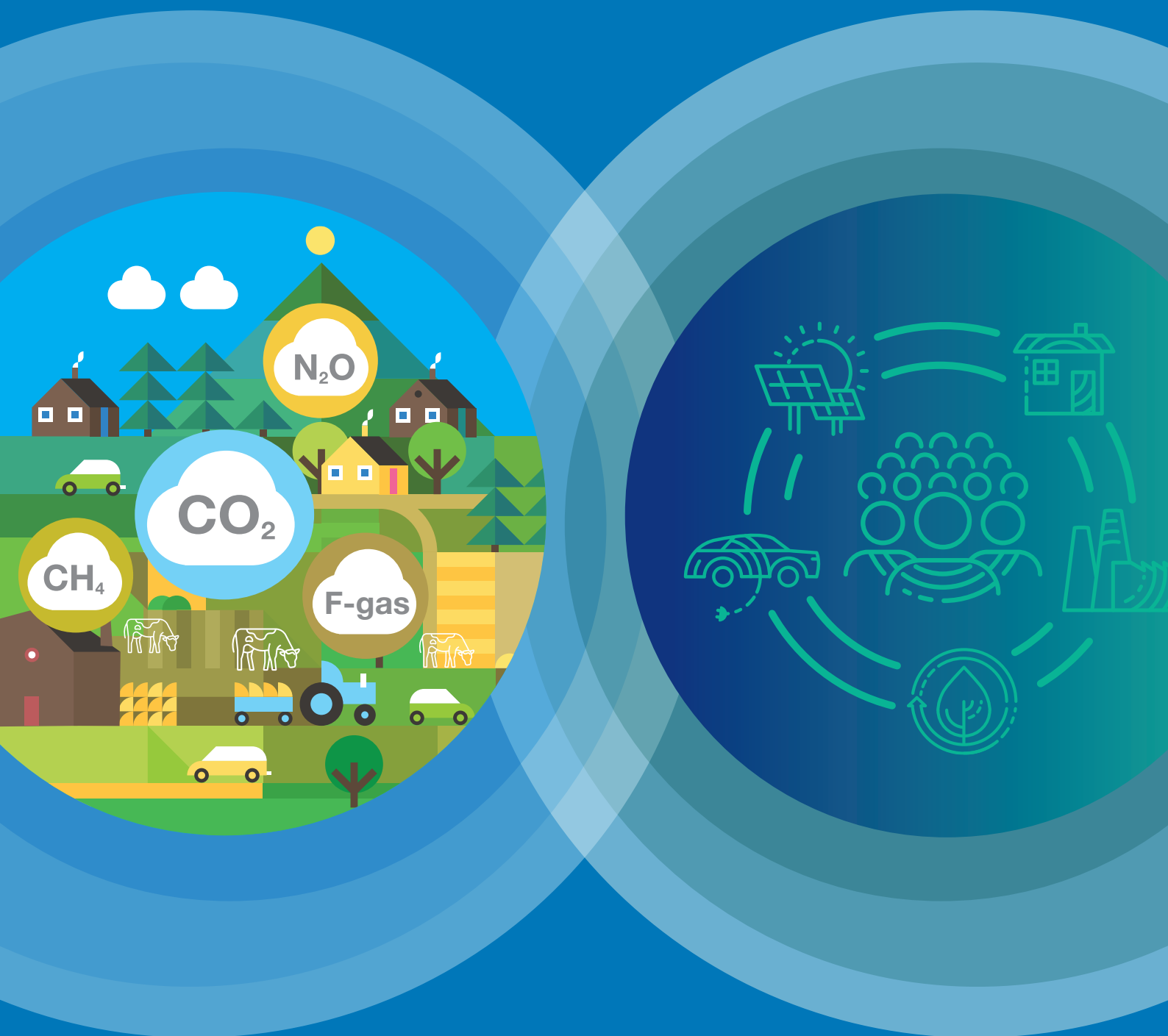


The impact on 2020 greenhouse gas emissions of COVID-19 restrictions

January 2021



© Sustainable Energy Authority of Ireland and Environmental Protection Agency, 2021

Reproduction of the contents is permissible, provided the source is acknowledged.

Key Findings

2020 emissions down 5.9%

The dramatic decline in economic activity and travel in 2020 as a result of the COVID-19 pandemic is translating into greenhouse gas emissions reductions in the short term. These estimates indicate a reduction in Ireland's total emissions of 5.9% in 2020 compared to 2019 levels.

Biggest changes in transport

Emissions from the Transport sector are estimated to have reduced by over 2 Mt CO₂eq compared to 2019, a fall of almost 17%.

Less fossil fuel used in power generation

Emissions from the Energy Industries sector are estimated to have decreased by 14% (1.3 Mt CO₂eq) in 2020 compared to the 2019 level. Whilst the pandemic measures played a part in this, reduced coal and peat use in power generation and an increase in renewable generation were also significant factors.

Increase in residential emissions

Residential sector emissions (mainly home heating) are estimated to have increased by 9% (0.6 Mt CO₂eq) in 2020 as many people have been working extensively from home.

