



# **County Wexford Tier 2 Baseline Emission Inventory April 2023**



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CLIENT NAME: Wexford County Council



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## GLOSSARY OF TERMS

**Baseline Year** – the period for which the data is used to ascertain the GHG emissions for each sector

**BER** - Building Energy Rating

**CIBSE** - Chartered Institution of Building Energy Services Engineers

**CNG** - Compressed Natural Gas

**CO<sub>2</sub>** - Carbon Dioxide

**CSO** - Central Statistics Office

**eq** - equivalent

**F-gases** – Fluorinated gases

**GHG** – Greenhouse Gas Emissions

**GWh** – Gigawatt-hour

**kt** - Kilotons

**ktoe** - kiloton of oil equivalent

**kWh** - Kilowatt Hour

**LPG** - Liquid Petroleum Gas

**LULUCF** – Land Use, land use change, and forestry

**M&R** – Monitoring and Reporting

**MWh** - Megawatt-hour

**PSVs** – Public Service Vehicles

**Public Sector Baseline Period** – Public Sector baseline, including for Wexford County Council is 2016-2018, as set out in the Climate Action Plan 2021

**SEAI** - Sustainable Energy Authority of Ireland

**TFC** - Total Final Consumption

**WCC** - Wexford County Council

**WWTP** - Wastewater Treatment Plant

## 1.0 EXECUTIVE SUMMARY

The national carbon reduction targets set out in the Climate Action and Low Carbon Development (Amendment) Act 2021 are 51% reduction by 2030, compared to 2018 levels.

Wexford County Council is required, under Section 16 of the Climate Action and Low Carbon Development (Amendment) Act 2021, to prepare a Local Authority Climate Action Plan (LACAP). The LACAP will outline the pathway for Wexford County Council to reduce its Greenhouse Gas Emissions (GHG) by the required 51% by 2030. The LACAP will outline the pathway for Wexford County Council to reduce its Greenhouse Gas Emissions (GHG) by the required 51% in non-electricity emissions and by SEAI's projection for supply-side emissions reduction for the electricity grid (77%) by 2030. Hence, Wexford County Council must reduce total GHG emissions from energy by 68% overall. This is compared to GHG emission levels from 2016-2018, which has been set as the baseline.

***The National Climate Action Plan 2023, Section 10 requires all public sector bodies including local authorities to calculate their baseline GHG's for 2018 using an average of years 2016-2018.***

For the purpose of this report and the data analysis, all GHG are converted and reported as CO<sub>2</sub>eq emissions, or CO<sub>2</sub>eq. Some emissions are actual carbon dioxide (CO<sub>2</sub>), some are methane (CH<sub>4</sub>) and some are Nitrous Oxide (N<sub>2</sub>O). All emissions are converted into CO<sub>2</sub>eq.

The quantitative Baseline Emission Inventory was prepared in accordance with the methodology provided in "Technical Annex C: Climate Mitigation Assessment" of the Local Authority Climate Action Plan Guidelines" (DECC, 2023). These guidelines outlined the Tier 2 approach to be taken by the Local Authorities in the development of the Baseline Emissions Inventory at County Level. Tier 2 is the bottom-up approach for data analysis, which takes national datasets and local-scale datasets together to look at county wide GHG emissions across various sectors which include:

- Residential
- Manufacturing & Commercial
- Industrial Processes
- Agriculture
- Transport
- Land Use Change and Forestry (LULUCF)
- Waste
- F-gases

The Local Authority Climate Action Plan (LACAP) will outline the specific target for Wexford County Council and therefore included in this BEI is the extraction of Wexford County Councils direct GHG emissions from the above sectors. Wexford County Councils data is reported as a separate sector in this report. Wexford County Council has full accountability and obligations to reduce its own GHG emissions by 51% (68% when taking supply-side emissions reduction for the electricity grid into account) by 2030, and can influence, co-ordinate, facilitate and advocate for all other sectors to reduce their own GHG emissions by 51% by 2030. The BEI therefore outlines the 2018 baseline data for County Wexford as a whole, which includes Wexford County Councils 2018 data. However, for

Wexford County Councils own targets, the 2016-2018 baseline period has been used, as outlined in the Climate Action Plan 2021. Both sets of data are reported in Chapter 4.

