firing at the relevant peat power plants was made in April 2017 (after the 31st December 2016 cut off point for policies and measures to be included in the *With Existing Measures* scenario).

- From 2026 the emissions profile changes significantly with higher emissions in the *With Existing Measures* scenario from 2026 out to 2030. This is largely due to the accelerated phase out of coal used for power generation and the introduction of commercial interconnectors (Greenlink and Celtic Interconnector) after 2025 under the *With Additional Measures* scenario, leading to significantly lower domestic power generation.
- Under the *With Existing Measures* scenario, total energy industries emissions are projected to decrease by 18% over the period 2017- 2020 to 10.2 Mt CO₂eq and decrease by 21% over the period 2017-2030 to 9.9 Mt CO₂eq. Renewable electricity generation capacity is dominated by wind but also includes biomass (co-fired with peat), the operation of waste to energy incinerators (Carranstown and Poolbeg), landfill gas for electricity generation and solar photo voltaics. Fuels used from renewable sources steadily increases over the projected period which is largely attributed to an increase in installed wind capacity. As well as the change in fossil fuel type (e.g. gas replacing peat), the increase in renewables is also contributing to the overall decrease in emissions.
- Under the *With Additional Measures* scenario, total energy industries emissions are projected to decrease by 12% over the period 2017 – 2020 to 11 Mt CO₂eq and decrease by 40% over the period 2017-2030 to 7.4 Mt CO₂eq. The profile of renewable energy is largely similar to that under the *With Existing Measures* Scenario with more biomass needed for co-firing as described above. The bigger decrease in emissions over the longer period compared to the *With Existing Measures* scenario is also a result of more coal and gas being used under the *With Existing Measures* scenario.

Transport

- Under the *With Existing Measures* scenario, transport emissions are projected to increase by 18% over the period 2017 – 2020 to 14.55 Mt CO₂eq and 20% over the period 2017-2030 to 14.75 Mt CO₂eq. The *With Existing Measures* scenario includes:
 - the impact of VRT and motor tax changes (introduced in 2008), public transport efficiencies (e.g. integrated ticketing) and the carbon tax imposed on fuels since 2010
 - improvements to the fuel economy of private cars

¹² <https://www.dccae.gov.ie/en-ie/energy/topics/Renewable-Energy/electricity/renewable-electricity-supports/Pages/REFIT-3.aspx>

- an increase in biofuel blending rates to 8 units per 100 litre by 2020 which is supported by the Biofuel Obligation Scheme 2010¹³ and Statutory Instrument 225 of 2016¹⁴
 - This scenario assumes approximately 400,000 electric vehicles are deployed by 2030. Most of this deployment is projected to occur after 2025 and is consistent with an electric vehicle growth scenario from the Low Emissions Vehicles Taskforce.
- Under the *With Additional Measures* scenario, transport emissions are projected to increase by 17% over the period 2017 – 2020 to 14.39 Mt CO₂eq and a similar increase over the period 2017-2030 to 14.32 Mt CO₂eq. In this scenario, an increase in biofuel blending rates including 10 units per 100 litres by 2020 is assumed. Post 2020 growth in electric vehicles out to 2030 is projected to be similar to the growth described under the *With Existing Measures* scenario.
 - The overall growth in transport emissions projections is largely underpinned by growth in diesel fuel consumption for both diesel cars and diesel freight up to 2025. A decline in diesel consumption between 2025 and 2030 is anticipated with the acceleration of the deployment of electric vehicles during this period.