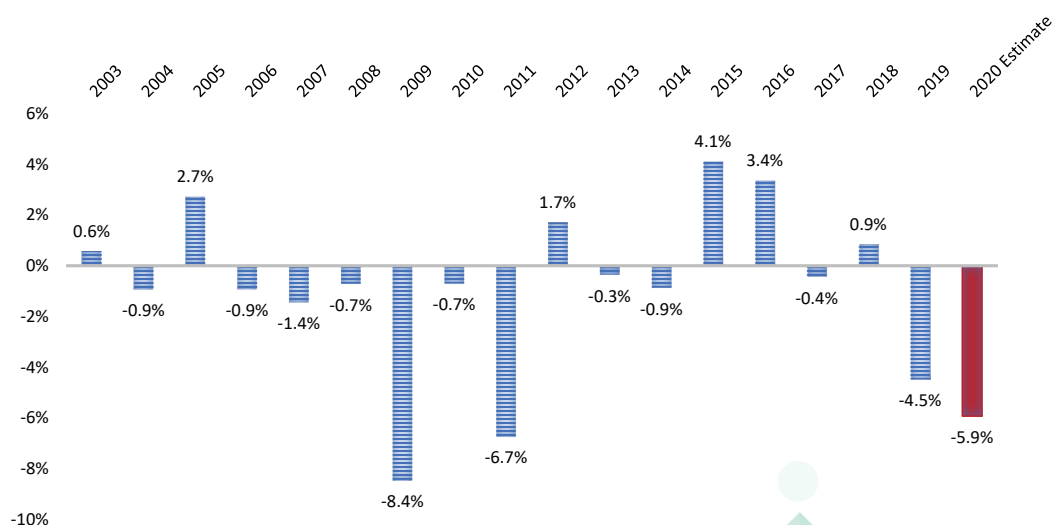
Green recovery essential

Focusing on climate action as part of a 'green' recovery stimulus offers the opportunity to rebuild our economy, generate new jobs and respond to climate change. The 2020s will need to be a decade of action on Climate change for Ireland to play its part in limiting dangerous global warming.

1 Introduction

The global health crisis has impacted Ireland's energy consumption and emissions of greenhouse gases. These impacts have been felt in Ireland as a result of lock-down measures and restrictions aimed at controlling the spread of COVID-19. The speed at which we have had to adapt to new living and work practices has led to unprecedented changes in energy related emissions, within a short period of time, with overall emissions estimated to be 5.9% lower in 2020 compared to the latest 2019 estimates (*Figure 1*) as a result of the impact of the pandemic. This is comparable to the level of reductions last seen following the Financial Crisis.

Figure 1: Percentage change in emissions 2005 – 2020



The estimates presented in this report were prepared by the Environmental Protection Agency (EPA) and Sustainable Energy Authority of Ireland (SEAI) as the competent authorities for national greenhouse gas emissions statistics and national energy statistics respectively. This report presents early emissions estimates for 2020 based on trends in a limited selection of monthly indicator data, as the source data used by the EPA and SEAI for the National Greenhouse Gas Inventory and the National Energy Balance is largely only available annually due to its comprehensive nature. Macroeconomic modelling work undertaken by the Economic and Social Research Institute (ESRI) considering the impact of COVID-19 on the Irish economy and emissions¹ has been used, supplemented by monthly energy and fuel use data from the SEAI, EirGrid, Gas Networks Ireland (GNI), the National Oil Reserves Agency (NORA) and other sources.

Whilst the latest ESRI report² anticipates growth of 3.4% in GDP for 2020, the domestic economy has been hit hard by the pandemic with anticipated reductions in private consumption (-9%) and exports slowing down (4.6% – less than half the growth in 2019). Increased unemployment (18.4%) is also evident. These economic impacts translate directly to changes in energy use patterns and emissions due to businesses closing, reduced movement of people e.g. school closures, working from home, restrictions on local and international travel, reduced industrial/ business output and transactions. The impact of these changes on energy consumption and emissions is explored below and more detail is provided on those sectors where the most significant impact of the pandemic on energy use and emissions can be seen.

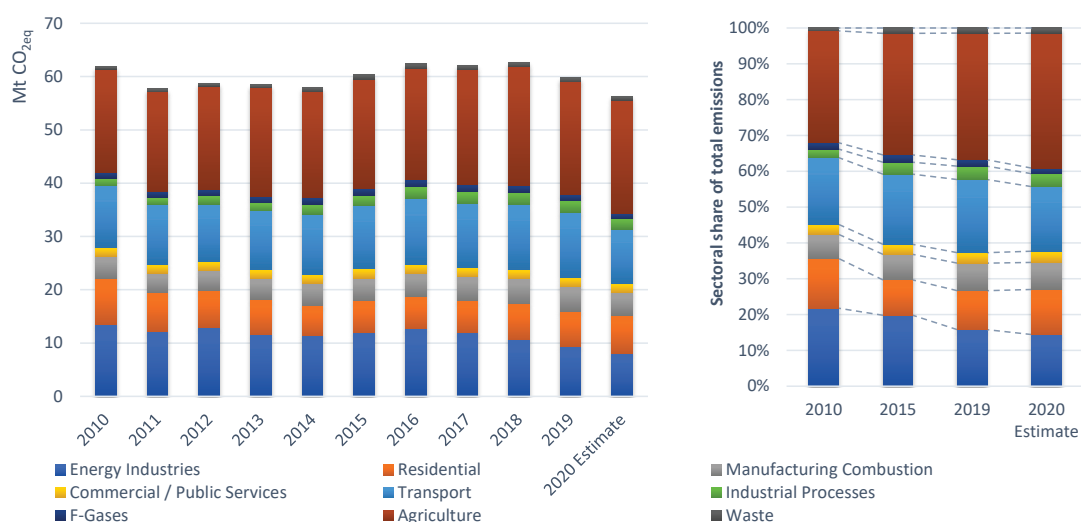
¹ https://www.esri.ie/system/files/publications/RS106_2.pdf