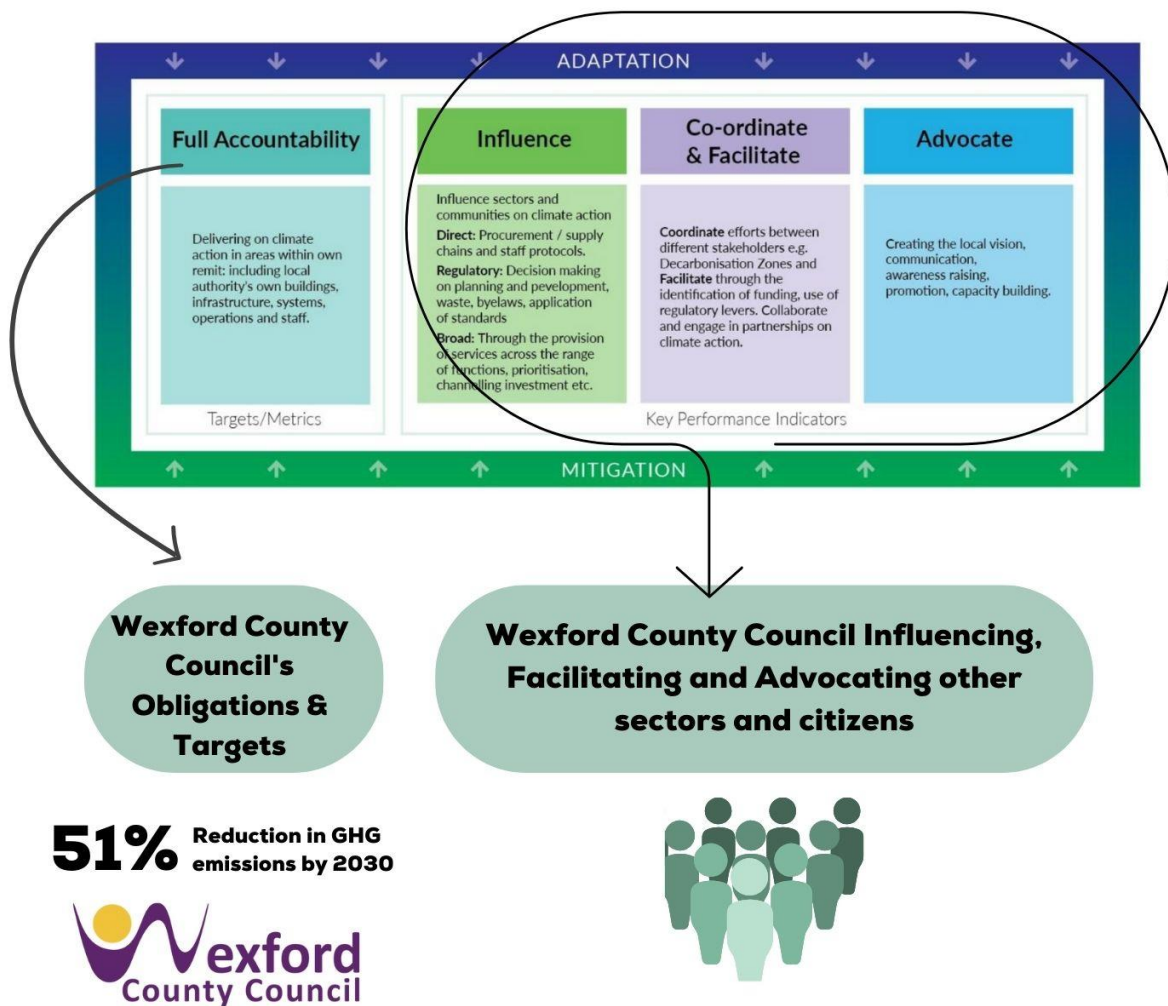
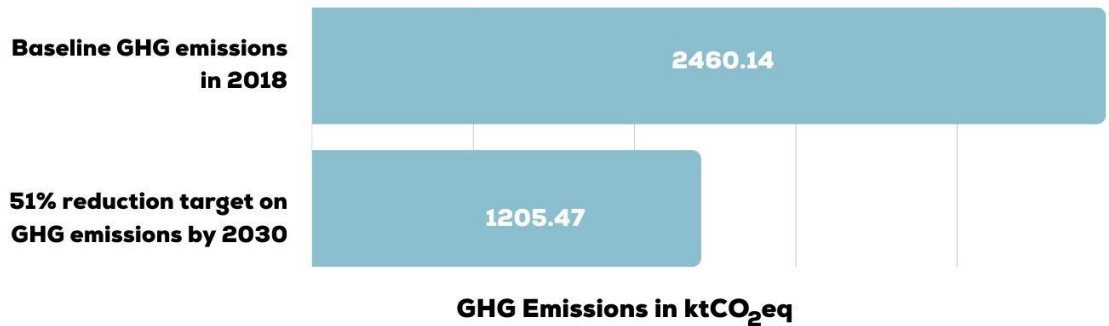


