SUSTAINABLE ENERGY AUTHORITY OF IRELAND

First Look: Mid-Year Review of Ireland's Energy and Related Emissions in 2024

Ireland's Energy and Energy-Related Emissions from January to June 2024

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Sustainable Energy Authority of Ireland
SEAI is Ireland's national energy authority investing in, and delivering, appropriate, effective and sustainable solutions to help Ireland's transition to a clean energy future. We work with the public, businesses, communities and the Government to achieve this, through expertise, funding, educational programmes, policy advice, research and the development of new technologies.

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Contents

1 Background and Scope

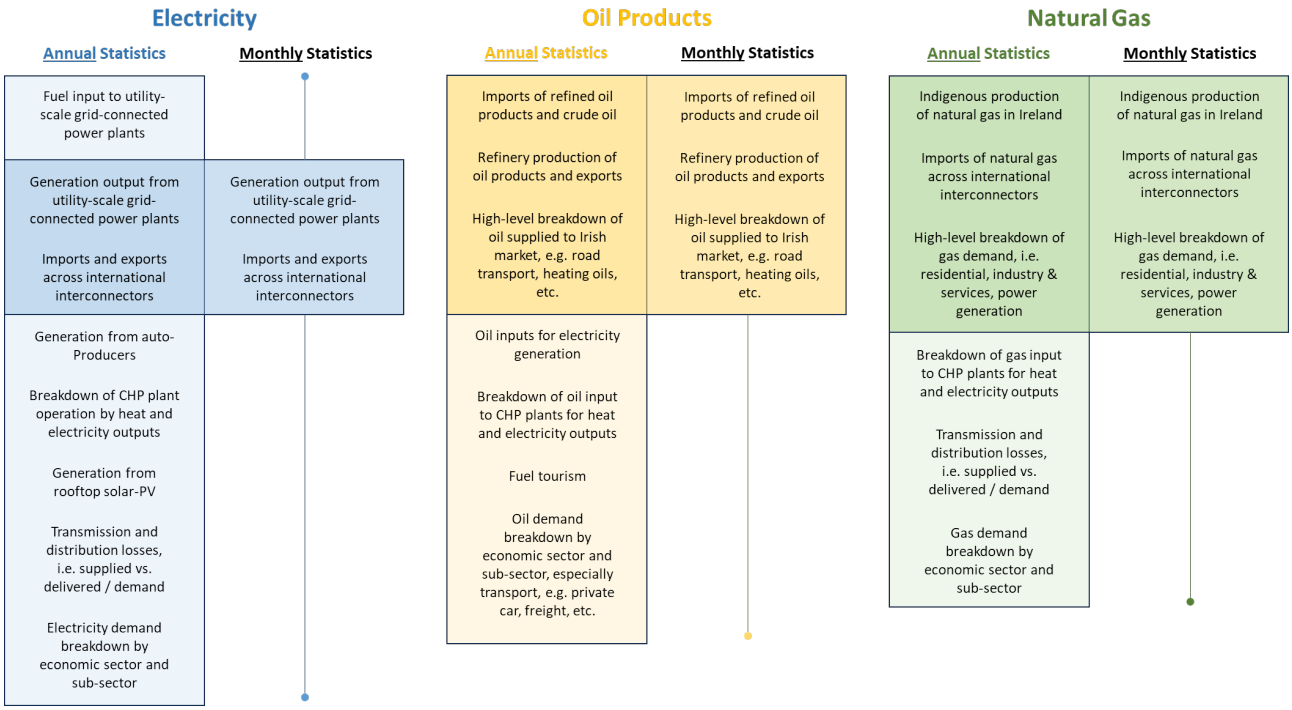
This report is part of the new *'First Look'* series of publications from the Energy Statistics Team in SEAI. These *First Look* publications aim to rapidly highlight the key energy insights from SEAI's data releases. *First Look* publications effectively disseminate timely and trusted energy and energy-related emission data, to better inform evidence-led energy policy, and to measure the pace of progress against binding energy and climate targets.

This *First Look* note provides a mid-year review of Ireland's energy and energy-related emissions in the first 6-months of 2024, i.e. from 1st of January 2024 to 30th of June 2024. It compares key energy data from that period to what was previously observed in recent years. This comparison provides fast-provisional 'in year' insights into the trends developing in 2024 in the key areas of:

- Energy-related emissions
- Electricity supply and generation
- Renewable electricity
- Gas supply and demand
- Oil product deliveries

The primary data sources for this *First Look* note are SEAI's monthly energy web-updates on electricity, gas, and oil products, based on Ireland's reporting obligations to the European Commission under the *Energy Statistics Regulation 1099/2008*. Additional data sources include a monthly breakdown of natural gas demand provided by *Gas Networks Ireland*, and provisional energy-related emission calculations made by SEAI.

The trends observed in provisional monthly data are not as definitive or as inclusive as those based on the annual energy data in SEAI's National Energy Balance, or the annual emissions data in EPA's National Greenhouse Gas Emissions Inventory. But the trends in the monthly data can often be identified just a few weeks after the fact, providing much timelier insights. The different scopes of monthly and annual energy statistics is summarised below:



Insights from this *First Look* note are best regarded as useful early indications of shifts and trends in energy and energy-related emissions that will later be more fully quantified and verified by definitive annual data. The complementary use of both fast-provisional monthly data, and slower-definitive annual data, helps balance the competing needs of timeliness and authority in Ireland's energy and energy-related emissions data.

2 Key Observations

Energy-related emissions

Comparing monthly energy data for the first six months of 2024 with data from the same period last year provides the following insights on energy-related emissions:

- The electricity sector's emissions in the first-half of 2024 were down 17.2%.
- The transport sector's emissions in the first-half of 2024 were down 1.3%.
- Residential emissions from gas in the first half of 2024 were up 5.1%.
- Residential emissions from kerosene in the first half of 2024 were up 5.6%.
- Industry and service emissions from gas in the first-half of 2024 were up 7.9%.

The underlying shifts in energy supply and demand giving rise to these changes in emissions are summarised below, and more fully detailed in the subsequent sections of this note.

Electricity - Emissions, renewable generation, and supply

SEAI estimates that emissions from the electricity sector in the first 6-months of 2024 were 3.4 $MtCO_2e$, down 17.2% on the same period one-year earlier, reaching the lowest level for decades. This drop in emissions from the electricity sector was mainly driven by increased use of imported electricity that reduced the use of fossil fuels in Ireland, and increased use of Irish renewables for electricity generation.

If SEAI's estimate of electricity emissions in the first 6-months of 2024 remains representative of the subsequent 18-months, then the total emissions from the electricity sector in the 5-year period of the first carbon budget will sum to approximately 41 $MtCO_2e$. This would be approximately 1 $MtCO_2e$ over the 40 $MtCO_2e$ sectoral emission ceiling allowed for electricity to the end of 2025[1]. If this result eventuated, then the sectoral emission ceiling for electricity in the second carbon budget (2026 – 2030) would be limited to 19 $MtCO_2e$. Staying within the second carbon budget would require average electricity sector emissions of no more than 3.8 $MtCO_2e$ per year (the average for the first 3-years of the first carbon budget was 9.1 $MtCO_2e$ per year).

The first-half of 2024 highlighted some positive progress for Ireland's renewable electricity generation:

- Almost half (48.9%) of utility scale generation in Ireland was renewable, and we generated 10.2% more renewable electricity (+0.5 TWh) than in the same period last year.
- Electricity from wind farms was up 5.9%, but below what was seen in the same 6-month period in 2020 and 2021.
- Electricity from solar farms was up 75% in the first half of 2024, from a low base, and accounted for 2.2% of utility-scale generation in that period.

Overall utility-scale supply of electricity (i.e. the sum of indigenous generation and electricity imported across international interconnectors), which is proportional to electricity demand, increased in the first-half of 2024, and outpaced our growth in renewable generation:

- Overall utility-scale supply of electricity was 4.0% (0.7 TWh) higher than in the same period last year.
- Utility-scale generation in Ireland fell by 3.1% due to increased use of imported electricity.
- Electricity imports in the first-half of 2024 were up 84% on the same period last year.
- In the first 6-months of 2024 imports accounted for a record breaking 14.4% of Ireland's utility scale electricity supply

[1] See *Methodological notes on extrapolating emissions to the end of the first carbon budget (2021-2025)* at the end of this section.

- Imports were the third-largest source of electricity in Ireland, after electricity generation from natural gas and from wind.

Transport emissions and other oil demands

SEAI estimates that emissions from the transport sector in the first 6-months of 2024 were 5.8 $MtCO_2e$, down 1.3% on the same period one-year earlier. If this estimate of transport emissions in the first 6-months of 2024 remains representative of the subsequent 18-months, then the total emissions from the transport sector in the 5-year period of the first carbon budget would sum to approximately 58 $MtCO_2e$.This would be approximately 4 $MtCO_2e$ over the 54 $MtCO_2e$ sectoral emission ceiling allowed for transport. If this result eventuated, then the sectoral emission ceiling for transport in the second carbon budget (2026 – 2030) would be limited to 33 $MtCO_2e$. Staying within the second carbon budget would require average transport sector emissions of no more than 6.6 $MtCO_2e$ per year (the average for the first 3-years of the first carbon budget was 11.6 $MtCO_2e$ per year).

Based on deliveries of oil-products for road transport compared to the same period last year:

- Demand for blended road diesel in the first-half of 2024 was down 1.1%.
- Demand for blended road petrol in the first-half of 2024 was up 4.4%.

The first-half of 2024 saw record levels of biofuel blending into the petrol and diesel used on our roads:

- Biodiesel accounted for 8.6% of blended road diesel.
- bioethanol accounted for 5.4% of blended road petrol.

Deliveries of jet kerosene in the first-half of 2024 were down 3.5% on the same period last year. Deliveries of jet kerosene in the first-half of 2024 are comparable to those observed in first-half of 2019, before international travel was impacted by COVID travel restrictions.

Deliveries of heating kerosene in the first-half of 2024 were up 5.6% - practically all heating kerosene is consumed in the residential sector.

Gas supply and demand

Total gas supply, which covers electricity generation, industrial processes, and residential space and water heating, etc., in the first-half of 2024 was down 2.8% on the same period last year, broken down by:

- Gas for electricity generation in the first-half of 2024 was down 9.3%.
- Gas for residential (heating) use in the first-half of 2024 was up 5.1%.
- Gas demand from the industry and services sectors in the first-half of 2024 was up 7.9%.