² Economic and Social Research Institute (ESRI), Quarterly Economic Commentary, Winter 2020. https://www.esri.ie/system/files/publications/QEC2020WIN_0.pdf

2 Greenhouse gas emissions estimates for 2020 and EU Target Compliance

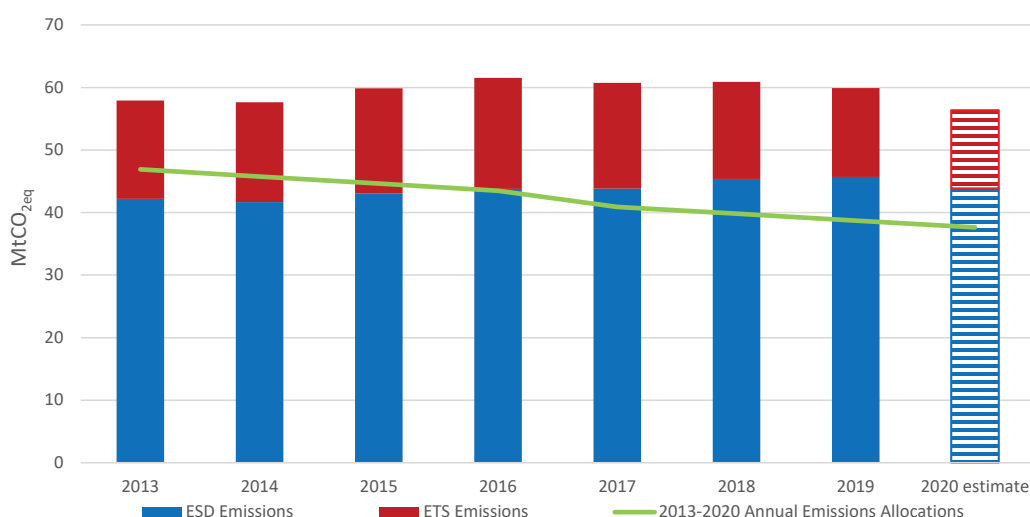
Total emissions in 2020 are estimated to be 56.4 Mt CO₂eq (Figure 2). A declining proportion of emissions originating from the Energy Industries sector³ is evident over the past decade with emissions from the Agriculture and (excepting 2020) Transport sectors increasing proportionately as a consequence.

Figure 2: Greenhouse gas emissions by source sector 2010-2020



These early estimates for 2020 indicate a 4% drop compared to 2019 in emissions covered by the EU Effort Sharing Decision (ESD)⁴ targets (Figure 3) i.e. primarily agriculture, transport and residential, with 2020 emissions 8% below those in 2005. In relation to ESD compliance, an annual deficit of 6.2 Mt CO₂eq in 2020 and a cumulative deficit of 11.6 Mt CO₂eq over the 2013 to 2020 compliance period are now estimated.

Figure 3: Compliance with EU Effort Sharing Decision targets



Even with the impact of the pandemic taken into account, we will miss our energy and climate targets for 2020, which established a trajectory to achieve a 20% decrease in emissions in by 2020 compared to 2005 levels. 2020 emissions are anticipated to be 8% below those in 2005 based on these early estimates.

³ <http://www.epa.ie/pubs/reports/air/airemissions/ghgprojections2019-2040/>

⁴ https://ec.europa.eu/clima/policies/effort_en

3 Transport

The most significant impact on emissions, both in absolute and percentage terms, is anticipated in the transport sector as a result of the severe movement restrictions implemented in response to COVID-19. Emissions from the Transport sector in 2020 are estimated to have reduced by over 2 Mt CO₂eq compared to 2019, a fall of almost 17% (Figure 4). This is almost 21% lower than the level originally projected for 2020 before the occurrence of COVID-19⁵. The Transport sector as represented here does not include emissions associated with International Aviation, in line with greenhouse gas inventory reporting practice⁶.

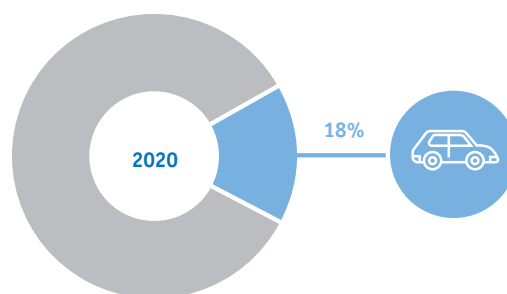
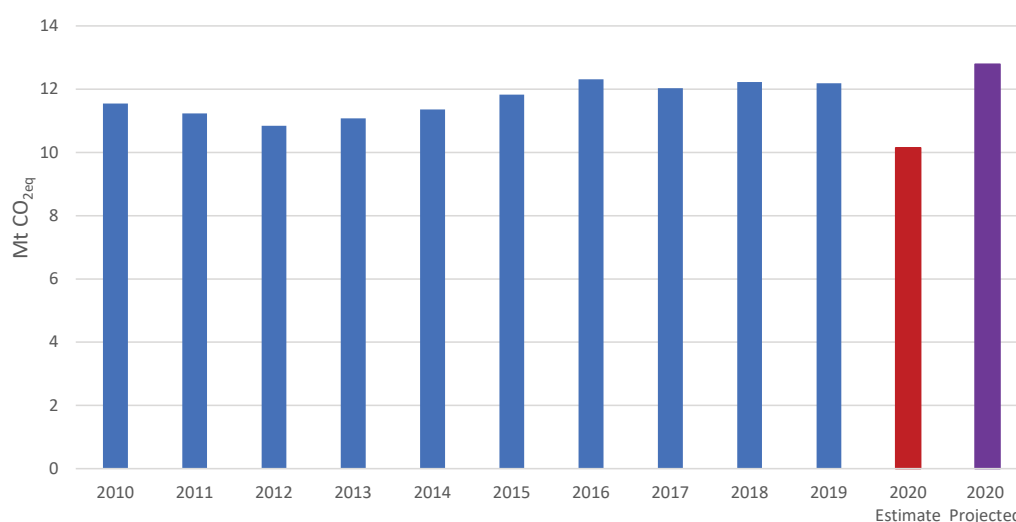