Figure 1. Local Authority Scope for Climate Action Plan

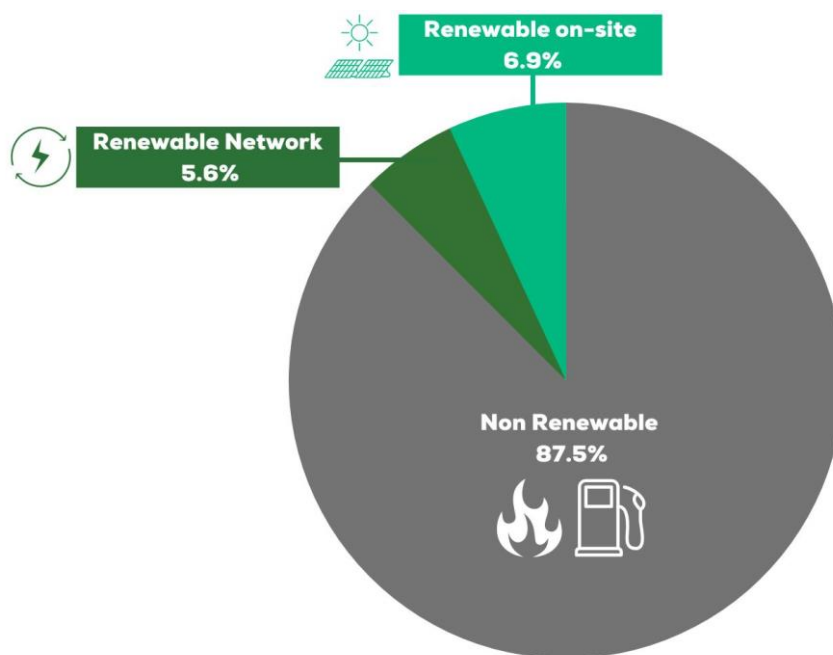


This Tier 2 Baseline Emissions Inventory (BEI) outlines the GHG emissions data for 2018, in order to establish the absolute GHG emissions target for 2030 for County Wexford, see Figure 1.

Documents outlining the data collection process, the sources of data, assumptions or projections made, and the calculation methodology are available in the “Technical Annex C: Climate Mitigation Assessment” of the Local Authority Climate Action Plan Guidelines”.

In order to ascertain the GHG emissions per sector, the energy consumption has also been analysed and is reported alongside the GHG data in this report. Although not the focus of the report, which is GHG emissions, the energy data has been included for reference purposes, as it is the energy data that is converted to CO<sub>2</sub>eq. GHG emissions in some sectors (where applicable).

Energy consumption in 2018 for County Wexford is 4,882.9 Gigawatt hours (GWh). It should be noted that energy from on-site renewables contributed to 6.9% of the total fuel mix, while grid electricity produced from renewables was 5.6%<sup>1</sup>, see Figure 2.



**Figure 2. County Wexford Energy from Renewable Sources**

The non-energy related GHG emissions include Methane (CH<sub>4</sub>), Nitrous Oxide (N<sub>2</sub>O), sulfur Hexafluoride (SF<sub>6</sub>) and are mainly associated with agriculture, industrial processes, waste & F-gases sectors.

<sup>1</sup> <https://www.seai.ie/publications/Energy-in-Ireland-2019-.pdf>

The breakdown of GHG emissions and energy consumption per sector, in 2018, is shown in Figure 3, and is as follows:

### **Wexford County Council**

- Total final emissions produced by Wexford County Council in County Wexford in the year 2018 was 6.1 ktCO<sub>2</sub>eq.
- Total final energy used in the year 2018 was 21.4 GWh.
- Total average GHG emissions produced by Wexford County Council in the period 2016-2018 was 7.1 ktCO<sub>2</sub>eq.
- Average final energy used in 2016-2018 baseline was 22.7 GWh

### **Residential**

- Total residential emissions were 433.9 ktCO<sub>2</sub>eq.
- Total energy consumed by residential sector was 1,468.1 GWh

### **Manufacturing and Commercial**

- Total commercial and manufacturing emissions were 403.2 ktCO<sub>2</sub>eq.
- Total energy consumed by commercial and manufacturing sector was 1,611.4 GWh

### **Industrial Processes**

- Total emissions from industrial processes were 14.6 ktCO<sub>2</sub>eq.