Agriculture

- Agriculture sector emissions arise from enteric fermentation, manure management and nitrogen & urea application to soils. Fuel combustion from agriculture/forestry/fishing is included within the definition of the Agriculture category.
- Total emissions from agriculture are projected to increase by 4% over the period 2017 – 2020 to 20.7 Mt CO₂eq under the *With Existing Measures* scenario. Emissions are projected to increase by 7% over the period 2017 – 2030 to 21.1 Mt CO₂eq under the *With Existing Measures* scenario. Under the *With Additional Measures* scenario emissions are projected to increase by 3% and 6% from current levels to 2020 and 2030 respectively.
- The data underpinning the agriculture projections include projected animal numbers, crop areas and nitrogen fertiliser application to soils as supplied by Teagasc to the EPA in April 2018. Projections are based on an updated analysis undertaken by Teagasc of the projected national herd population, crop areas and fertilizer use which takes into account Food Wise 2025 policy targets and reflects recent trends in agricultural production.
- The updated projected activity for certain agricultural categories has increased when compared to the activity data that underpinned 2017 Emission Projections (which was based on data produced by Teagasc in 2015). For example, the dairy herd in 2020 and 2030 has increased by 9% and 11% respectively compared to the agricultural activity data underpinning 2017 emission projections. Similarly, the beef herd in 2020 and 2030 has increased by 5% and 13% respectively compared to previous projected activity. The updated activity data reflects revised projections which take into account development in the cattle population since the elimination of the milk quota system as well as an updated outlook for the sector.
- In terms of future projections of key agricultural activity data, the dairy cow herd is projected to increase by 10% and 22% on current levels out to 2020 and 2030 respectively while the remainder of the cattle population (which includes the offspring of the dairy cow herd, as well as suckler cows and their offspring) is projected to increase by 1% out to 2020 and decrease by 2% out to 2030.

¹³<http://www.dccae.gov.ie/energy/en-ie/Renewable-Energy/Pages/Biofuels.aspx>

¹⁴

Nitrogen fertiliser use is projected to increase by 14% and 21% by 2020 and 2030 respectively. Over the last decade fertiliser use has been subject to considerable fluctuation due to both changes in fertiliser prices and variability in agronomic conditions, making the projection of future levels of fertiliser use quite challenging. Efficiency gains are assumed under the *With Additional Measures* scenario.

- The 2018 emissions projections include recent methodological changes that were applied to the latest national inventory. These concern changes to nitrous oxide (N₂O) emission factors for nitrogen fertiliser use and N₂O emission factors for dung and urine deposited by grazing cattle on soils.¹⁵

Residential

- Under the *With Existing Measures* scenario, emissions from the residential sector are projected to increase by 8% to 6.5 Mt CO₂eq between 2017 and 2020 and 2017 and 2030. Energy efficiency and renewable energy policies and measures impacting the sector have been included. In the *With Existing Measures* scenario only policies and measures in place by the end of 2016 are included.
- Under the *With Additional Measures* scenario, emissions are projected to increase by 8% between 2017 and 2020 to 6.5 Mt CO₂eq and 7% between 2017 and 2030. In this scenario, the anticipated impact of the full suite of existing measures as described in the NEEAP and NREAP are incorporated and includes an extension of a number of existing schemes as described in Ireland's National Mitigation Plan¹⁰.

Manufacturing Combustion

- Under the *With Existing Measures* emission projection, emissions from manufacturing combustion are projected to increase by 3.2% to 4.7 Mt CO₂eq between 2017 and 2020 and 8.7% between 2017 and 2030 to 4.9 Mt CO₂eq. This scenario takes into account existing energy efficiency and renewable energy policies and measures impacting on the industry and services sectors.
- Under the *With Additional Measures* emission projection, emissions from manufacturing combustion are projected to increase by 3.6% to 4.72 Mt CO₂eq between 2017 and 2020 and 11.1% between 2017 and 2030 to 5 Mt CO₂eq. Additional measures in this scenario include an extension of the SEAI Large Industry Programme, Accelerated Capital Allowance Scheme and the Excellence in Energy Efficiency Design (EXCEED) Programme.
- The higher emissions in the *With Additional Measures* scenario compared to the *With Existing Measures* scenario is due to impact of the co-firing policy in electricity generation (described above under Energy Industries). Increased use of biomass for co-firing with peat in the power generation sector reduces the available resource for use in the industry sector. This increases the price of biomass in the *With Additional Measures* scenario and hence reduces the modelled uptake of biomass for heat in end-use sectors. Consequently, energy demand in affected end-use sectors is being met by more fossil fuels compared to the *With Existing Measures* scenario.