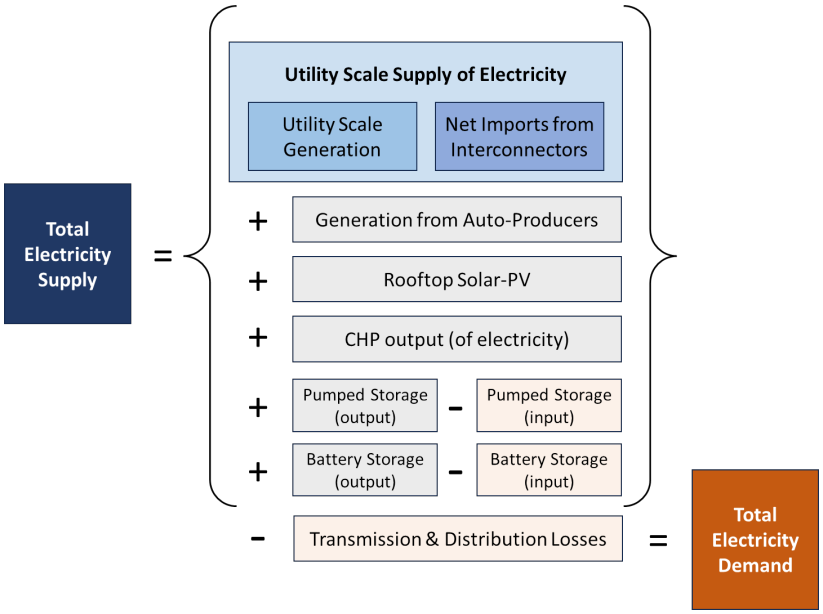
Ireland's Indigenous gas supply from the Corrib gas field was down 13.5% in the first-half of 2024, compared to the same period last year. Imported gas supply in the first-half of 2024 was up 0.6%, and imported gas in the first-half of 2024 accounted for 79.4% of Ireland's total gas supply.

Methodological notes on extrapolating emissions to the end of the first carbon budget (2021-2025)

Note that the above estimates of total electricity (41 $MtCO_2e$) and transport (58 $MtCO_2e$) sector emissions to the end of the first carbon budget are based on simple short-term extrapolations of the observed emissions for the first six months of 2024. Although based on the best measured data currently available, these simple extrapolations do not account for anticipated changes in Government policy, technology ramp-up, socio-economic, or unpredicted market shifts, and so should only be regarded as short-term indicators. The National Energy Projections and GHG Emissions Projections published by SEAI's Modelling Team, and the EPA, respectively, provide medium- and long-term indicators of Ireland's future energy-related emissions. These fuller projections account for a wide range of policy and measure scenarios, economic growth, and other factors that can influence Ireland's energy system transition, to support robust policy planning and prioritisation for the future.

3 Electricity Supply & Emissions

The monthly data currently available to SEAI on electricity supply covers only the *utility scale supply* of electricity, i.e. the electricity supplied by large-scale grid-connected sites, and through international interconnectors. As a result, the monthly data does not capture instances of mini- or micro-generation of electricity, for example the electricity generated in rooftop solar panels. The monthly data also does not capture the small number of auto-producers active in Ireland that generate electricity for their own consumption.



Nonetheless, the fast-provisional total utility scale supply of electricity calculated from monthly data serves as an excellent proxy for identifying developing trends in Ireland's total electricity supply, and the total electricity demand driving that supply. The utility scale supply of electricity in recent years has accounted for over 95% of overall electricity supply. Small-scale electricity generation, as well as transmission, distribution, and storage losses, are fully accounted for in SEAI's National Energy Balance, which benefits from more definitive annual surveys and cross-agency reconciliations of data.

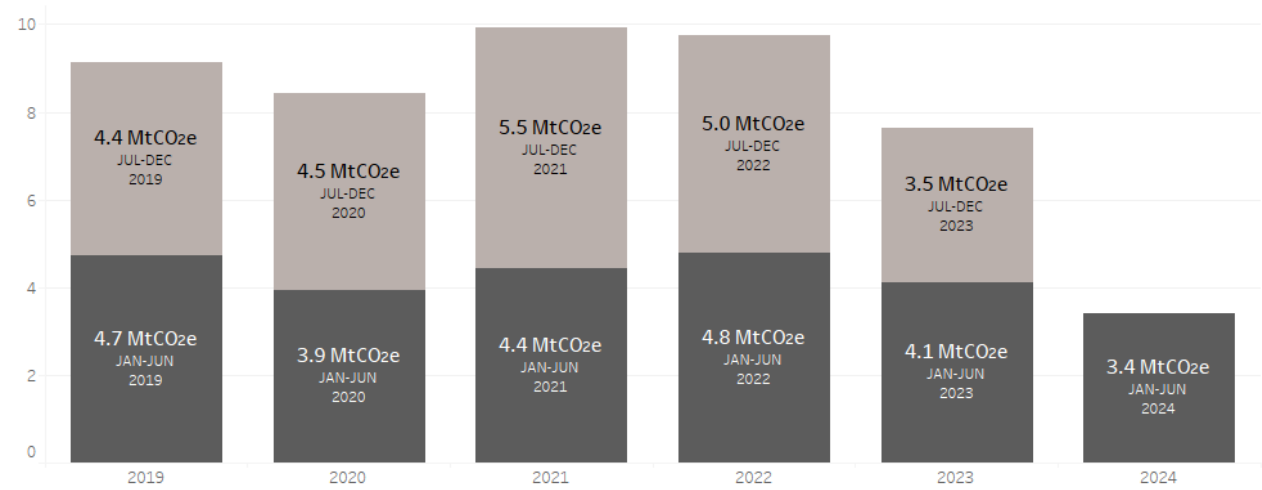
For this note, SEAI has used the *utility scale supply of electricity* to identify and quantify emerging trends in:

- Electricity generation emissions.
- Electricity supply – including net imports of electricity.
- Electricity generation – including renewable generation of electricity.

3.1 Electricity Emissions

SEAI estimates that emissions from the electricity sector, under the national carbon budgets[2], in the 6-month period of January-to-June 2024 were 3.4 $MtCO_2e$. Emissions from the electricity sector in January-to-June 2024 were down 17.2% on the same period one-year earlier. This drop in emissions from the electricity sector was mainly driven by increased use of imported electricity, reduced use of fossil fuels for generation, and increased use of renewables for generation.

Figure 1 - SEAI estimate of emissions from the electricity sector ($MtCO_2e$) for the last 5 years, broken into half year periods, i.e. January-to-June and July-to-December.



If SEAI's estimate of emissions from the electricity sector in the 6-month period of January-to-June 2024 remains representative of how those emissions will trend over the subsequent 18-months, then the total emissions from the electricity sector in the 5-year period of the first carbon budget will sum to approximately 41 $MtCO_2e$. This would be approximately 1 $MtCO_2e$ over the 40 $MtCO_2e$ sectoral emission ceiling allowed for electricity. It is important to note that this simple extrapolation of emissions from the electricity sector to the end of 2025 could be shifted positively or negatively by many different factors over the next 18-months.

Factors that could influence the electricity sector emissions extrapolation over the next 18-months include:

- Price differentials between international electricity markets and their impact on interconnector imports.
- Physical balancing of supply and demand within the Ireland's *Integrated Single Electricity Market* (I-SEM), which covers both the Republic of Ireland and Northern Ireland.
- Changes in electricity demand and wholesale natural gas prices.
- Wind conditions and other weather effects.
- Increases in wind and solar capacity.
- (Un)scheduled maintenance of public thermal power plants.

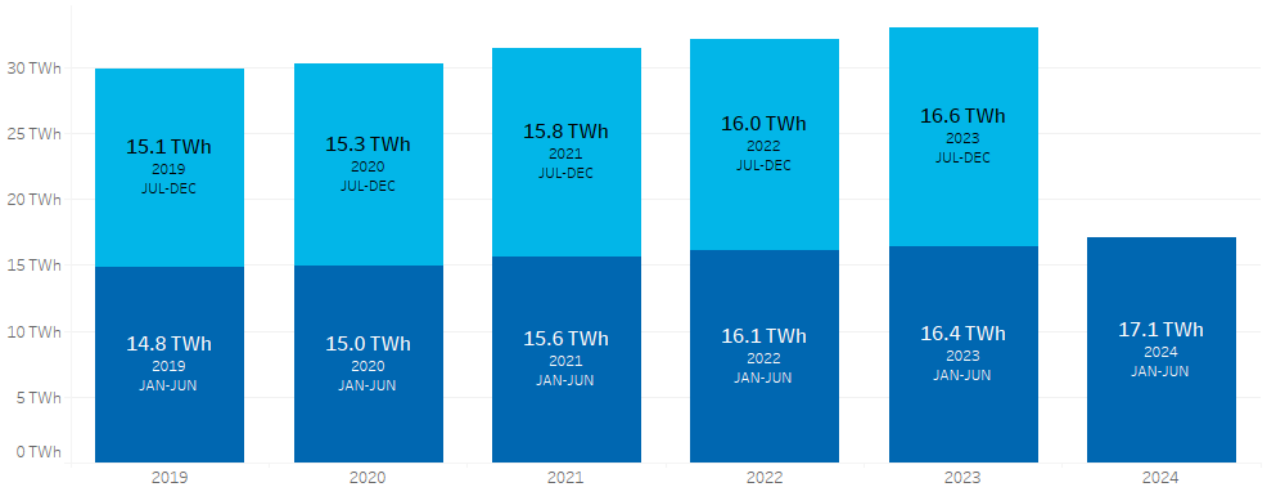
The definitive electricity sector emissions for Ireland in the first carbon budget will be calculated and published by the EPA, through Ireland's greenhouse gas inventory.

[2] As per the EPA's GHG inventory, electricity sector emissions under the carbon budgets are given by the sum of emissions from (1) *public electricity and heat production (IPCC code 1.A.1.a)*, (2) *solid fuel and other energy industries (IPCC code 1.A.1.c)*, and (3) *fugitive emissions (IPCC code 1.B.1 & 1.B.2)*. As a result, the electricity emission in the carbon budgets include no emissions from auto-producers (including CHP plants), but do include the emissions associated with peat-briquetting, and fugitive emissions, such as the emissions associated with the production, processing, transmission, and storage of natural gas, *etc.*

3.2 Electricity Generation & Supply

The utility scale supply of electricity was 17.1 TWh in the 6-month period of January-to-June 2024. The utility scale supply of electricity from monthly data serves as an excellent proxy for identifying trends in both total electricity supply and total electricity demand. The utility scale supply of electricity in January to June 2024 was up by 4.0% on the same period one-year earlier. The increase in utility scale supply of electricity in January to June 2024 came mainly from an increased use of imported electricity.

Figure 2 - Utility scale supply of electricity (TWh) for the last 5 years, broken into half year periods, *i.e.* January-to-June and July-to-December.



The utility scale supply of electricity from indigenous generation in Ireland, i.e. Irish (fossil fuelled) thermal plants, wind farms, solar farms, etc., was 14.6 TWh in the 6-month period of January-to-June 2024. The utility scale supply of electricity from indigenous generation in January-to-June 2024 was down by 3.1% on the same period one-year earlier.