### **Agriculture**

- Total emissions in 2018 from the Agricultural sector were 968.2 ktCO<sub>2</sub>eq.
- Total final energy used in 2018 was 163.2 GWh

### **Transport**

- Total final emissions from transport were 428.2 ktCO<sub>2</sub>eq.
- Total final Energy for Transport sector was 1,619.4 GWh

### **Land Use, Land Use Change and Forestry (LULUCF)**

- Total emissions from LULUCF sector were 177.2 kt of CO<sub>2</sub>eq.

### **Waste**

- Total emissions from waste sector were 28.9 ktCO<sub>2</sub>eq.

### **F-Gases**

- In County Wexford there were no emission accounted from F-gases.

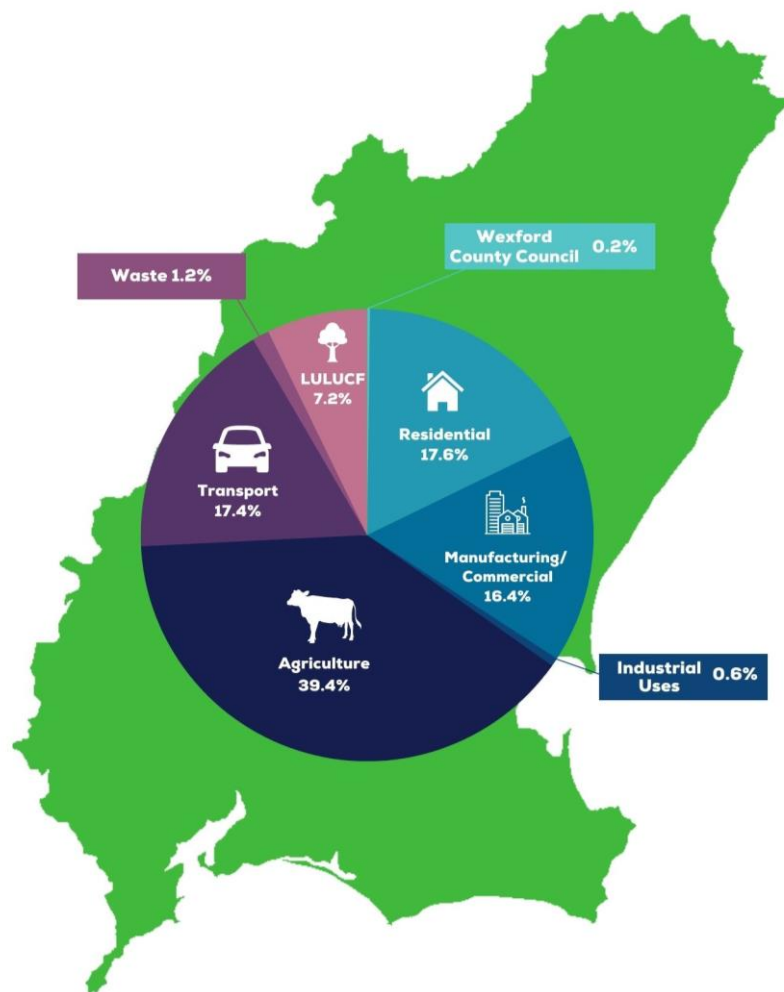


GHG emissions in 2018 for County Wexford was **2,460.1 kt of CO<sub>2</sub>eq.**

Agriculture is the highest GHG emitter, with 39.4% of the County GHG emissions.

Residential and Transport are next largest, with a share of 17.6% and 17.4% respectively.

GHG emissions for Wexford County Council in 2016-2018 were **7.1 kt of CO<sub>2</sub>eq.** or 0.2% of the County wide GHG emissions.



**Figure 3: Share of Total Emissions in County Wexford 2018**

# 1.0 INTRODUCTION

The 2030 Emission Reduction Target as set out in the Climate Action and Low Carbon Development (Amendment) Act 2021 is a 51% absolute reduction in overall greenhouse gas emissions by 2030 and setting us on a path to reach net-zero emissions by no later than 2050, as committed to in the Program for Government (Government of Ireland, 2021).