Commercial and Public Services

¹⁵ For further information see http://www.epa.ie/pubs/reports/air/airemissions/ghgemissions2016/Report_GHG%201990-2016%20April_for%20Website-v2.pdf

- Under the *With Existing Measures* scenario, emissions from the commercial and public services sector are projected to decrease by 8% to 1.7 Mt CO₂eq between 2017 and 2020 and increase by 8% between 2017 and 2030 to 2 Mt CO₂eq. As above this scenario takes into account energy efficiency and renewable energy policies and measures impacting on the industry and services sectors.
- Under the *With Additional Measures* scenario, emissions from the commercial and public services sector are projected to decrease by 10% to 1.6 Mt CO₂eq between 2017 and 2020 and increase by 4% between 2017 and 2030 to 1.9 Mt CO₂eq. Additional measures in this scenario include an extension of a number of the measures including Accelerated Capital Allowance Scheme, Excellence in Energy Efficiency Design (EXCEED) Programme, Energy Supplier Obligation Scheme, SEAI SME Programme, Public Sector Building Demonstration and Public Sector Programmes, Better Energy Scheme.

Other sectors:

There is only one scenario (*With Existing Measures*) for greenhouse gas emissions projections from the Waste sector, Industrial processes and Fluorinated-Gases based on available data.

- Emissions from **Industrial Processes** are projected to increase by 13% to 2.4 Mt CO₂eq between 2017 and 2020 and 52% between 2017 and 2030 to 3.2 Mt CO₂eq. The majority of emissions come from cement and lime industries and projections are largely underpinned by projected GDP growth.
- **Waste sector** emissions are projected to decrease by 40% to 0.5 Mt CO₂eq between 2017 and 2020 and by 53% between 2017 and 2030 to 0.4 Mt CO₂eq. The waste sector includes landfill, incineration and open burning of waste, mechanical & biological treatment and wastewater treatment. Emissions are primarily attributable to methane emissions from landfill which reduces significantly over the projected period in line with the projected reduction in waste going to landfill.
- **Fluorinated-Gas emissions** are projected to decrease by 24% to 0.9 Mt CO₂eq between 2017 and 2020 and 40% between 2017 and 2030 to 0.7 Mt CO₂eq¹⁶. The relevant source of fluorinated gas emissions in Ireland is production, use and disposal of equipment containing these fluids (e.g. refrigerators, mobile air conditioning systems, metered dose inhalers and electrical switch-gear). The savings associated with the impact of Directive 2006/40/EC¹⁷ are included in 2018 projections.

4. Projected performance against targets under the National Policy Position on Climate Change

Ireland's National Policy Position on Climate change¹⁸ sets out a low-carbon roadmapping process that will be guided by a long-term vision of low-carbon transition based on:

- an aggregate reduction in carbon dioxide (CO₂) emissions of at least 80% (compared to 1990 levels) by 2050 across the electricity generation, built environment and transport sectors;

¹⁶ The methodology for projecting Fluorinated-Gas emissions is being reviewed as part of preparation for the next emissions projections reporting cycle. Any change in the projected emissions trend will be reflected in 2019 emissions projections

¹⁷ Directive 2006/40/EC Relating to emissions from air-conditioning systems in motor vehicles and amending Council Directive 70/15/EEC

¹⁸ <https://www.dccae.gov.ie/en-ie/climate-action/publications/Documents/5/National%20Climate%20Policy%20Position.pdf>

- in parallel, an approach to carbon neutrality in the agriculture and land-use sector, including forestry, which does not compromise capacity for sustainable food production.