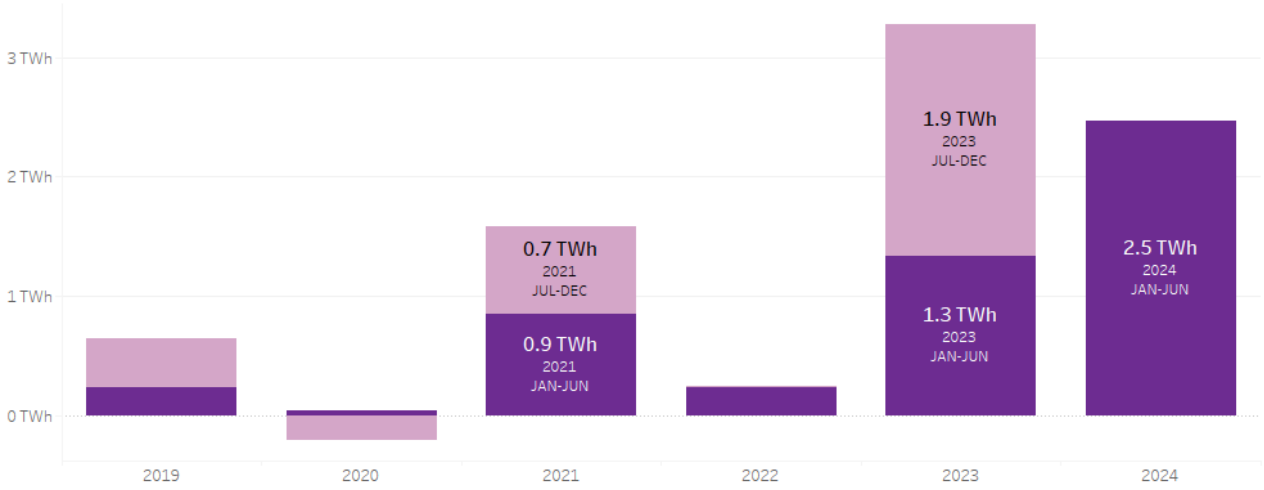
Figure 3 - Utility scale supply of electricity from indigenous generation (TWh) for the last 5 years, broken into half year periods. i.e. January-to-June and July-to-December.

Net imports of electricity across international interconnectors into Ireland provided 2.5 TWh of electricity in the 6-month period of January-to-June 2024. This net import value sums the import and export flows across:

- The North-South interconnector to Northern Ireland, which is within the *integrated single electricity market* for Ireland (SEM), and
- The East-West interconnector to Great Britain's electricity market.

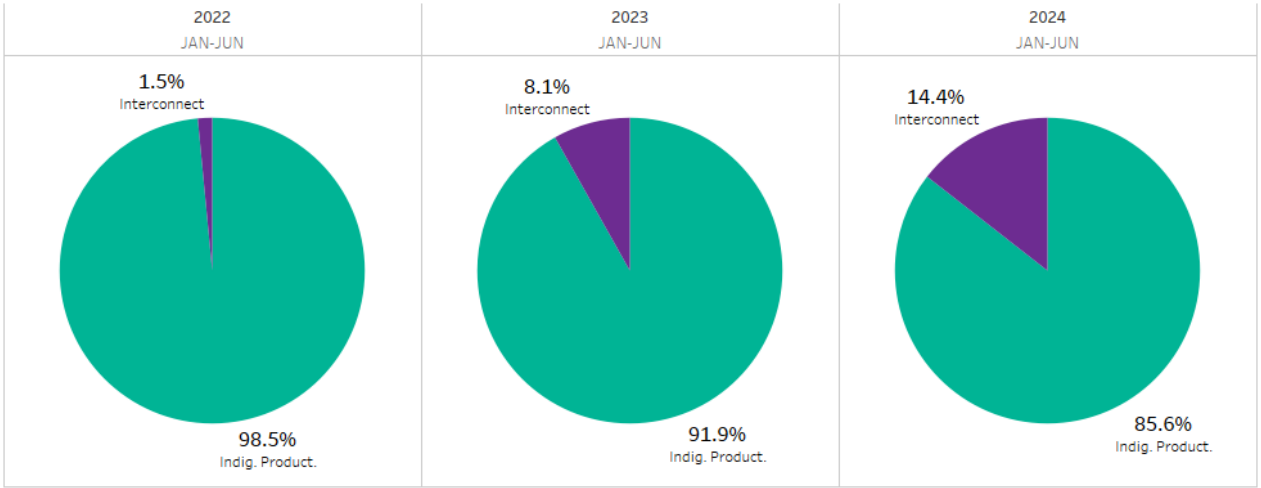
Net imports of electricity in January-to-June 2024 were up by 84% on the same period one-year earlier.

Figure 4 - Net imports of electricity across international interconnectors (TWh) for the last 5 years, broken into half year periods, i.e. January-to-June and July-to-December.



Net imports of electricity accounted for 14.4% of Ireland's utility scale supply of electricity in the 6-month period of January-to-June 2024. Net imports of electricity in January-to-June 2024 accounted for a larger share of Ireland's overall utility scale supply of electricity than for the same period one-year earlier (8.1%) and two-years earlier (1.5%).

Figure 5 – The percentage contribution of net imports to Ireland's overall utility scale supply of electricity in the first 6-months of 2022, 2023, and 2024.



3.3 Renewable Electricity

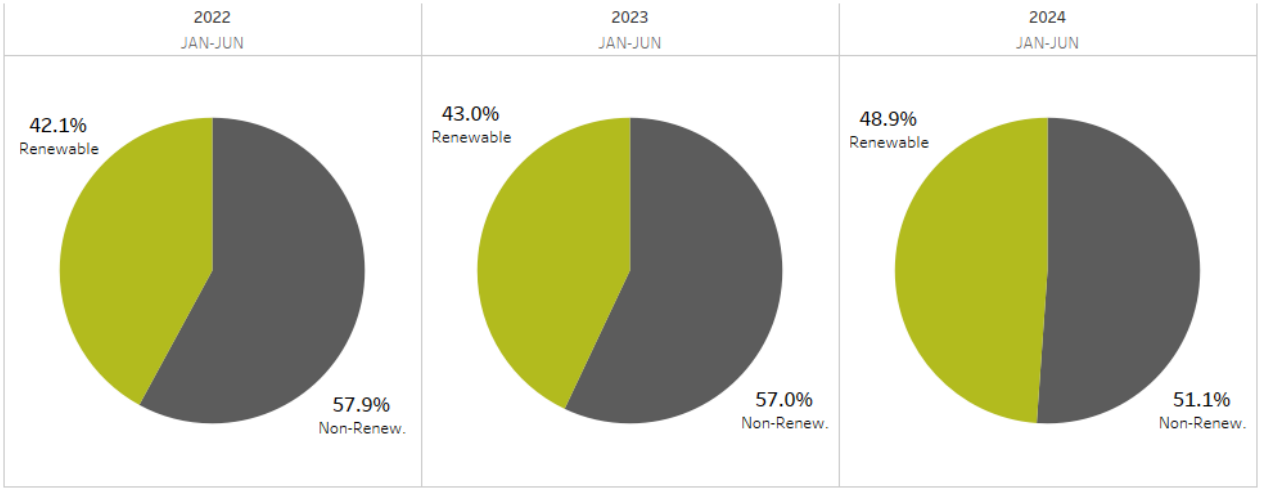
Utility scale renewable generation of electricity, for example, from wind farms, solar farms, hydro-electricity plants, etc., was 7.1 TWh in the 6-month period of January-to-June 2024. Utility scale renewable generation in January-to-June 2024 was up 10.2% on the same period one-year earlier. This increase in utility scale renewable generation was largely driven by increased generation from wind farms and solar farms - see *Figure 9* and *Figure 10* for details.

Figure 6 - Utility scale renewable generation of electricity (TWh) for the last 5 years, broken in half year periods. i.e. January-to-June and July-to-December.

The monthly data available to SEAI does not capture instances of mini- or micro-generation of renewable electricity, for example, the electricity generated by rooftop solar-panels. As a result, the utility scale renewable generation of electricity data shown in Figure 6 will be approximately 0.2 to 0.3 TWh below the *total* annual renewable generation of electricity in Ireland (in 2023 and 2024).

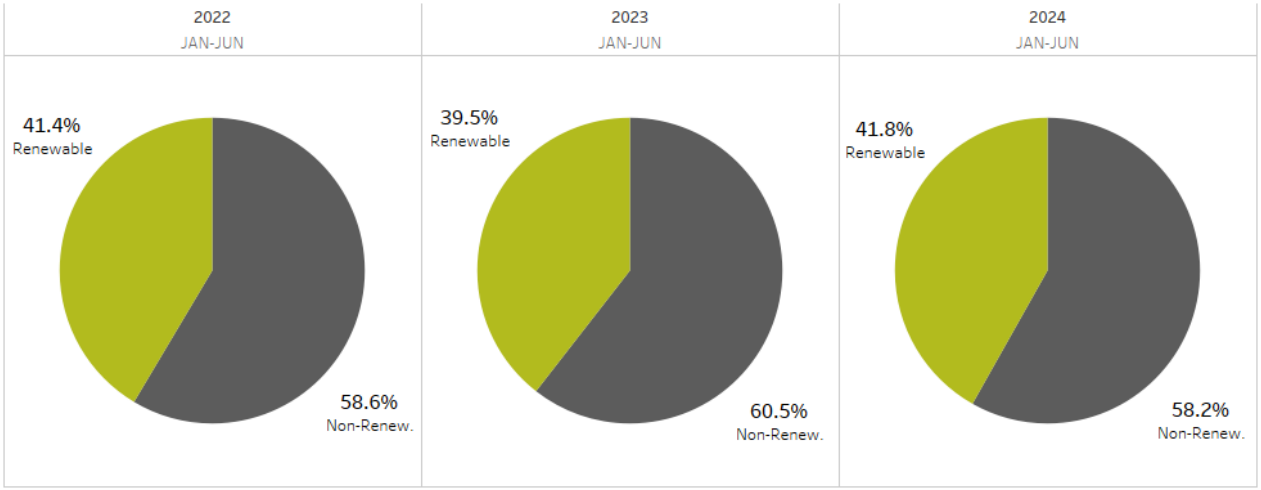
Utility scale renewable generation accounted for 48.9% of Ireland's utility scale electricity generation in the 6-month period of January-to-June 2024. Utility scale renewable generation in January-to-June 2024 accounted for a larger share of Ireland's overall utility scale electricity generation than in the same period one-year earlier (43.0%) and two-years earlier (42.1%).

Figure 7 – Percentage contribution of utility scale renewable generation to Ireland's overall utility scale generation of electricity in the first 6-months of 2022, 2023, and 2024.



Utility scale renewable generation accounted for 41.8% of Ireland's utility scale supply of electricity in the 6-month period of January-to-June 2024[3]. Utility scale renewable generation in January-to-June 2024 accounted for a larger share of Ireland's overall utility scale supply of electricity than in the same period one-year earlier (39.5%) and almost the same share than two-years earlier (41.4%).

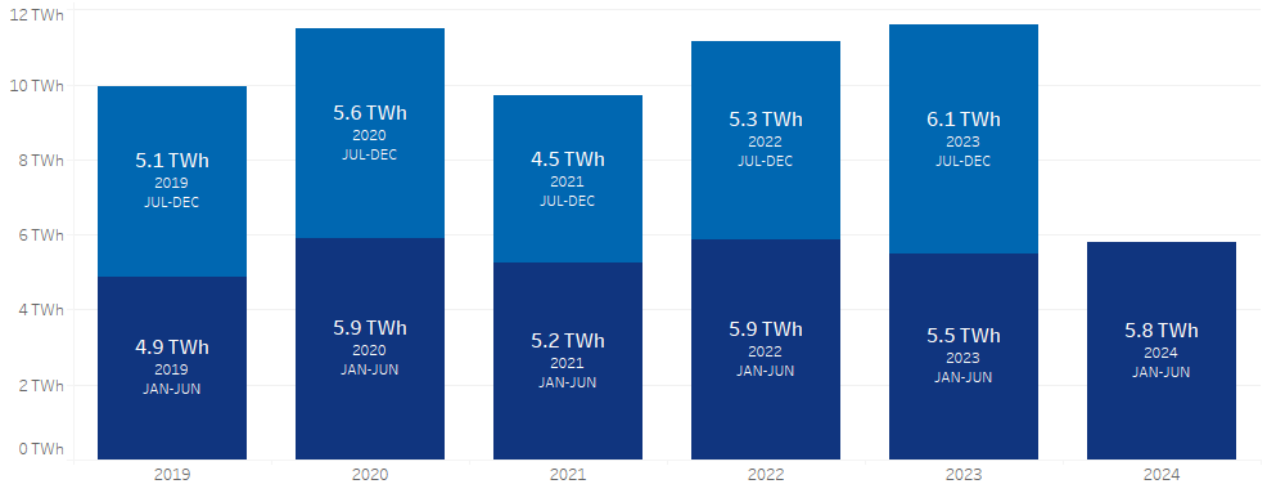
Figure 8 - The percentage contribution of renewable generation to Ireland's utility scale supply of electricity in the first 6-months of 2022, 2023, and 2024.