Figure 4: Transport greenhouse gas emissions 2010-2020 including the latest 2020 estimate and 2020 EPA Projection



- Transport represented 20% of total emissions in Ireland in 2019 (this fell to 18% in 2020 as a result of the pandemic) and has traditionally been the sector whose activity and greenhouse gas emissions are most responsive to changes in economic activity.
- The COVID-19 impact on transport emissions in 2020 has however been more significant even than the largest annual fall seen during the financial crisis, where 2009 saw a 9% fall in transport emissions.
- As Transport is also a significant source of air pollution, particularly in urban areas, monitoring locations that experienced reduced traffic volumes also saw reductions in air pollutant concentrations.⁷
- The sector saw dramatic growth in greenhouse gas emissions aligned to economic growth to 2007, followed by a significant reduction during the last recession, falling by 25% between 2007 and 2012. Emissions have increased substantially following a 2012 low, growing by 13% between 2012 and 2018 before a small decline in 2019.

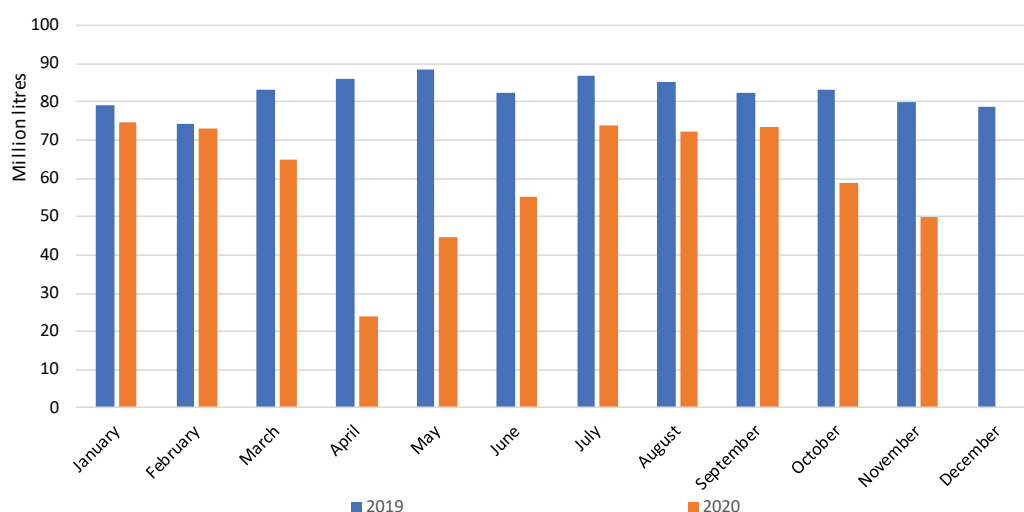
3.1 Road transport fuels

A better understanding of the drivers behind the transport emissions reduction in 2020 can be gained by looking at the monthly petrol and diesel consumption figures from the National Oil Reserves Agency. Petrol consumption reached its lowest level in April 2020, over 70% below the level from the same month in 2019 (Figure 5). For the year to end of November 2020, petrol consumption is down 27% compared to 2019.

⁵ <http://www.epa.ie/pubs/reports/air/airemissions/ghgprojections2019-2040/>

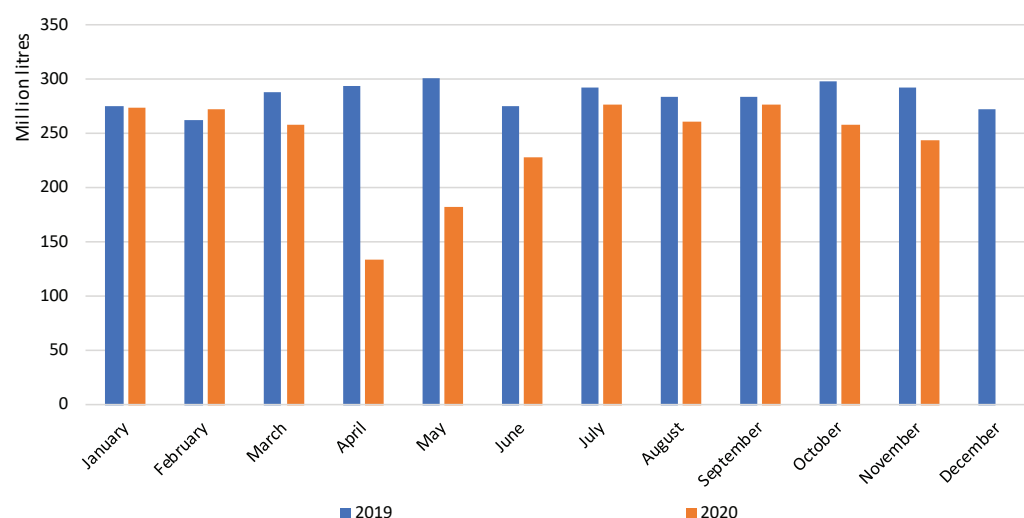
⁶ Separate figures are provided below illustrating the impact on jet kerosene due to reduced air travel.