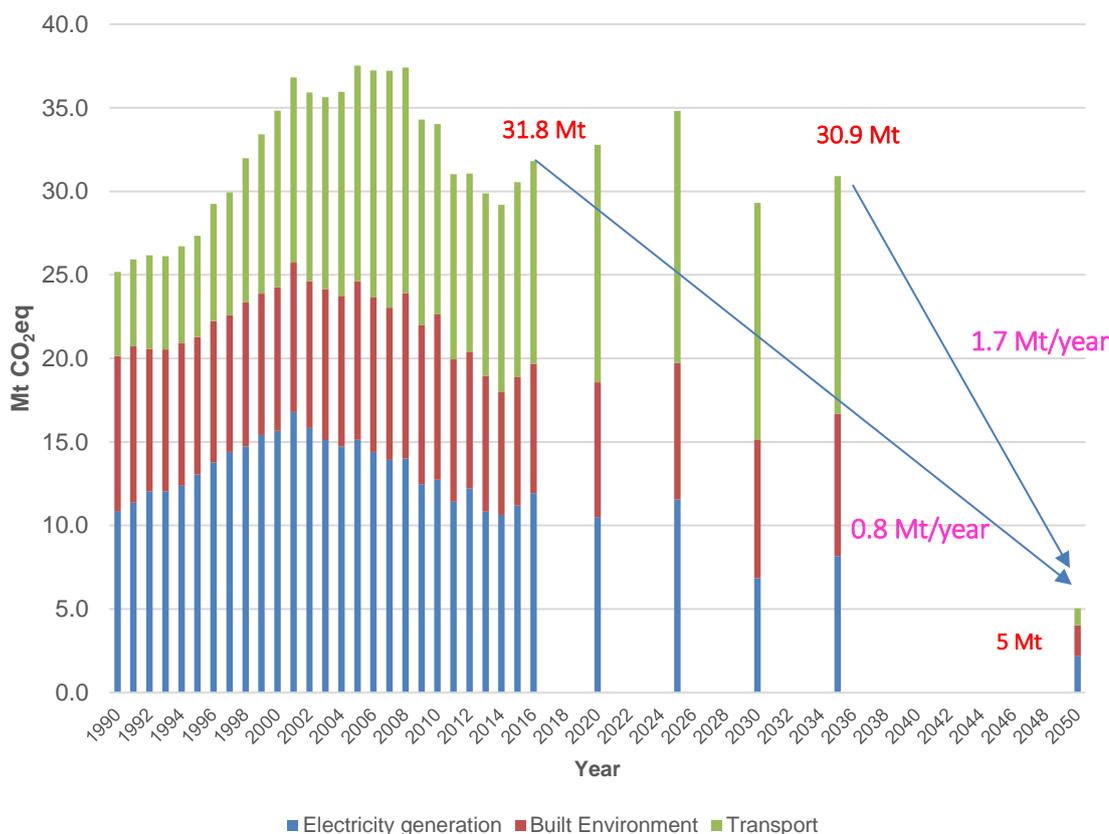


Figure 5. Historic and projected CO₂ emissions from the electricity generation, built environment and transport (EGBET) sectors

Figure 5 presents the latest historic and projected emissions for CO₂ only (under the *With Additional Measures* scenario) from the electricity generation, built environment and transport sectors, in addition to the 2050 target pathway based on the long-term vision of low-carbon transition as set out in Ireland’s National Policy Position.¹⁹ The graph demonstrates the extent of the challenge in meeting national 2050 targets according to the latest projections.

5. Projected performance relative to EU 2020 and 2030 Targets – Non ETS Emissions

The EU’s Effort Sharing Decision (Decision No 406/2009/EC) set 2020 targets for EU Member States including Ireland. These targets cover greenhouse gas emissions from sectors that are not included in the EU Emissions Trading Scheme. For Ireland these sectors cover agriculture, transport, built environment (residential, commercial/institutional), waste and non-energy intensive industry – collectively referred to as non-ETS sector emissions – and Ireland’s target is to achieve a 20% reduction by 2020 on 2005 levels.

In addition, there are annual emission limits for the period 2013-2020 to ensure a gradual move towards the 2020 target. Any overachievement of the binding emission limit in a particular year can be banked and used towards compliance in a future year.

¹⁹ Presentation of electricity generation, built environment and transport sectors in Figure 5 is based on EPA’s interpretation of the categorisation of the sectors that are included in the national policy document and how they are estimated to align with IPCC reporting categories.

Figure 6 shows projected emission levels for non-ETS sector emissions under the *With Existing Measures* and *With Additional Measures* scenarios. In addition, it shows the annual compliance/non-compliance in relation to the annual emission limits. Ireland's non-ETS emissions are projected to be 0% and 1% below 2005 levels in 2020 under the *With Existing Measures* and *With Additional Measures* scenarios, respectively. The target for Ireland is a 20% reduction. Ireland has exceeded its annual binding limits for the first time in 2016. Further information on the 1990- 2016 inventory is available²⁰.