[3] Although this value can be regarded as a leading indicator of Ireland's renewable share of energy in electricity (RES-E), it is not directly equivalent to the RES-E value, because the methodology for the RES-E calculation additionally includes (1) mini- and micro-generation of renewable electricity, (2) the electricity generated by auto-producers (including CHP plants), (3) multi-year normalisation of wind and hydro generation, and (4) a formal accounting for the sustainability status of various biomass fuels.

Utility scale wind generation in Ireland was 5.8 TWh in the 6-month period of January-to-June 2024. Utility scale wind generation in January-to-June 2024 was up 5.9% on the same period one-year earlier. Note that the intermittency of wind generation can act to complicate straightforward year-to-year comparisons. Comprehensive insights on the developing trends in utility scale wind generation should therefore include a consideration of trends in installed capacity, the number of sites at the planning and application stages, etc., which can be found in SEAI's annual Energy in Ireland report.

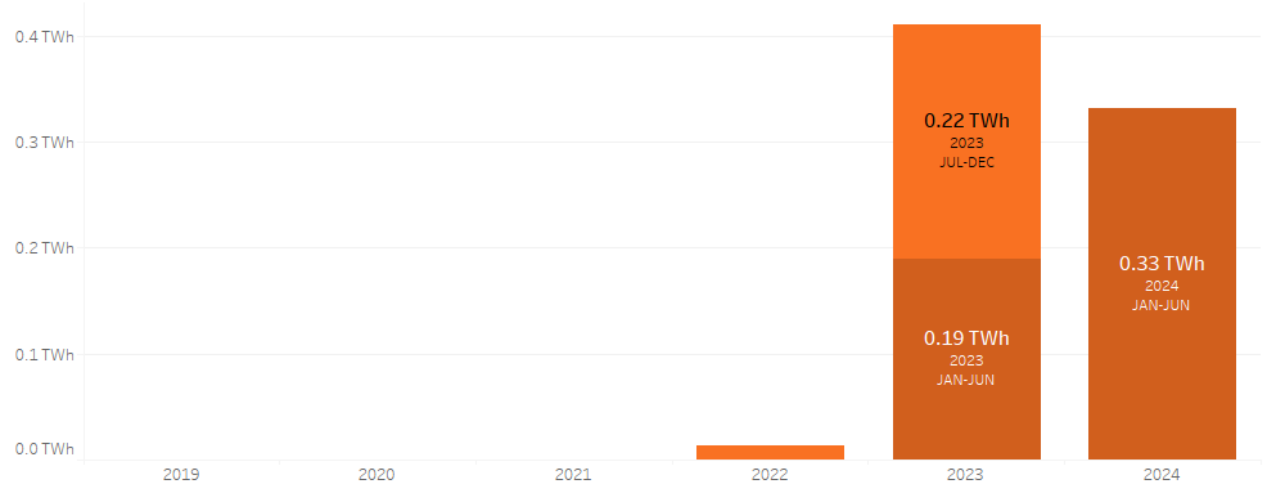
Figure 9 - Utility scale wind generation (TWh) for the last 5 years, broken into half year periods, i.e. January-to-June and July-to-December.



Note that the monthly data available to SEAI does not capture instances of mini- or micro-generation of electricity from wind or instances of auto-producers generating electricity from wind. As a result, the utility scale wind generation shown in Figure 9 underestimates the total annual generation of electricity from Wind (by approx. 0.1 TWh in 2023 and 2024).

Utility scale of solar photovoltaic (PV) generation, for example from solar farms, in the 6-month period of January-to-June 2024 was 0.33 TWh. Utility scale solar-PV generation in January-to-June 2024 was up by 75% on the same period one-year earlier. Note that prior to the summer of 2022, there was no significant utility scale solar farms connected to the electricity grid.

Figure 10 – Utility scale solar-PV generation (TWh) for the last 5 years, broken into half year periods January-to-June and July-to-December.



Note that the monthly data available to SEAI does not capture the electricity generated by rooftop solar-panels, so the data in *Figure 10* corresponds to the electricity generated from solar farms only. *Figure 10* does not include electricity generated from rooftop solar panels. For reference, in 2023, utility-scale grid-connected solar farms accounted for 64% of all solar PV generation, with 36% coming from rooftop solar panels.

4 Gas Supply & Demand and Related Emissions

Ireland's national gas supply comes from the sum *indigenous production* at the Corrib Gas Field and *international imports* from the UK through a pair of international interconnectors to Moffat in Scotland.

SEAI uses public data from the Gas Network Ireland dashboard, and monthly survey returns from the Corrib Gas Field, to determine Ireland's national gas supply, and its split across indigenous production and imports flows. SEAI uses additional data kindly provided by Gas Network Ireland to understand how the national gas supply is apportioned against different high-level sectors of the economy, e.g. residential, electricity generation, and industry and services.

For this note, SEAI has used the above data to identify emerging trends in the following key areas:

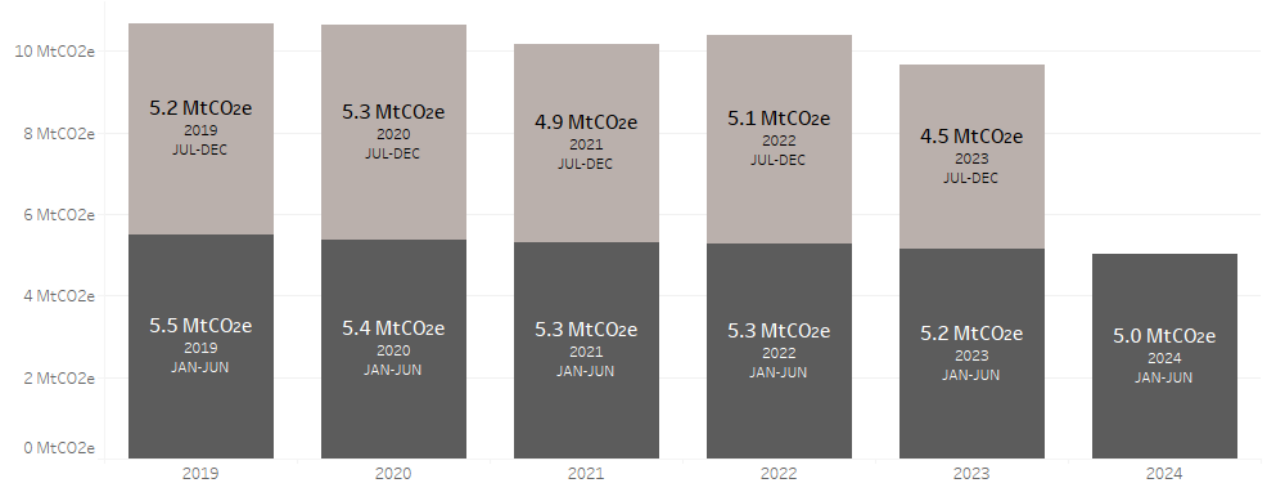
- Gas-related emissions – total and by high-level sector
- Gas demand – total and by high-level sector
- Gas supply – total and import / indigenous splits

The gas supply and demand data in this note are expressed in terms of gross calorific value (GCV), while SEAI's national Energy Balance expresses all energy in terms of net calorific value (NCV). The net calorific value can be calculated from the gross calorific value by multiplying by a factor of 0.902.

4.1 Gas Emissions

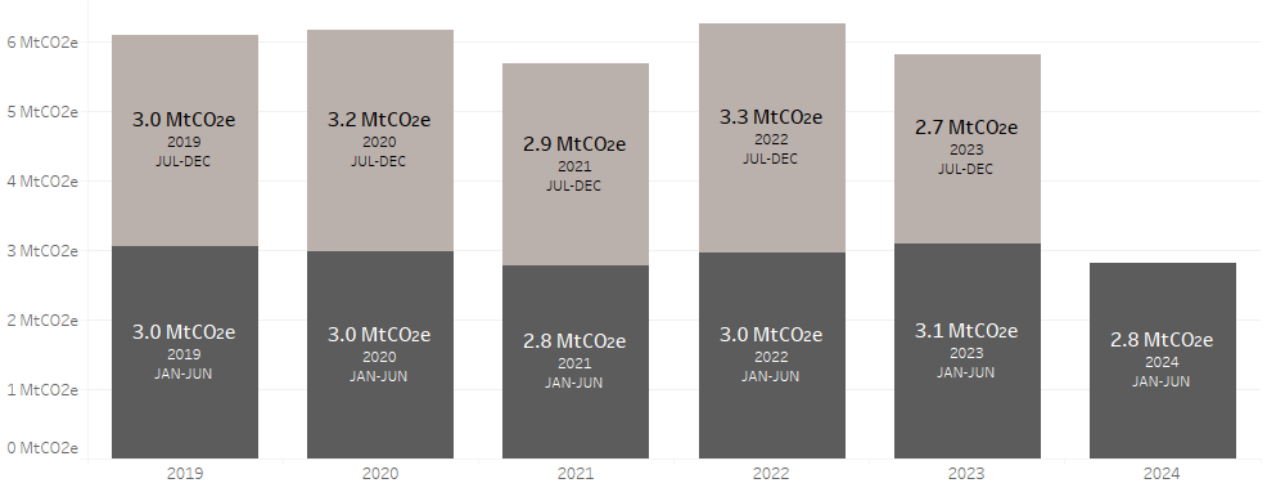
SEAI estimates that total emissions associated with natural gas use in Ireland for the 6-month period of January-to-June 2024 were 5.0 $MtCO_2e$. Total gas emissions in January-to-June 2024 were down by 2.8% on the same period one-year earlier. The drop in total gas emissions was largely driven by reduced use of gas for electricity generation.

Figure 11 - SEAI estimates of total natural gas emissions ($MtCO_2e$) for the last 5 years, broken into half year periods, i.e. January-to-June and July-to-December.



SEAI estimates that emissions from the use of natural gas for electricity generation[4] in the 6-month period of January-to-June 2024 were 2.8 $MtCO_2e$. Emissions from the use of natural gas for electricity generation in January-to-June 2024 were down 9.3% on the same period 12-months earlier.