⁷ <http://www.epa.ie/newsandevents/news/name,70312,en.html>

Figure 5: Petrol Subject to NORA levy

Source: National Oil Reserves Agency (NORA)

The same analysis for diesel shows a similar but less marked trend (Figure 6). Diesel consumption in the lowest month, April, was 55% below the same month in 2019.

Figure 6: Diesel Subject to NORA levy

Source: National Oil Reserves Agency (NORA)

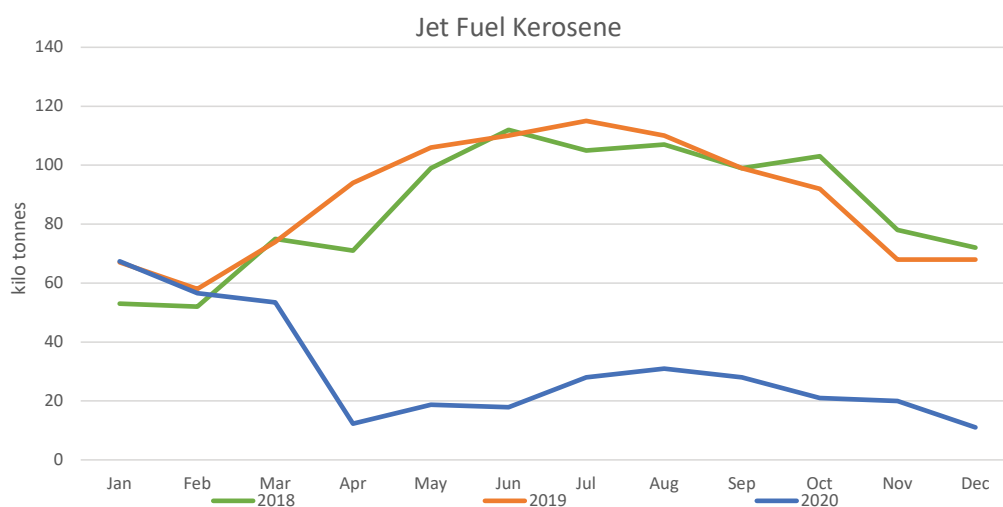
To the end of November 2020 diesel consumption was down 15% compared to the same period in 2019. In the second lockdown period, from mid-October on, the evidence from the available NORA data suggests a smaller percentage reduction in road fuel (particularly diesel) consumption compared to the restricted period in the first half of the year.

3.2 International Aviation

Whilst international aviation emissions are not accounted as part of the national total emissions in the Greenhouse Gas Inventory⁸, it is worth noting the impact of the severely restricted air travel on aviation fuel consumed in Ireland. Jet fuel consumption has been around 80% below the 2018-19 levels for much of the year from when the restrictions began in March (Figure 7).

⁸ International aviation emissions are considered on a global basis, <https://www.icao.int/environmental-protection/CORSIA/Pages/default.aspx>

Figure 7: Jet fuel kerosene consumption 2018-2020



Source: SEAI

4 Energy Industries

The estimates for 2020 indicate a further substantial drop in emissions of 14% compared to the 2019 level and 28% compared to what was originally projected pre-COVID-19. Overall it is estimated that 1.3 Mt CO₂eq less emissions less will occur from this sector in 2020 compared to 2019 (Figure 8).

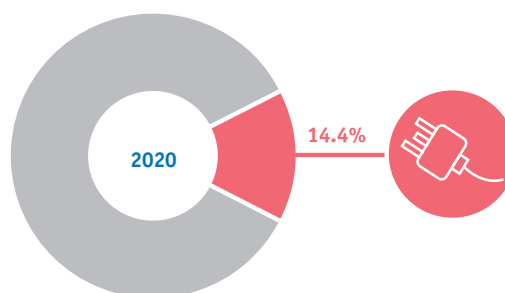
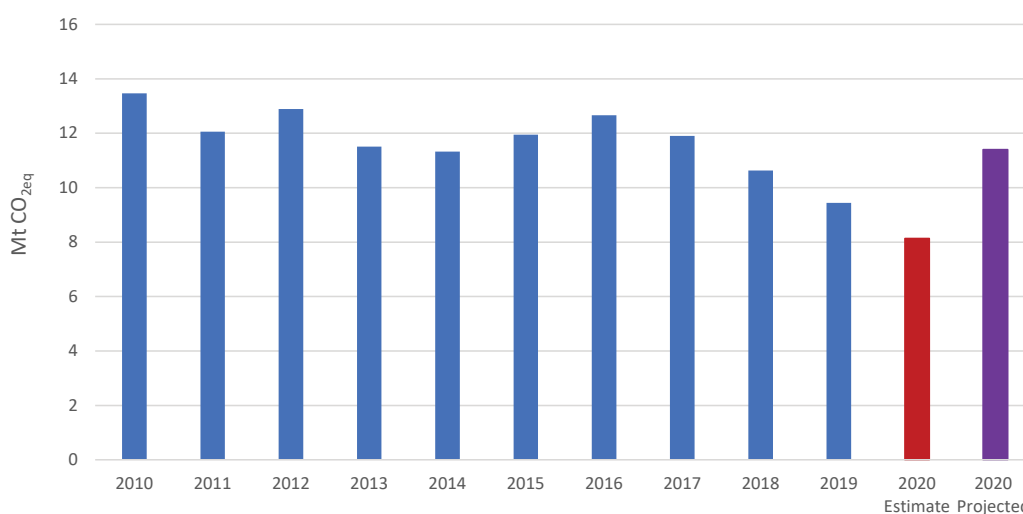