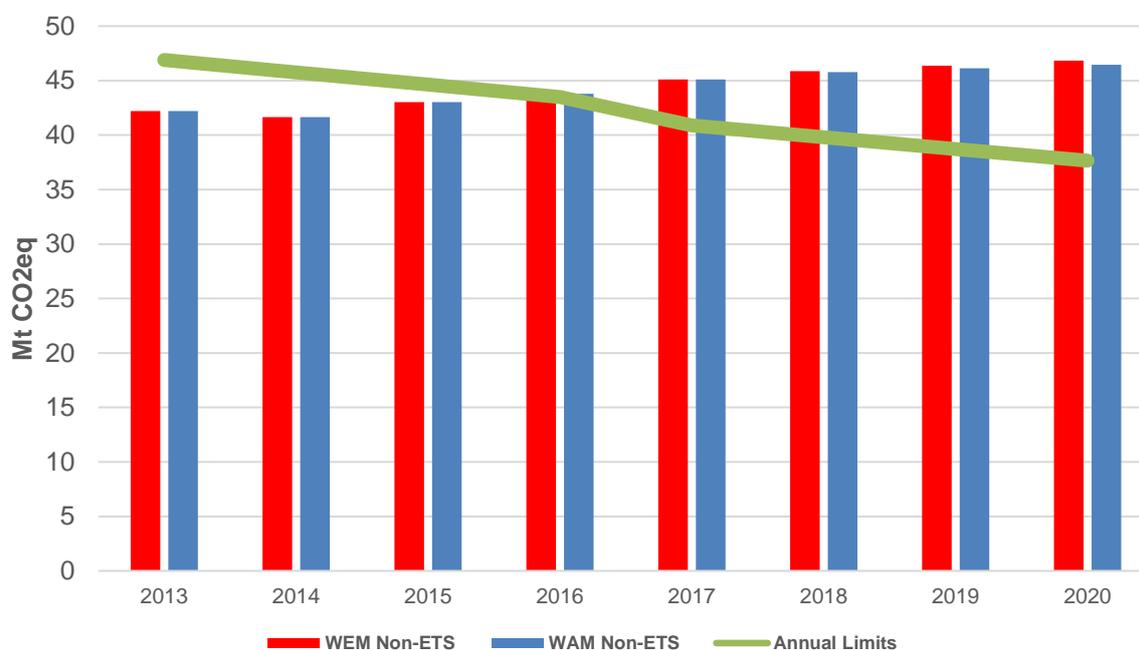


Figure 6. *With Existing Measures* and *With Additional Measures* greenhouse gas emission projections and comparison with the linear reduction pathway required between 2013 and 2020²¹

To determine compliance under the Effort Sharing Decision, any overachievement of the binding emission limit in a particular year (between 2013 and 2020) can be banked and used towards compliance in a future year. However, even using this mechanism Ireland will still be in non-compliance according to the latest projections.

Figure 7 shows that over the period 2013-2020 Ireland is projected to cumulatively exceed its compliance obligations by approximately 17 Mt CO₂ equivalent under the *With Existing Measures* scenario and 16.3 Mt CO₂ equivalent under the *With Additional Measures* scenario.

²⁰ <http://www.epa.ie/pubs/reports/air/airemissions/ghgemissions2016/#d.en.63244>