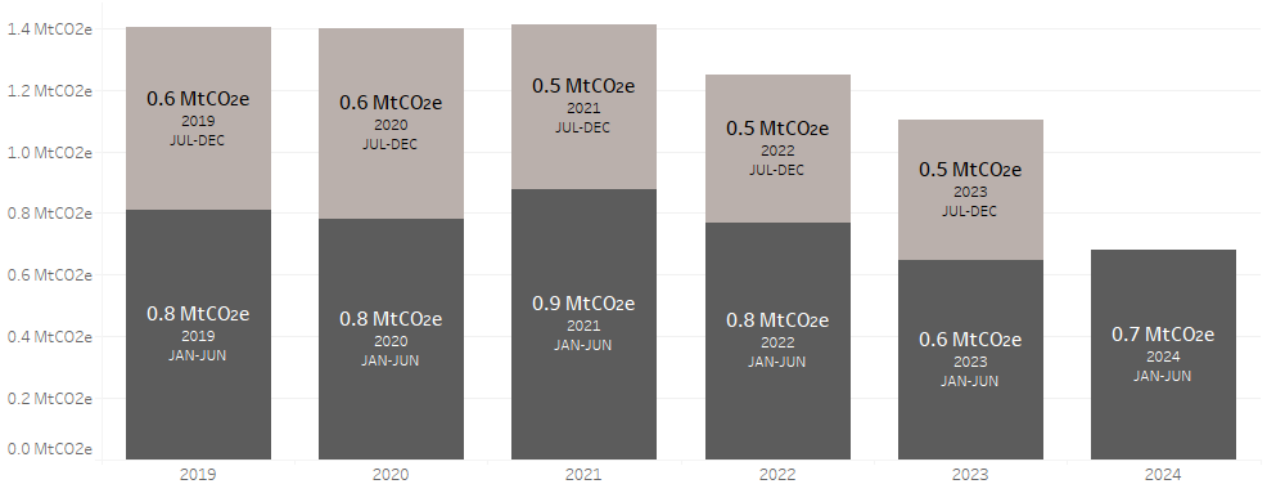
Figure 12 - SEAI estimates of emissions from the use of natural gas for electricity generation (MtCO2e) for the last 5 years, broken into half year periods, i.e. January-to-June and July-to-December.



[4]This estimate of carbon emissions from the use of natural gas in electricity generation is based on the supply of natural gas to GNI's definition of the 'power generation' sector, which includes public thermal plants and gas supplied to large-scale CHP plants.

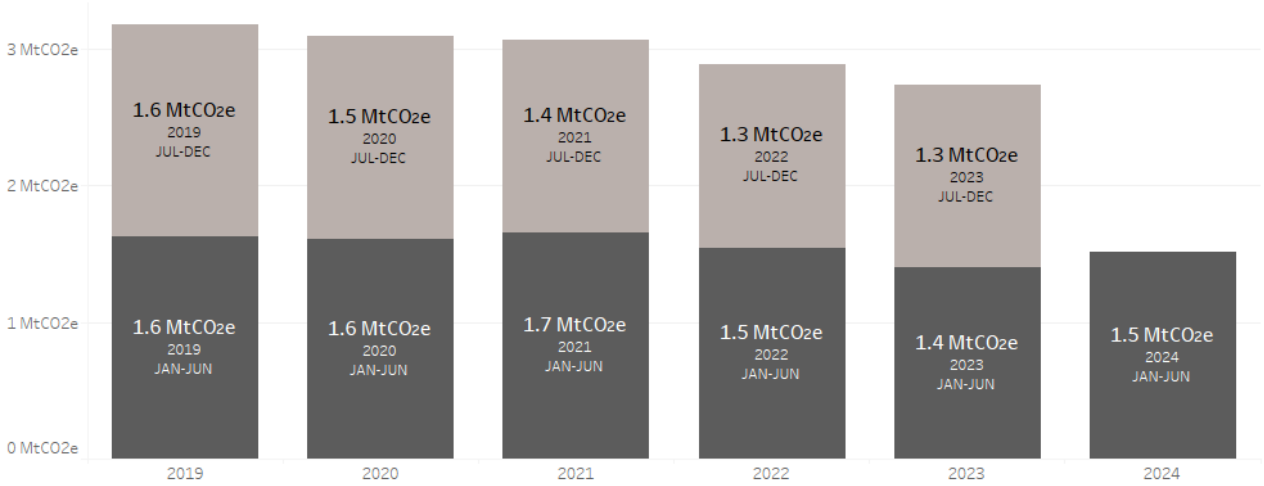
SEAI estimates that emissions from the residential use of natural gas in the 6-month period of January-to-June 2024 were 0.7 $MtCO_2e$. Emissions from the residential use of natural gas in January-to-June 2024 were up 5.1% on the same period one-year earlier[5].

Figure 13 - SEAI estimates of emissions from the residential use of natural gas ($MtCO_2e$) for the last 5 years, broken into half year periods, i.e. January-to-June and July-to-December.



SEAI estimates that emissions from industry and services sector use of natural gas in the 6-month period of January-to-June 2024 were 1.5 $MtCO_2e$. Emissions from industry and services sector use of natural gas in January-to-June 2024 were up 7.9% on the same period one-year earlier.

Figure 13 - SEAI estimates of emissions from industry and services sector use of natural gas ($MtCO_2e$) for the last 5 years, broken into half year periods, i.e. January-to-June and July-to-December.

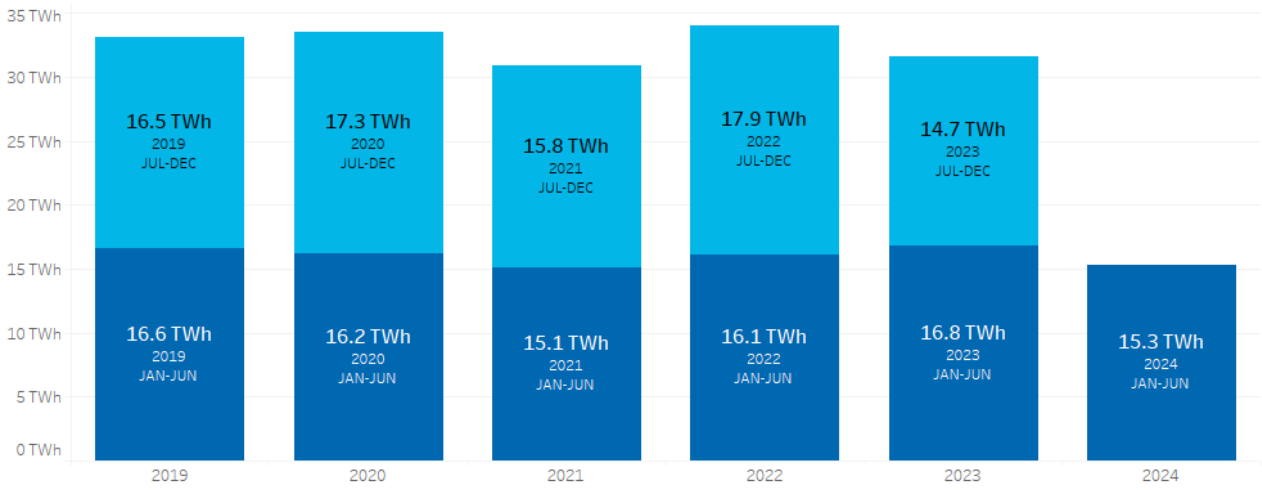


[5] The length and severity of a given winter's 'heating season' has a strong influence on the emissions from the residential use of natural gas. In SEAI's annual *Energy in Ireland* report, a 'heating degree-days' normalisation is applied to the residential heat demand data to better identify long-term trends and shifts.

4.2 Gas Demand

Natural gas demand for electricity generation in the 6-month period of January-to-June 2024 was 15.3 TWh[6]. Natural gas demand for electricity generation in January-to-June 2024 was down 9.3% on the same period one-year earlier.

Figure 15 - Natural gas demand for electricity generation (TWh) for the last 5 years, broken into half year periods, i.e. January-to-June and July-to-December.



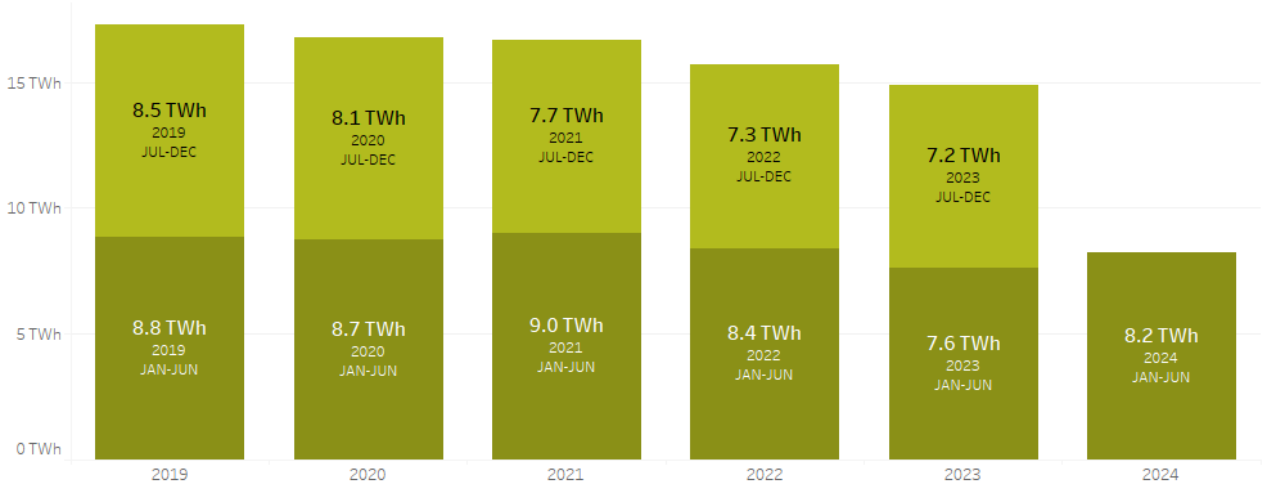
[6] The data in Figure 15 is based on the supply of natural gas to GNI's definition of the 'power generation' sector, which includes public thermal plants and gas supplied to large -scale CHP plants.

Natural gas demand for residential use in the 6-month period of January-to-June 2024 was 3.7 TWh. Natural gas demand for residential use in January-to-June 2024 was up 5.1% on the same period one-year earlier[7].

Figure 16 - Natural gas demand for residential use (TWh) for the last 5 years, broken into half year periods, i.e. January-to-June and July-to-December.

Natural gas demand from the industry and services sectors in the 6-month period of January-to-June 2024 was 8.2 TWh. Natural gas demand from the industry and services sectors in January-to-June 2024 was up 7.9% on the same period one-year earlier.

Figure 17 - Natural gas demand from the industry and services sectors (TWh) for the last 5 years, broken into half year periods, i.e. January-to-June and July-to-December.