An absolute reduction means that regardless of activity in the county, the total GHG emissions across the County by 2030 must be 51% less than the total GHG emissions in the baseline year, which in this case is 2018. For example, if the GHG emissions in 2018 were 100 ktCO<sub>2</sub> equivalent, then the total allowable GHG emissions by 2030 is 49kt CO<sub>2</sub> equivalent. The absolute target must be met regardless of growth or changes within each sector.

Although the National targets are set against a 2018 baseline, Local Authorities are required, in accordance with Department Guidelines on the preparation of a Climate Action Plan, to use the data average of 2016-2018 as their baseline period. Therefore, throughout this report, when Wexford County Councils baseline data is outlined, it is for the 2016-2018 baseline period. All other sectors data included in this report use 2018 period for their baseline.

This County Wide Baseline Emissions Inventory (BEI) therefore outlines the 2018 baseline data for County Wexford as a whole, which includes Wexford County Councils 2018 data. However, for Wexford County Councils own targets, the 2016-2018 baseline period has been used, as outlined in the Climate Action Plan 2021. Both sets of data are reported in Chapter 4.

Wexford County Council (WCC) requested the South East Energy Agency (SEEA) to prepare this Tier 2 Baseline Emissions Inventory (BEI) for County Wexford to serve as an evidence-base for mitigation planning in County Wexford, and to inform the development of the 5-year County Wexford Climate Action Plan.

The following report outlines the results and the methodology used to calculate County Wexford's energy consumption and GHG emissions per sector for 2018. The methodology and Tier 2 approach for the County Wide GHG emissions inventory was outlined in the "Technical Annex C: Climate Mitigation Assessment" of the Local Authority Climate Action Plan Guidelines" published in March 2023 (pages 24-30) (DECC, 2023).

Tier 2 is the bottom-up approach for data analysis, which takes national datasets and local-scale datasets together to look at county wide GHG emissions across various sectors which include:

- Residential
- Manufacturing & Commercial
- Industrial Processes
- Agriculture
- Transport
- Land Use Change and Forestry (LULUCF)
- Waste
- F-gases

This baseline report aims to raise awareness of climate change and the impact that different sectors in County Wexford have on Ireland's overall carbon emissions and energy use. It provides Wexford County Council with the necessary information to make decisions on climate change actions to lower the carbon emissions in their own direct emissions, which is the emissions they have responsibility and accountability for.

***It is important to note that the BEI is a 'snapshot in time' of an area's GHG emissions sources, and it is not an inventory of emission reduction opportunities*** ((Page 16 (DECC, 2023)).

The methodology used for the analysis was developed using MapEire and EPA data, and other publicly available local sources including:

- Electricity metered consumption data<sup>1</sup>
- Central Statistics Office's household census, agricultural census and transport Omnibus<sup>2</sup>
- SEAI's latest Energy in Ireland report<sup>3</sup>, emission factors for fuels and grid electricity<sup>4</sup>
- M&R system and National Building Energy Rating Database<sup>5</sup>
- Valuation Office data on commercial buildings<sup>6</sup>
- CIBSE energy benchmarks (Guide F and TM46)
- Agricultural energy and emissions benchmarks from sources such as Teagasc, Dept. Agriculture, Food and Marine, and the Carbon Trust

MapEire is the state-of-the-art integrated model system to map emissions for Ireland's emission inventories of air pollutants and greenhouse gases. Based on a variety of spatial and statistical data, the MapEire model produced detailed spatial emissions at a resolution of 1 km × 1 km (Nielsen *et al*, EPA, 2022).

<sup>1</sup>[Metered Electricity Consumption 2020 - CSO - Central Statistics Office](#)

<sup>2</sup>[Introduction and Overview of Results - CSO - Central Statistics Office](#)

<sup>3</sup>[Energy in Ireland 2019 Report \(seai.ie\)](#)

<sup>4</sup><https://www.seai.ie/data-and-insights/seai-statistics/conversion-factors/>

<sup>5</sup><https://ndber.seai.ie/BERResearchTool/ber/search.aspx>

<sup>6</sup><https://opendata.valoff.ie/api/>

## 2.0 SCOPE OF REQUIREMENTS

The following elements for the Baseline Emissions Inventory (BEI) were required by Wexford County Council, as outlined in Annex C<sup>2</sup> of the Local Authority Climate Action Plan Guidelines (DECC, 2023).