²¹ 1 Mt = 1,000,000 tonnes

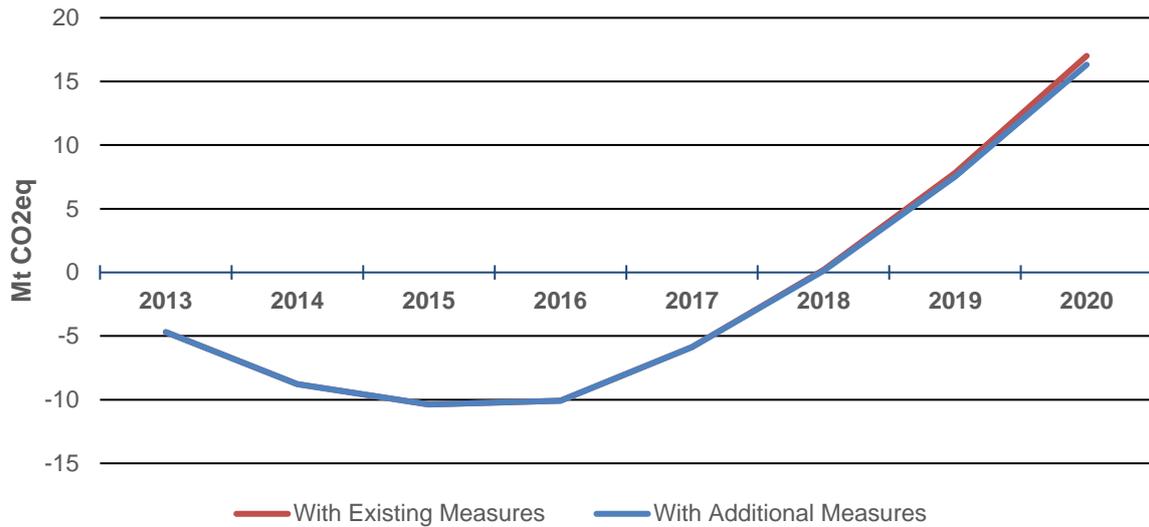


Figure 7. Projected cumulative distance to target for Ireland’s Non-ETS emissions 2013 to 2020

Agriculture and transport dominate non-ETS sector emissions accounting for 75% of emissions in 2020 and 2030, as shown in Figure 8.

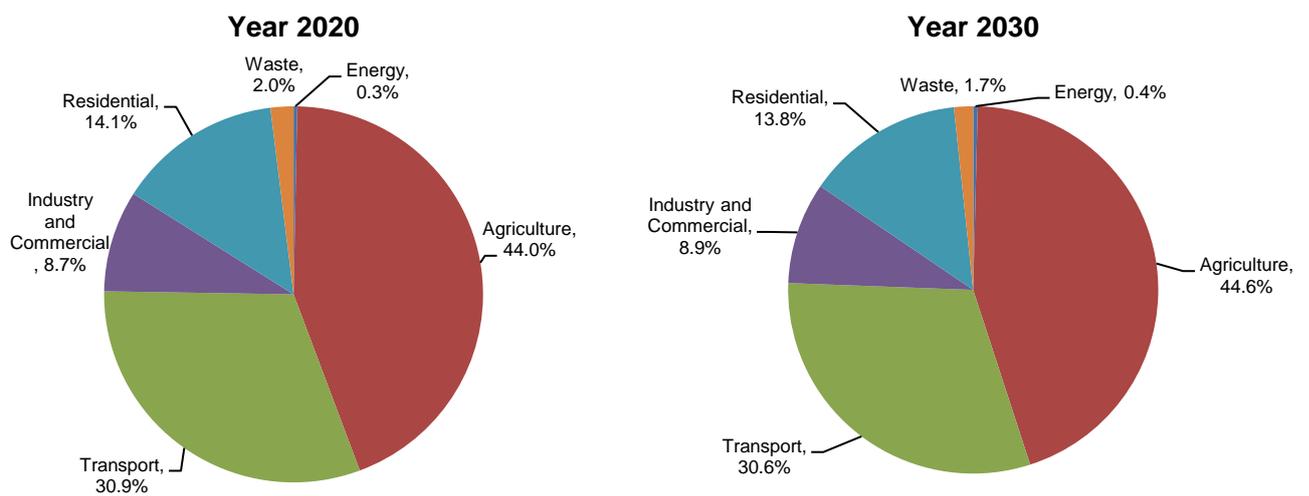


Figure 8. Projected sectoral share of non-ETS greenhouse gas emissions in 2020 and 2030 under the *With Additional Measures* scenario

On 14th May 2018, the European Council adopted a regulation on greenhouse gas emission reductions. The regulation sets out binding emission reduction targets for Member States in sectors falling outside the scope of the EU emissions trading system for the period 2021-2030. The Regulation (Effort Sharing Regulation) maintains existing flexibilities under the current Effort Sharing Decision (e.g. banking, borrowing and buying and selling between Member States) and provides two new flexibilities (use of ETS allowances and credit from action undertaken in the Land Use, Land Use Change and Forestry (LULUCF) sector) to allow for a fair and cost-efficient achievement of the targets. The latest projections indicate that Ireland will exceed the carbon budget implied by those limits by between 47 and 52 Mt CO₂

equivalent assuming both ETS and LULUCF flexibilities are fully utilised. See table 2.3 below for projected Annual Emissions allocations and annual exceedances.