Figure 8: Energy Industries greenhouse gas emissions 2010-2020 including the latest 2020 estimate and 2020 EPA Projection



- Much of the estimated drop in emissions in 2020 cannot be directly attributed to the impact of the pandemic, but rather a declining trend in the amount of electricity produced using coal and peat.
- Approximately 40% of Ireland's electricity is estimated to have been generated from renewable sources in 2020.

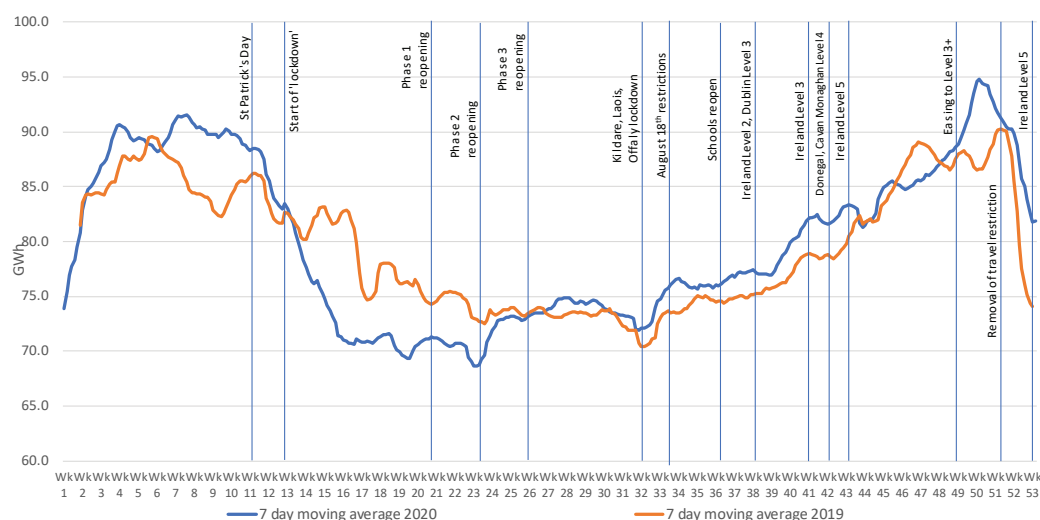
- Electricity demand was very similar between 2019 and 2020 with demand reductions experienced during lockdown periods being offset by higher demand at other times in 2020.

The end of Public Sector Obligation (PSO) levy support for two of Ireland's peat stations played a role in reducing emissions from electricity generation in 2020. International policy, including the EU ETS carbon market is also starting to influence investment decisions on grid infrastructure, putting further pressure on the use of carbon intensive fossil fuels for electricity generation. The ETS carbon price was above €30 per tonne by the end of 2020 and had remained close to that level for most of the second half of the year, despite an initial pandemic impact. Significant gains have been made in decarbonisation of Ireland's electricity system over recent years, such as deployment of renewable technologies (mainly wind) and increased interconnection. This has enabled higher use of locally generated renewables and substitution of high carbon intensity peaking plants with increased electricity imports. Ireland is currently a world leader in integrating wind on an electricity system⁹.

4.1 Electricity Demand

Demand side changes in electricity use also impacted emissions in 2020. Analysis of the daily demand data sourced from EirGrid (Figure 9) shows the 7-day moving average of the daily demand in GWh from 1st January through to the end of December¹⁰.

Figure 9: Electricity daily demand 2020 vs 2019 by week



Source: SEAI based on EirGrid data

- Average daily electricity demand returned to 2019 seasonal levels following phase 2 reopening at around 73 GWh/day in June and July.
- Between the start of July and the end of October, demand had been running a little above seasonal 2019 levels following phase 3 reopening. However, with the move to level 5 restriction, demand fell below 2019 levels until the 3rd week of November. Restrictions were eased back to level 3+ on the 1st of December
- Cumulative demand to the end of November is approximately 0.3% up compared to 2019.

⁹ Ireland has the highest share of non-synchronous variable renewable electricity on a single synchronous power system.

¹⁰ Moving average data smooths out differences in weekday and weekend demand.

5 Residential

Estimates suggest Residential emissions increased by 9% (0.6 Mt CO₂eq) in 2020. This is 13% higher than the level originally projected for the sector pre-COVID-19¹¹ (Figure 10). Residential sector emissions account for household heating needs where that need is met using fossil fuels rather than electricity (emissions associated with electricity production are counted in Energy Industries).