- A calculation of the Greenhouse Gas (GHG) emissions resulting from activity within the geographical boundary of the Wexford County Council area.
- Visual representation of the resulting GHG emissions baseline, broken down as far as possible into sub-sectors.
- A ranking of sectors and sub-sectors contributing the largest GHG emissions.
- A detailed report outlining the methodology, assumptions and all data sets used to formulate the BEI, and an executive summary customised for a non-technical audience.
- A calculation of the emissions reduction required, based on the baseline, to meet the national climate action plan 2030 targets.
- Any other outputs resulting from the BEI analysis that will add to the evidence-base for mitigation planning in the Local Authority administrative area.
- Presenting the findings to Wexford County Council Climate Action Team.

The GHG Protocol Corporate Standard categorise greenhouse gas emissions as Scope 1, Scope 2, and Scope 3 emissions. This report analyses Scope 1 emissions, which are direct emissions associated with the direct consumption and activity. This does not include emissions associated with the purchase of energy (Scope 2) or indirect emissions from the value chain (Scope 3).

- **Scope 1 emissions** – This covers the GHG emissions that are made directly – for example running boilers and vehicles
- **Scope 2 emissions** – This covers the GHG emissions that are produced indirectly – like buying electricity or energy it buys for heating and cooling buildings
- **Scope 3 emissions** – This covers the GHG emissions associated not with the organisation itself, but that the organisation is indirectly responsible for in the supply chain – for example when we use products from suppliers

The Scope 1 emissions included in this report includes all emissions locally produced from the following sectors:

- Large Industries
- Buildings (residential and commercial)
- Industrial processes
- Waste
- Transport
- Agriculture
- Fluorinated gases and land-use

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<sup>2</sup> <https://assets.gov.ie/250051/e165c6b5-3eed-487d-b4ec-1db46dcec7e1.pdf>

## 3.0 EMISSION TARGETS

The methodology on how to complete the Climate Mitigation Assessment is outlined in “Technical Annex C: Climate Mitigation Assessment” of the Local Authority Climate Action Plan Guidelines” published in March 2023 (pages 24-30).

The Baseline Emissions Inventory (BEI) is a key instrument that will enable Wexford County Council to measure the impact of all actions related to emission reductions across its own operations as well as varying sectors of society. The BEI represents an evidence-based approach to not only inform appropriate emission reduction actions, but also measure progress overtime.

*It is important to note that the BEI is a ‘snapshot in time’ of an area’s GHG emissions sources, and it is not an inventory of emission reduction opportunities ((page 16(DECC, 2023)).*

### 3.1 WEXFORD COUNTY COUNCIL DIRECT GHG EMISSIONS

Wexford County Council maintains responsibility to deliver its own targets for emission reductions and establishing the baseline is a necessary starting point. Data for the Local Authorities direct energy-based emissions are reported annually to the SEAI under the mandatory Monitoring & Reporting system<sup>3</sup>. The M&R system is the tool that tracks the public sectors progress towards the 2030 targets, based on the annual submission of energy data. The methodology for reporting Wexford County Councils data to the SEAI via the Monitoring & Reporting system is set out by the SEAI. Wexford County Council have reported using this system since 2012, and all data has been verified and accepted by SEAI, and is published in the Annual Report on Public Sector Energy Efficiency Performance (see most recent 2021 report - Sustainable Authority of Ireland, 2021<sup>4</sup>)

It is necessary that Wexford County Council addresses its own GHG emissions and clearly identifies the sources and level of emissions and energy use from across the range of activities performed. The required data extracted from the local authority’s M&R system provides an energy and carbon based BEI distinct to Wexford County Council. This BEI should be used to inform the development of targeted and specific actions to further reduce the local authority’s own emissions.

The National Climate Action Plan 2023 , Section 10 requires all public sector bodies including local authorities to calculate their baseline GHG’s for 2018 using an average of years 2016-2018.

### 3.2 COUNTY WIDE GHG EMISSIONS

This report focuses on energy use and GHG emissions from different sectors which align with the sectors addressed by the National Emissions Inventory (Environmental Protection Agency, 2020).