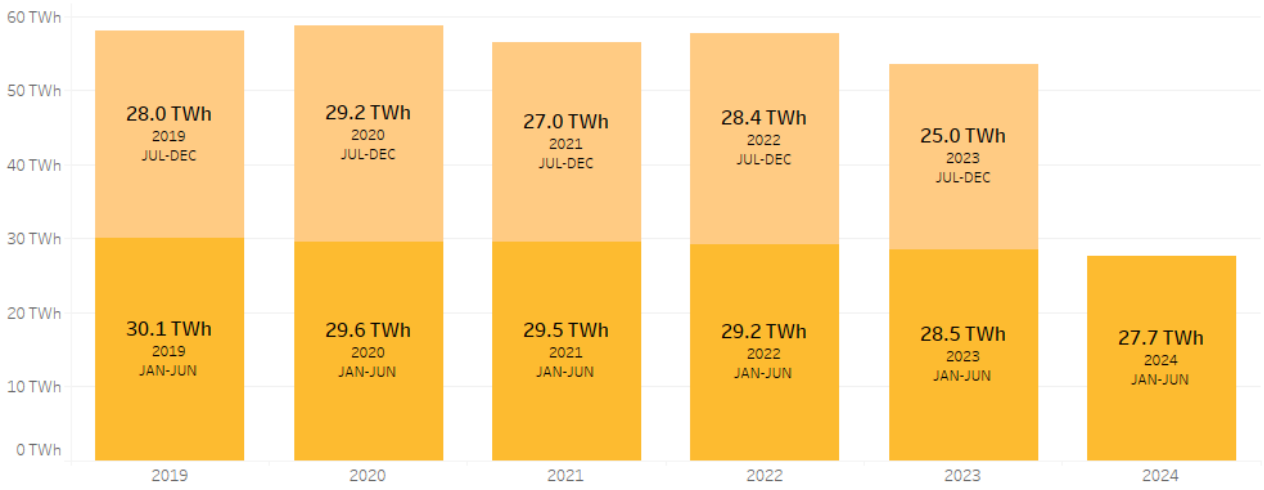


[7] The length and severity of a given winter's 'heating season' has a strong influence on the residential demand of natural gas. In SEAI's annual *Energy in Ireland* report, a 'heating degree-days' normalisation is applied to the residential heat demand data to better identify long-term trends and shifts.

4.3 Gas Supply

Total natural gas supply for Ireland in the 6-month period of January-to-June 2024 was 27.7 TWh. Total natural gas supply for Ireland was down 2.8% on the same period one-year earlier. This decrease in natural gas supply was matched to the corresponding decrease in natural gas demand, which was mainly driven by reduced use of gas for electricity generation.

Figure 18 – Total natural gas supply for Ireland (TWh) for the last 5 years, broken into half year periods, i.e. January-to-June and July-to-December.



Indigenous production of natural gas in the 6-month period of January-to-June 2024 was 5.7 TWh. Indigenous production of natural gas was down 13.5% on the same period one-year earlier. This decrease in indigenous natural gas was mainly driven by the natural lifecycle reduction in output from the Corrib Gas Fields.

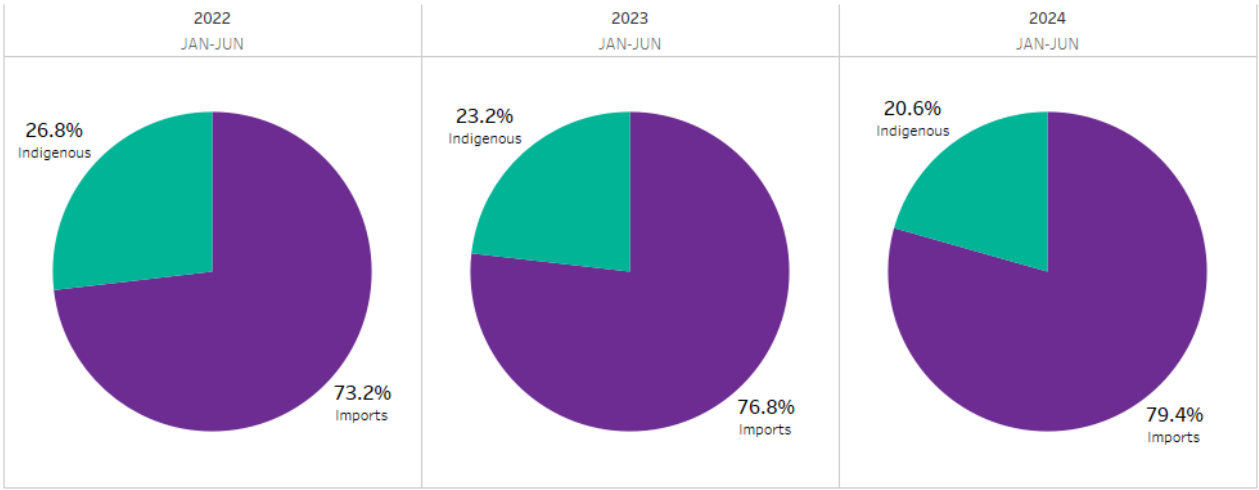
Figure 19 – Indigenous production of natural gas in Ireland (TWh) for the last 5 years, broken into half year periods, i.e. January-to-June and July-to-December.

Imported natural gas in the 6-month period of January-to-June 2024 was 22.0 TWh. Imported natural gas was up 0.6% on the same period one-year earlier.

Figure 20 – Imported natural gas (TWh) for the last 5 years, broken into half year periods, i.e. January-to-June and July-to-December.

Imported natural gas accounted for 79.4% of Ireland's total gas supply in the 6-month period of January-to-June 2024. Imported natural gas in January-to-June 2024 accounted for a larger share of Ireland's total gas supply than in the same period one-year earlier (76.8%) and two-years earlier (73.2%).

Figure 21 – The percentage contribution of imported natural gas to Ireland's total supply of natural gas in the first 6-months of 2022, 2023, and 2024.



5 Oil Product Deliveries and Emissions

Monthly data on the delivery of both oil products and biofuel products to the Irish market is made available to SEAI through its access to the national oil levy administration (OLA) database, which is maintained and operated by the Department of the Environment, Climate and Communication (DECC). SEAI uses data from DECC's OLA database to satisfy several of Ireland's energy reporting obligations to the European Commission under the Energy Statistics Regulation 1099/2008, and to populate the national Energy Balance for Ireland.

Relevant obligated parties, for example large oil suppliers operating in the Irish market, are required to make monthly submission to the OLA database. Despite occasional corrections and revisions by these suppliers, the running total of monthly *gross inland deliveries* provides an excellent fast-provisional proxy for identifying trends in Ireland's demand for oil products and biofuel blending.

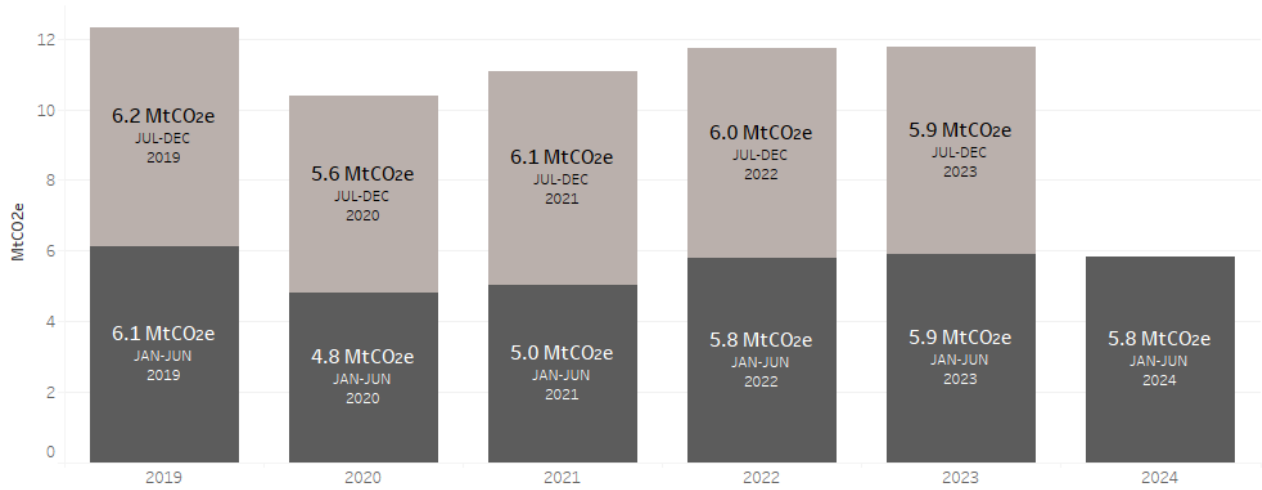
For this note, SEAI has used the monthly gross inland deliveries of key oil products and biofuel products to identify and quantify emerging trends in:

- Oil-related emissions – for road transport, and heating
- Oil demand – for road transport, aviation, and heating
- Biofuel blending – in road diesel and road petrol

5.1 Oil Emissions

Over 98% of Ireland's national transport emissions[8] come from the combustion of oil products, particularly in road transport. SEAI estimates that emissions from the transport sector, under the national carbon budgets[9], in the 6-month period of January-to-June 2024 were 5.8 $MtCO_2e$. Emissions from the transport sector in January-to-June 2024 were down 1.3% on the same period one-year earlier.

Figure 22 - SEAI estimate of transport sector emissions ($MtCO_2e$) for the last 5 years, broken into half year periods, i.e. January-to-June and July-to-December.



If SEAI's estimate of emissions from the transport sector in the 6-month period of January-to-June 2024 remains representative of how those emissions will trend over the subsequent 18-months, then the total emissions from the transport sector in the 5-year period of the first carbon budget will sum to approximately 58 $MtCO_2e$.This would be approximately 4 $MtCO_2e$ over the 54 $MtCO_2e$ sectoral emission ceiling allowed for transport. It is important to note that this simple extrapolation of emissions from the transport sector to the end of 2025 could be shifted positively or negatively by many different factors over the next 18-months.

Factors that could influence the transport sector emissions extrapolation over the next 18-months include:

- Changes to wholesale oil prices
- Changes to biofuel obligation
- Shift in economic activity (which tends to correlate highly to road freight activity)
- Shift from private car use to public transport
- Increase in number of journeys made using active travel

The definitive transport sector emissions for Ireland in the first carbon budget will be calculated and published by the EPA, through Ireland's greenhouse gas inventory.

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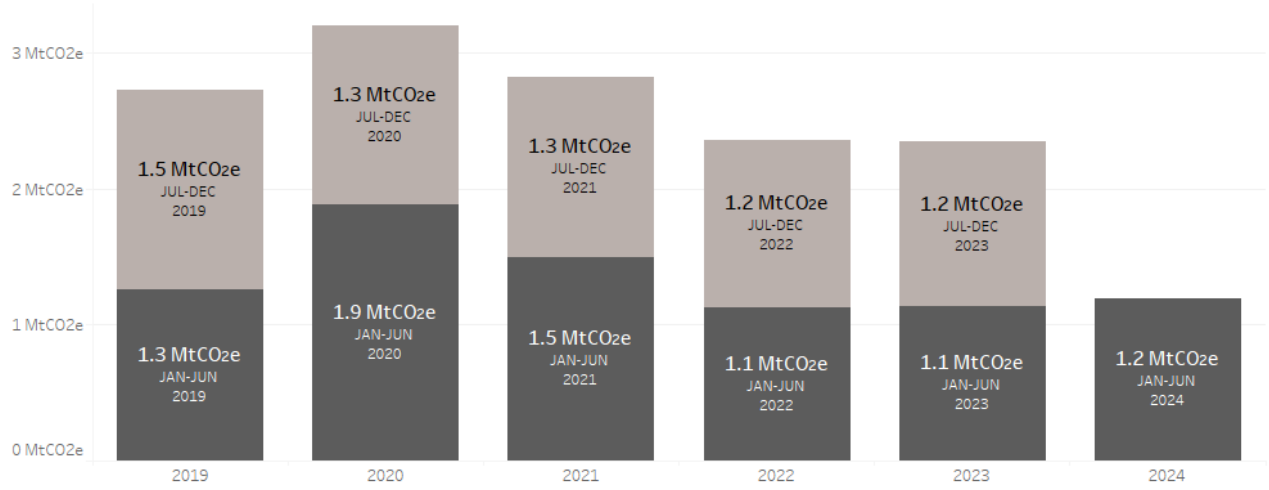
[8] Ireland's national and sectoral transport emissions do not include emissions associated with international aviation or maritime transport, which are calculated and reported separately in accordance with guidance from United Nations Framework Convention on Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change (IPCC).