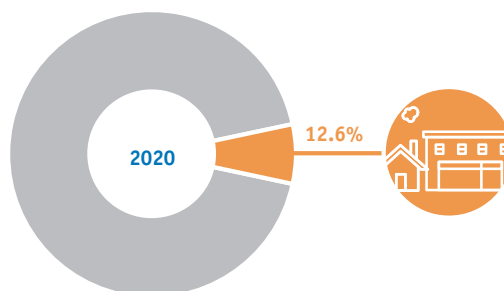
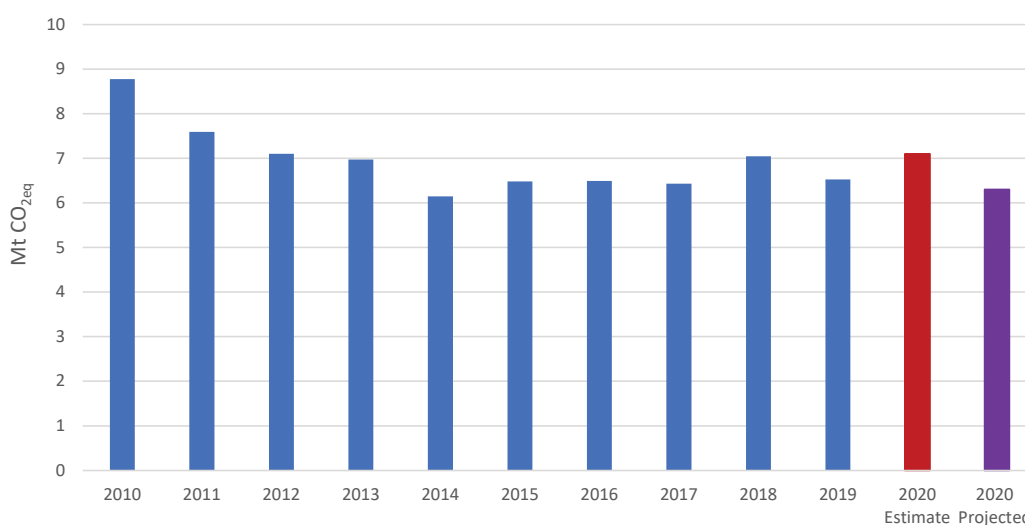


Figure 10: Residential greenhouse gas emissions 2010-2020 including the latest 2020 estimate and 2020 EPA Projection



- The Residential sector is one of few major sectors estimated to have seen an increase in emissions as a result of the pandemic, largely due to the impact of people working from home.
- 2020 has so far seen low prices for home heating fuel, particularly in the early part of the year, which can also lead to increased emissions.
- For the year to the end of November, kerosene sales were up 18% in 2020 compared to 2019 (based on NORA data), likely reflecting a reaction to the lower prices in 2020, in addition to COVID-19 and weather impacts. Met Éireann degree day data for synoptic weather stations indicates that 2020 was overall a marginally colder year than 2019¹².

Detailed data is not yet available for the last quarter of 2020 but more energy use by households compared to 2019 is anticipated, given the mobility restrictions and large number of people still working from home. This could also raise concerns about greater exposure to lower air quality, particularly in areas where solid fuel burning for heat is prevalent – given the propensity to use stoves and open fires when more time is spent at home.

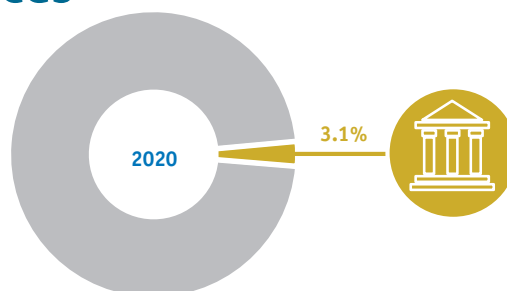
¹¹ As detailed in the publication of the EPA's Provisional 2019 GHG Inventory, care is needed in comparing the historic Inventory to the latest Projections for some sectors as the Projections pre-date the methodological changes made to the 1990-2019 Inventory, which impacted on the estimate of energy usage by sector (<http://www.epa.ie/ghg/residential/>).

¹² <https://www.met.ie/climate/available-data/monthly-data>

6 Commercial and Public Services

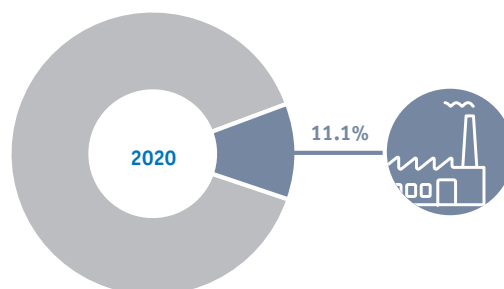
Overall emissions across Commercial and Public Services sectors are estimated to have fallen by 1.2% in 2020 compared to 2019, with emissions 20% lower than originally projected for the sector pre-COVID-19¹³. The Commercial service sector is a heterogeneous sector including the retail, hospitality and ICT sectors. Public services include the health, education and public administration sectors. The key impacts of COVID-19 on the commercial and public services sectors were:

- A slowdown in activity levels having a commensurate impact on energy demand and emissions. A recent CSO survey¹⁴ found two-thirds of enterprises trading at normal capacity but that only 40% had turnover close to what would normally be expected.
- Some sectors have moved to widespread working from home, leading to less electricity, gas and oil use in these sectors.
- On the other hand, some increases in emissions could be expected in the Public sector due to increased demand for some public services, such as water and health sector services.