Appendix - Underlying assumptions and additional data

Two emissions projections scenarios are presented which show two potential outlooks to 2035 depending on policy development and implementation. These are called:

- *With Existing Measures*
- *With Additional Measures*

The *With Existing Measures* scenario is based primarily on SEAI's *Baseline* energy projection which incorporates the anticipated impact of policies and measures that were in place (and legislatively provided for) by end of 2016.

The *With Additional Measures* scenario is based primarily on SEAI's *Advanced* energy projection (which includes existing and planned policies and measures) and anticipated progress in the implementation of Government renewable and energy efficiency policies and measures including those set out in the National Renewable Energy Action Plan (NREAP)²² and the National Energy Efficiency Action Plan (NEEAP)²³.

The model input assumptions for the latest SEAI Energy Projections were finalised in the first quarter of 2018. Determination of anticipated progress in the implementation of policies and measures was coordinated by the SEAI in discussion with the relevant Government Departments.

The energy projections are also based on a set of macroeconomic assumptions from the Economic and Social Research Institute which were finalised in late 2017 - See Table 2.1 which include the key macroeconomic assumptions underlying the projections.

Table 2.1 Key macroeconomic assumptions underlying the projections

	2017 – 2020	2021-2025	2026-2030	2031-2035
Average Annual % Growth Rate				
GDP	+3.74%	+3.53%	+3.26%	+3.31%
GNP	+5.06%	+5.08%	+4.99%	+5.01%
Personal Consumption	+3.09%	+2.93%	+2.07%	+2.07%
	2017	2020	2025	2030
Housing Stock ('000)	1,974	2,059	2,286	2,490
Population ('000)	4,736	4,866	5,077	5,276
EUETS: Carbon €₂₀₁₃/tCO₂	10.5	15	22.5	33.5
Carbon tax €₂₀₁₃/tCO₂	18.3	15	22.5	33.5
Coal \$₂₀₁₃/boe	10.8	8.3	9.3	10.1
Oil \$₂₀₁₃/boe	37.7	42.3	46.8	51.7
Gas \$₂₀₁₃/boe	25.1	24.7	25.3	25.7
Peat €/MWh	25	25	25	25

The following is the expected progress by 2020 in terms of Renewable Energy targets under the *With Additional Measures* (*Advanced* energy projection) Scenario:

- 37.7% renewable electricity (RES-E) share (full target is 40%)
- 7.4% renewable heat (RES-H) share (full target is 12%)
- 9.2% renewable transport (RES-T) share (full target is 10%)
- 11.9% Overall Renewable Energy (RES) share (full target is 16%)

²² <http://www.dcenr.gov.ie/energy/en-ie/Renewable-Energy/Pages/Action-Plan.aspx>

²³ [https://www.dccae.gov.ie/en-ie/energy/topics/Energy-Efficiency/national-energy-efficiency-action-plan-\(neeap\)/Pages/National-Energy-Efficiency-Action-Plan-\(NEEAP\).aspx](https://www.dccae.gov.ie/en-ie/energy/topics/Energy-Efficiency/national-energy-efficiency-action-plan-(neeap)/Pages/National-Energy-Efficiency-Action-Plan-(NEEAP).aspx)

The above information is based on model input assumptions underpinning the *Advanced* energy projection which does not include the impact of measures included in the National Development Plan and uses relatively low oil prices (compared to current oil prices). The SEAI is currently preparing model scenarios which will include the impact of additional policies and measures announced in the National Development Plan and a fuel price sensitivity analysis. The anticipated progress in achieving RES targets is likely to change in the SEAI analysis as a result.

Agriculture emissions projections are primarily based on updated agricultural activity projections (animal numbers, nitrogen fertiliser use and crop areas) provided by Teagasc in April 2018.

Table 2.2 shows the breakdown of historical and projected emissions for the non-ETS and ETS sectors (Mt CO₂eq) under the *With Existing Measures* and *With Additional Measures* scenarios.