[9] As per the EPA's GHG inventory, transport sector emissions under the carbon budgets align with IPCC category 1.A.3 *transport* and are the sum of domestic aviation (IPCC 1.A.3.a), road transportation (IPCC 1.A.3.b), railways (IPCC 1.A.3.c), domestic navigation (IPCC 1.A.3.d) and other transportation (IPCC 1.A.3.e).

Approximately 95% of Ireland's heating kerosene demand comes from the residential sector. Therefore, most of the emissions associated with the combustion of heating kerosene come from the residential sector. SEAI estimates that heating kerosene emissions in Ireland for the 6-month period of January-to-June 2024 were 1.2 $MtCO_2e$. Heating kerosene emissions in January-to-June 2024 were up 5.6% on the same period one-year earlier[10].

Figure 23 - SEAI estimate of heating kerosene emissions ($MtCO_2e$) for the last 5 years, broken into half year periods, i.e. January-to-June and July-to-December.

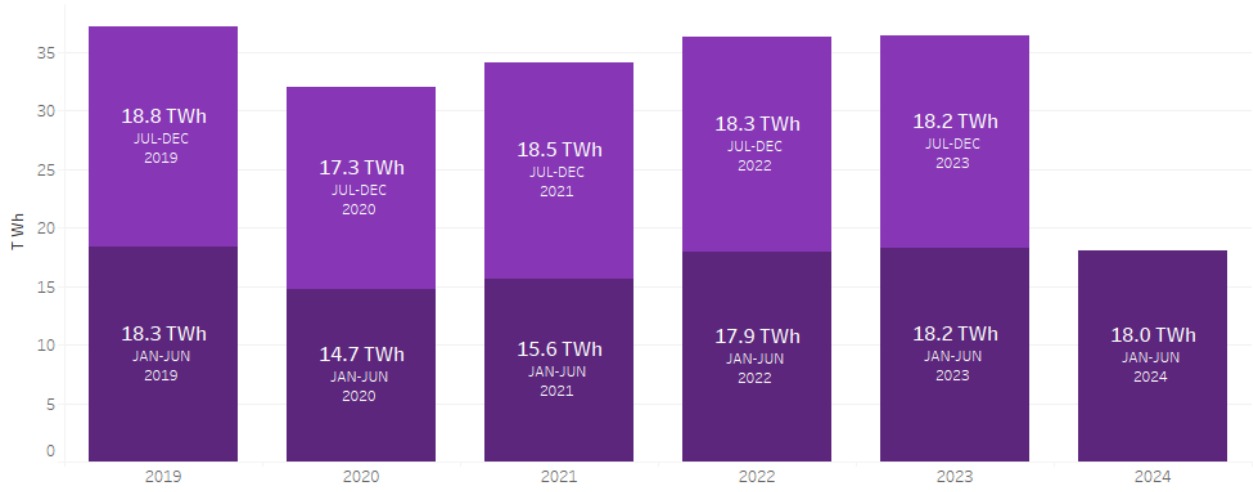


[10] The length and severity of a given winter's 'heating season' has a strong influence on the residential demand for heating kerosene. In SEAI's annual *Energy in Ireland* report, a 'heating degree-days' normalisation is applied to the residential heat demand data to better identify long-term trends and shifts.

5.2 Oil for Road Transport

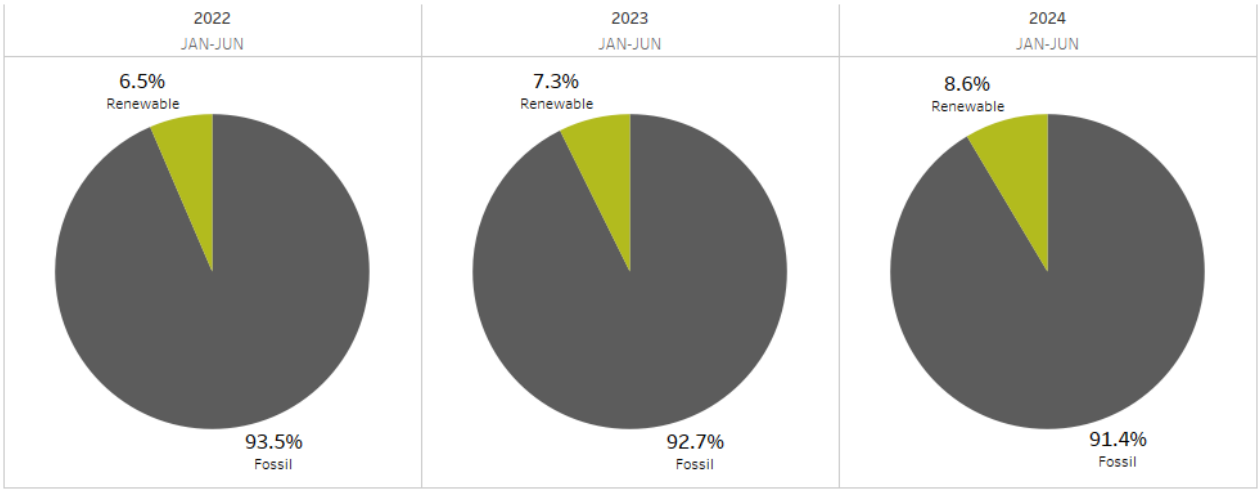
Inland delivery of blended road diesel to the Irish market in the 6-month period of January-to-June 2024 was 18.0 TWh. Inland delivery of blended road diesel was down 1.1% on the same period one-year earlier.

Figure 24 – Inland delivery of blended road diesel (TWh) for the last 5 years, broken into half year periods, i.e. January-to-June and July-to-December.



Biodiesel[11] accounted for 8.6% of the average blended road diesel delivered to the Irish market in the 6-month period of January-to-June 2024, by energy-share[12]. Biodiesel blending in January-to-June 2024 accounted for a larger share of the average blended road diesel than in the same period one-year earlier (7.3%) and two-years earlier (6.5%).

Figure 25 – The percentage contribution of biodiesel to Ireland's average blended road diesel in the first 6-months of 2022, 2023, and 2024.

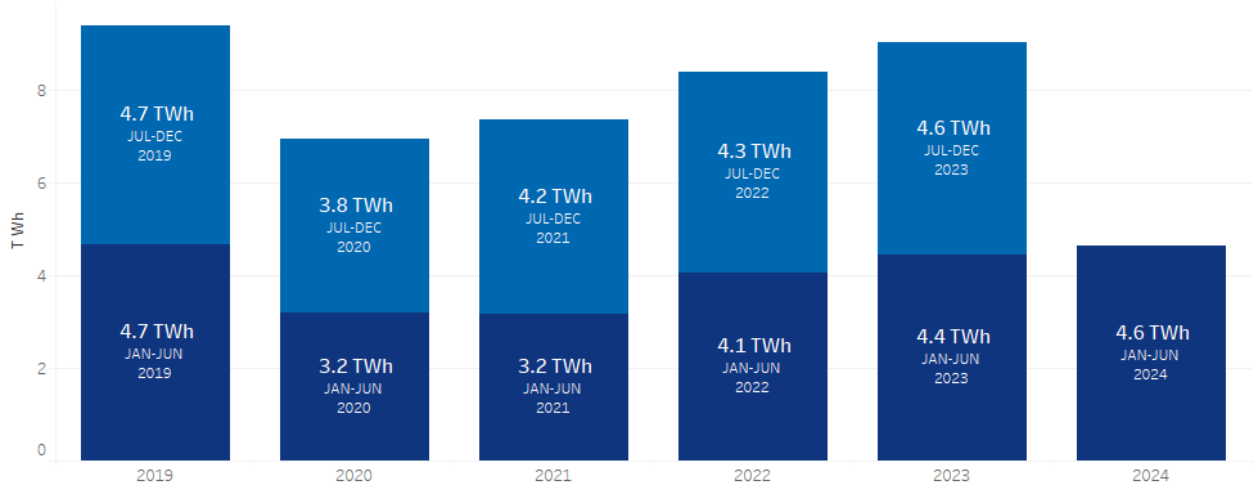


[11] The term 'biodiesel' here includes all methyl ester, hydrotreated vegetable oil (HVO) and co-processed HVO used in place of fossil diesel.

[12] Expressing the biofuel blending in terms of energy-share, rather than on a volume basis, accounts for the differences in the density (kg/m^3) and energy content (kWh/kg) of the renewable- and fossil-components in the blend-mix.

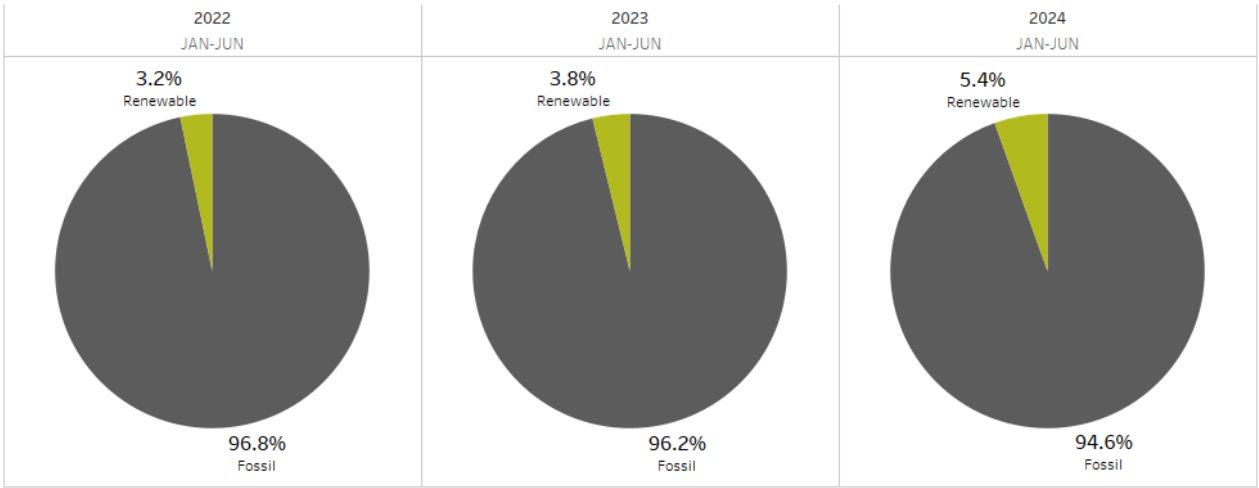
Inland delivery of blended road petrol to the Irish market in the 6-month period of January-to-June 2024 was 4.6 TWh. Inland delivery of blended road petrol was up 4.4% on the same period one-year earlier.

Figure 26 – Inland delivery of blended road petrol (TWh) for the last 5 years, broken into half year periods, i.e. January-to-June and July-to-December.