7 Industry

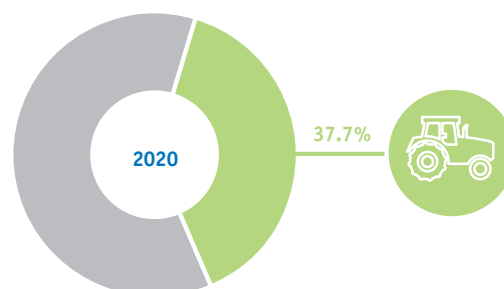
Overall Manufacturing combustion emissions are estimated to have declined by 8% and Industrial Process emissions by 10% in 2020 compared to 2019. This is 25% and 17% lower respectively than what was originally projected for these sectors in 2020 pre-COVID-19¹⁵. The Industrial sectors (Manufacturing Combustion and Industrial Processes) were impacted by similar factors as the commercial services sector, with some business operating at reduced capacity and others not at all. Some of the sub-sectors responsible for the bulk of Industrial emissions (such as the cement industry), saw extended shutdown periods compared to a normal year.



8 Agriculture

Overall Agriculture emissions are estimated to be relatively unchanged in 2020 compared to 2019 based on the latest available data. The estimates indicate a slight increase in overall emissions from the sector of 0.4% in 2020 compared to 2019 following increases in fuel and nitrogen fertiliser used.

- Nitrogen fertiliser use in the period October 2019 to September 2020 (latest data available), was running 3% ahead of fertiliser sales for the period October 2018 to September 2019¹⁶.
- The provisional (up to June) animal numbers data indicated an increase in cattle population of 1.5% in June 2020 compared to June 2019, with a 4.2% increase in the number of dairy cows¹⁷.



Animal number data for the full year 2020 is not yet available and given the seasonality of the industry it is not feasible to accurately estimate for the full year based on the data available for the first six months. Therefore, these estimates do not

¹³ <http://www.epa.ie/pubs/reports/air/airemissions/ghgprojections2019-2040/>

¹⁴ CSO Business impact of COVID-19 survey from 27th July to 23rd August 2020. <https://www.cso.ie/en/releasesandpublications/er/bic19/businessimpactofcovid-19survey27jul23aug2020/>

¹⁵ See footnote 6 - care is needed in comparing the historic Inventory to the latest Projections.

¹⁶ Department of Agriculture, Food and the Marine: Fertiliser Sales from 1st October 2019 to 30th September 2020

¹⁷ <https://www.cso.ie/en/releasesandpublications/er/clsjp/cropsandlivestocksurveyjuneprovisional2020/>

assume a change in animal numbers in 2020 but keep those numbers at the 2019 level. The number of calves born in 2020 had grown compared to 2019 and this is likely to have an impact in 2021 and 2022 as these animals mature and move into the older age categories.

9 Waste Sector and F-gases

Activity data for 2020 for the Waste sector and F-gases is not currently available so estimates are based on 2019 provisional data in the case of F-gases and the existing (pre-COVID-19) EPA projections in the case of the waste sector. Waste sector emissions (being largely linked to landfill gas emissions) are unlikely to be immediately affected by the impact of COVID-19 as it takes time for the organic material to break down in landfills. The impact is therefore more likely to be seen in future years. For the Waste sector, the existing estimate of an 8% drop in emissions in 2020 compared to 2019 is likely to be still broadly valid as it is based on a long-term declining trend in material sent to landfill.

For F-gases, these estimates are indicating a 16% drop in emissions in 2020 compared to 2019. Although the same volume of gases used is assumed in 2020 compared to 2019, the estimate makes use of some early data from Inventory data providers indicating a continued switch from high global warming potential (GWP) to lower GWP gases.

10 Conclusion

Early estimates for 2020 indicate the biggest fall in Ireland's National total greenhouse gas emissions since exiting from the financial crisis in 2011. Total emissions are estimated to have decreased by almost 6% in 2020 with emissions from Energy Industries and Transport showing the greatest decline. Emissions from the Residential sector however are estimated to have increased, reflecting increased use of home heating as many people worked from home, and Agriculture emissions were estimated to have been largely unaffected by the pandemic to date.

As the country hopes to soon exit the most restrictive lockdown measures, with the roll out of the vaccination programme, we will hopefully soon see an increase in economic activity generally. Focusing on climate action as part of a 'green' recovery stimulus offers the opportunity to rebuild our economy, generate new jobs and respond to climate change. The European Green Deal outlines a framework of regulations and legislation aimed at achieving the EU's targets of net-zero carbon emissions by 2050, and a 50% to 55% cut in emissions from 1990 levels by 2030. Swift implementation of the measures outlined in the 2019 Climate Action Plan is needed, at a minimum, to put Ireland on the right track with further measures needing to come on stream soon, reflecting the increased National and European ambition.

Many of the measures we can take involve making choices that benefit not just the climate but also our health and wellbeing. Moving away from fossil fuels for heating and transport needs improves the air quality in our towns and cities, something that has been observed during the COVID-19 lockdown periods where traffic volumes were reduced as people worked from home. For individuals, environmentally 'greener' choices such as active travel and building lower energy buildings are often also 'better' choices, benefitting our health and pockets and safeguarding us from the uncertainty of future energy costs. Avoiding food waste is an accessible climate action that reduces emissions, but also benefits our pockets.