Table 2.2. Historical and projected emissions for the non-ETS and ETS sectors (Mt CO₂eq²⁴) for *With Existing Measures* and *With Additional Measures* scenarios

		Non-ETS sector	ETS sector	Total	
Historical	2005	46.96	22.44	69.54	
	2008	46.84	20.38	67.34	
	2009	44.29	17.22	61.60	
	2010	43.80	17.36	61.23	
	2011	41.25	15.78	57.10	
	2012	40.84	16.89	57.73	
	2013	42.20	15.68	57.61	
	2014	41.66	15.95	57.31	
	2015	43.07	16.83	59.42	
	2016	43.79	17.73	61.54	
<i>With Existing Measures scenario</i>					
Projected	2017	45.10	17.17	62.30	
	2020	46.82	15.59	62.44	
	2025	48.08	17.40	65.51	
	2030	47.53	16.23	63.78	
	2035	48.05	18.18	66.27	
	<i>With Additional Measures scenario</i>				
	2017	45.10	17.17	62.30	
	2020	46.45	16.43	62.91	
	2025	47.58	18.03	65.64	
	2030	46.79	13.88	60.70	
2035	47.23	15.97	63.23		

Note: Numbers may not sum exactly due to rounding. Totals excludes Land Use, Land Use Change and Forestry (LULUCF)

²⁴ Units: 1 Mt = 1,000 kilotonnes (kt) = 1000 gigagram (Gg)

CO₂ Equivalent: greenhouse gases other than CO₂ (i.e. methane, nitrous oxide and so-called F-gases) may be converted to CO₂ equivalent using their global warming potentials.

Table 2.3. Projected non-ETS emissions and allowances for the 2021 to 2030 ESR compliance period for *With Existing Measures* and *With Additional Measures* scenarios

<i>Mt CO₂ equivalent</i>	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total
Non-ETS Projections - WEM	47.2	47.6	47.9	48.0	48.1	47.9	47.8	47.7	47.6	47.5	477.5
Non-ETS Projections - WAM	47.0	47.3	47.5	47.5	47.6	47.4	47.2	47.1	46.9	46.8	472.3
Projected Annual Emission Allocations	43.1	42.0	40.9	39.7	38.6	37.4	36.3	35.2	34.0	32.9	380.2
Gross Exceedance - WEM	4.09	5.64	7.05	8.29	9.50	10.49	11.53	12.55	13.57	14.62	97.32
Gross Exceedance - WAM	3.89	5.33	6.63	7.80	9.00	9.94	10.93	11.90	12.88	13.89	92.18
Total LULUCF Flexibility											-26.80
Total ETS Flexibility											-18.80
Net Exceedance - WEM											51.71
Net Exceedance - WAM											46.58

Sectoral Breakdown used

Under Section 3 of this report Ireland's Greenhouse Gas Emission Sectors are categorised as the following for analysis:

1. *Energy Industries* (electricity generation, waste to energy incineration, oil refining, briquetting manufacture and fugitive emissions)
2. *Residential* (combustion for domestic space and hot water heating)
3. *Manufacturing Combustion* (combustion for Manufacturing industries in ETS and non-ETS)
4. *Commercial and Public Services* (combustion for Commercial and Public Services space and hot water heating)
5. *Transport* (combustion of fuel used in road, rail, navigation, domestic aviation and pipeline gas transport)
6. *Industrial Processes* (process emissions from mineral, chemical, metal industries, non-energy products and solvents)
7. *F-Gases*²⁵ (gases used in refrigeration, air conditioning and semiconductor manufacture)
8. *Agriculture* (emissions from fertiliser application, ruminant digestion, manure management, agricultural soils and fuel used in agriculture/forestry/fishing)
9. *Waste* (emissions from solid waste disposal on land, solid waste treatment (composting), wastewater treatment, waste incineration and open burning of waste).

²⁵ These gases comprise HFCs (Hydrofluorocarbons), PFCs (Perfluorocarbons), SF₆ (Sulphur Hexafluoride) and NF₃ (Nitrogen Trifluoride). They are much more potent than the naturally occurring greenhouse gas emissions (carbon dioxide, methane and nitrous oxide).