Bioethanol accounted for 5.4% of the average blended road petrol delivered to the Irish market in the 6-month period of January-to-June 2024, by energy-share. Bioethanol blending in January-to-June 2024 accounted for a larger share of the average blended road petrol than in the same period one-year earlier (3.8%) and two-years earlier (3.2%).

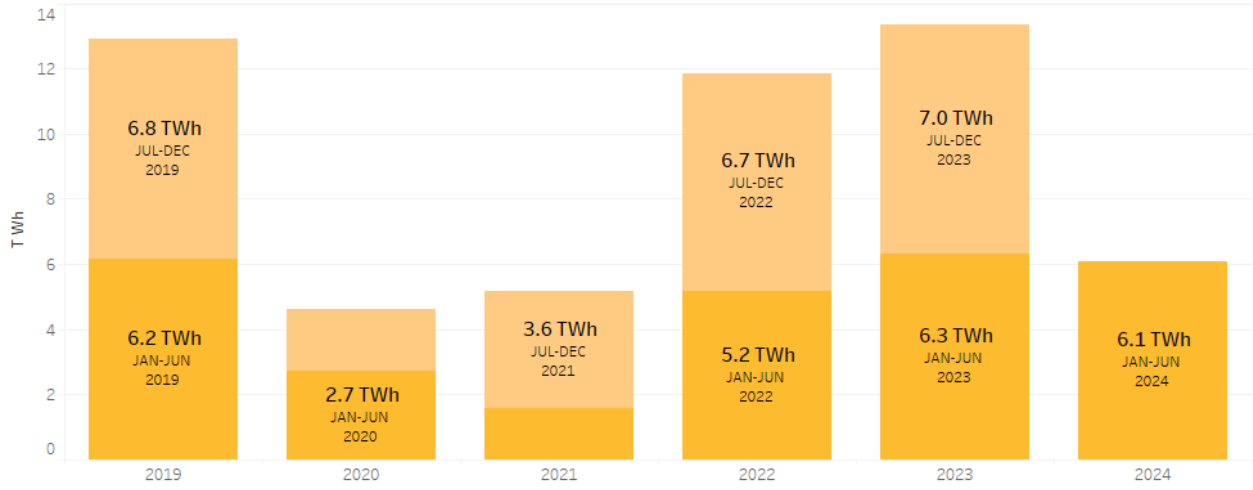
Figure 27 – The percentage contribution of bioethanol to Ireland's average blended road petrol in the first 6-months of 2022, 2023, and 2024.



5.3 Other Oil Deliveries

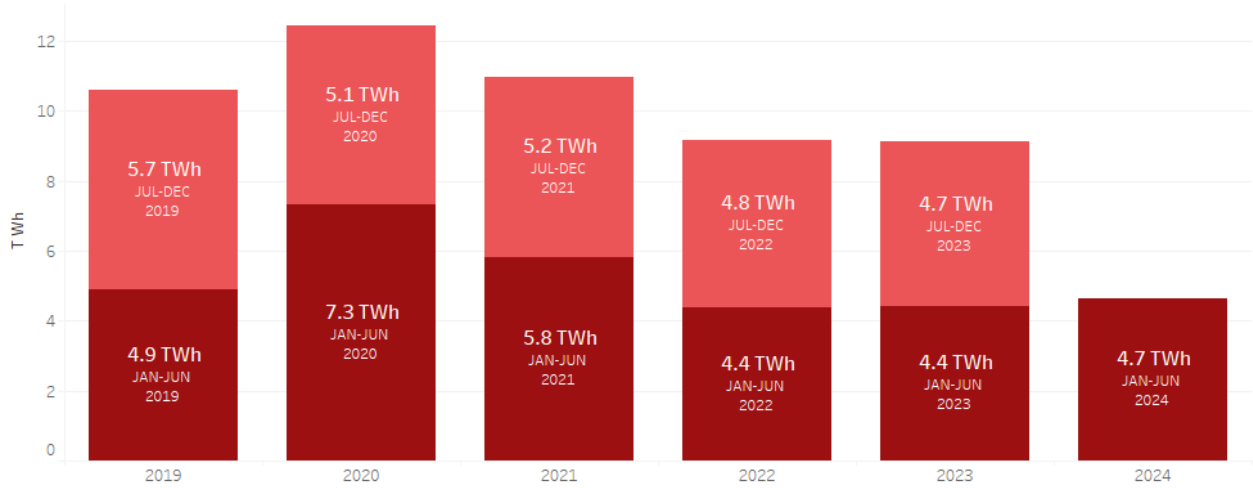
Inland delivery of jet kerosene to the Irish market in the 6-month period of January-to-June 2024 was 6.1 TWh. Inland delivery of jet kerosene was down 3.5% on the same period one-year earlier.

Figure 28 – Inland delivery of jet kerosene (TWh) for the last 5 years, broken into half year periods, i.e. January-to-June and July-to-December.



Inland delivery of heating kerosene to the Irish market in the 6-month period of January-to-June 2024 was 4.7 TWh. Approximately 95% of Ireland's heating kerosene demand comes from the residential sector. Inland delivery of heating kerosene was up 5.6% on the same period one-year earlier[13].

Figure 29 – Inland delivery of heating kerosene (TWh) for the last 5 years, broken into half year periods, i.e. January-to-June and July-to-December.



[13] The length and severity of a given winter's 'heating season' has a strong influence on the residential demand for heating kerosene. In SEAI's annual *Energy in Ireland* report, a 'heating degree-days' normalisation is applied to the residential heat demand data to better identify long-term trends and shifts.

6 Data & Methodology

Monthly Electricity Data

SEAI secures utility scale supply of electricity, i.e. the electricity supplied by large-scale grid-connected sites, and through international interconnectors from Eirgrid every month under the European Energy Statistics Regulation of 2008 (no.1099). While this utility scale data does not capture instances of mini- or micro-generation of electricity, or the relatively small quantity of auto-consumption[14] in Ireland, it acts as an excellent proxy for identifying trends in the demand and supply of electricity in Ireland.

SEAI makes its provisional estimate of electricity emissions by applying weighted effective emission factors to the monthly utility scale generation data, broken down by primary generation source, i.e. natural gas, coal, oil, etc. The effective emission factors are based on definitive annual emission data published by the EPA and the data collected by SEAI via its survey of electricity generators. Where annual effective emission factors lag monthly reporting, SEAI uses an extrapolation of the most recent annual data.

In the context of this report, emissions from the electricity sector refer to GHG emissions under the electricity sectoral emissions ceiling (SEC)[15] and follows the EPA's approach to mapping Ireland's Greenhouse Gas Inventory to the sectoral emissions ceiling sectors[16]. Emissions from the electricity sector include:

- Public electricity and heat production (main activity electricity and heat production, IPCC code 1.A.1.a)
- Manufacture of solid fuels and other energy industries (IPCC code 1.A.1.c)
- Fugitive emissions (IPCC codes 1.B.1 and 1.B.2)

When SEAI estimates emissions from the electricity sector, it normalises the emissions from electricity generation to account for emissions from generators that are not considered main activity producers (i.e. auto-producers). It extrapolates the emissions associated with the manufacture of solid fuel and fugitive emissions from EPA data from previous calendar years and using the latest data for briquette production (collected via its solid fuel survey)[17].

Where electricity generation sources use a blend of renewable and non-renewable fuel inputs, i.e. co-fired peat and biomass, wastes, and other inputs, SEAI applies a renewable / non-renewable 'split'. This is based on the most recent data available, either from the National Energy Balance, or monthly plant-level data from SEAI's survey of electricity generators.

Monthly Gas Data

SEAI uses public data from the Gas Network Ireland dashboard, and monthly survey returns from the Corrib Gas Field, to determine Ireland's national gas supply, and its split across indigenous production and imports flows. SEAI uses additional data kindly provided by Gas Network Ireland to understand how the national gas supply is apportioned against different high-level sectors of the economy, e.g. residential, electricity generation, and industry and services. The gas supply and demand data used to satisfy international reporting obligations is expressed in terms of gross calorific value (GCV). The net calorific value can be calculated from the gross calorific value by multiplying by a factor of 0.902.

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[14] Electricity that is generated and consumed on-site without being exported to the distribution or transmission system.

[15] The government adopted sectoral emissions ceilings setting out the maximum amount of greenhouse gas emissions that are permitted in different sectors of the economy during the first two carbon budget periods: https://www.gov.ie/en/publication/76864-sectoral-emissions-ceilings/

[16] https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/irelands-provisional-greenhouse-gas-emissions-1990-2023.php

[17] Peat briquette production ceased in 2023.

Monthly Oil Data

Monthly data on the inland delivery of oil and biofuel products to the Irish market is made available to SEAI through the national oil levy administration (OLA) database, which is maintained and operated by the Department of the Environment, Climate and Communication (DECC). Relevant obligated parties, i.e. large oil suppliers operating in the Irish market, are required to make monthly submission to the OLA database. SEAI aggregates this data to generate national statistical totals that anonymise the contributions from individual suppliers.

The gross inland delivery of oil and biofuel products correspond to the quantities of products flowing through the market from production to delivery that are now ready for sale or consumption. Refinery outputs, imports, and stock draws all act to increase gross inland delivery quantities. Exports, international marine bunkers (i.e. products purchased for and consumed by vessels carrying out international shipping), and stock-builds all act to decrease gross inland delivery quantities. Inter-product transfers describe the reclassification of products and are therefore reported as a negative value for one product, compensated by a positive value for another product.

Oil delivery data is sourced from the OLA database in units of volume (i.e. litres) with SEAI making the conversion to units of energy. Monthly oil delivery data is published in terms of net calorific value (NCV). SEAI makes simple provisional estimates of the GHG emissions from monthly oil deliveries by applying a weighted effective emission factor (tCO_2eq/TJ) for the relevant fuel and sector, sourced from the latest EPA GHG Emissions Inventory.

SEAI's estimate of the greenhouse gas emissions from the transport sector (SEC)[18] is based on the EPA's approach to mapping Ireland's Greenhouse Gas Inventory to the sectoral emissions ceiling sectors[19]. Emissions from the transport sector include:

- domestic aviation (IPCC 1.A.3.a)
- road transportation (IPCC 1.A.3.b)
- railways (IPCC 1.A.3.c)
- domestic navigation (IPCC 1.A.3.d)
- other transportation (IPCC 1.A.3.e)

SEAI calculates the emissions from road and rail from the monthly inland deliveries of oil products that are consumed in these modes of transport. Road and rail account for around 96% of the total emissions from the transport sector.

Data on the consumption of fuel in domestic aviation, domestic aviation and natural gas pipelines (*i.e.* other transport) is only available annually. Consequently, SEAI impute the emission data for these subsectors using the latest annual data from EPA's GHG Emissions Inventory.

[18] The government adopted sectoral emissions ceilings setting out the maximum amount of greenhouse gas emissions that are permitted in different sectors of the economy during the first two carbon budget periods: https://www.gov.ie/en/publication/76864-sectoral-emissions-ceilings/

[19] https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/irelands-provisional-greenhouse-gas-emissions-1990-2023.php

Version Control

Version	Description / Notes
1.0	Public release copy (03-SEP-2024)

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This co-operation has been especially appreciated in recent years, when the detail and pace of SEAI's data requests have increased, due to expanding international reporting obligations, and the need to produce ever-more-timely energy insights to support evidence-based discussions and decisions on government policy.

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