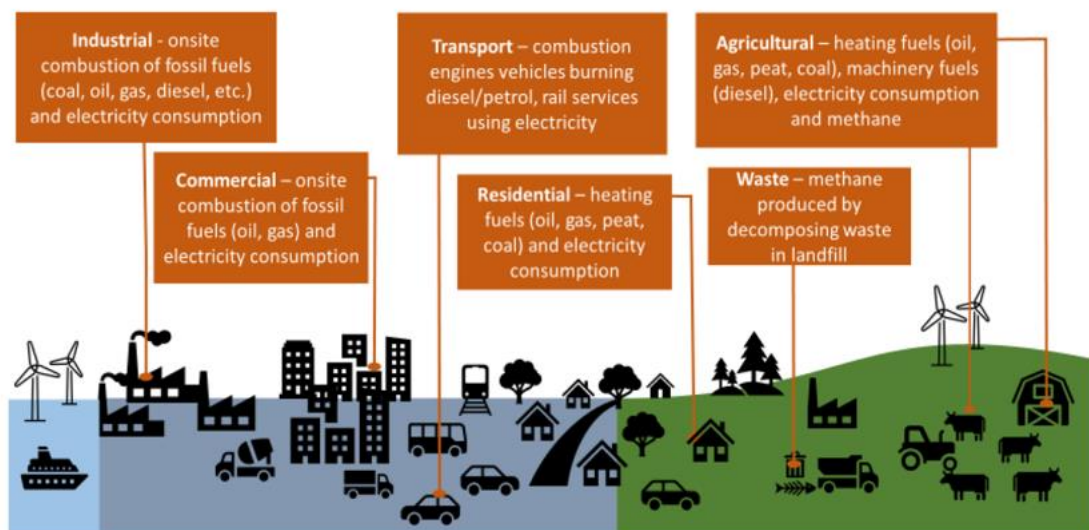
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<sup>3</sup> <https://psmr.seai.ie/Account/LogOn?ReturnUrl=%2f>

<sup>4</sup> <https://www.seai.ie/publications/Public-Sector-Annual-Report-2021.pdf>

The sectors are:

1. Residential
2. Manufacturing & Commercial
3. Industrial Processes
4. Agriculture
5. Transport
6. Waste
7. Land Use Change and Forestry (LULUCF)
8. Fluorinated Gases (F-Gases)



**Figure 4: Representative Sectoral Sources of GHG Emissions (Source: Codema)**

The Local Authority's own emissions are captured within the Manufacturing & Commercial and Transport sectors datasets provided by MapEire. For this report Wexford County Councils data is reported separately and have been extracted from the data reported for the Manufacturing & Commercial sector to avoid 'double-counting'. The transport emissions attributed to Wexford County Council are also extracted from the general Transport data and reported under Wexford County Council direct emissions.

The analysis focused on the current energy demand and fuels that used to provide energy, and the associated CO<sub>2</sub>eq emissions and GHG emissions related to activities within County Wexford. Non-energy related emissions were also reported where available and are mainly outlined in the Waste, Land Use, Land Use Change & Forestry (LULUCF) and Agriculture sections.

### 3.3 EMISSIONS SCOPE

The emissions accounted for in the MapEIre data source includes both ‘emissions trading scheme’ (ETS) and ‘non-emissions trading scheme’ (non-ETS) sectors and emissions. This includes all emissions locally produced from sectors, those produced by large industries, buildings (residential and commercial), industrial processes, waste, transport, agriculture and land-use. More detail can be found in the EPA 2022 Report (EPA, 2022).

- **Emissions Trading Scheme (ETS)** – This means that GHG from certain sectors are treated as a commodity or product that can be traded on the EU carbon market. This includes emissions from large industries, electricity generators, and the aviation industry.
- **Non Emissions Trading Scheme (Non-ETS)** – This means that GHG from sectors that cannot be traded on the EU carbon market. Non-ETS emissions include greenhouse gas emissions from homes, cars, small businesses and agriculture.

### 3.4 EMISSION FACTORS

Emission factors are used to convert energy use to CO<sub>2</sub>eq emissions. Emissions factors for different fuel types are published by SEAI annually and the 2018 factors were used for this report as the baseline year is 2018<sup>5</sup>. The emission factors are dependent on the type of fuel used, as different fuels have different emission factors. Figure 5 below illustrates the emission factors for different fuel types. It should be noted that Peat has the highest emission factor, as it has the highest emissions in kgCO<sub>2</sub>eq for every 1 kWh of energy use.

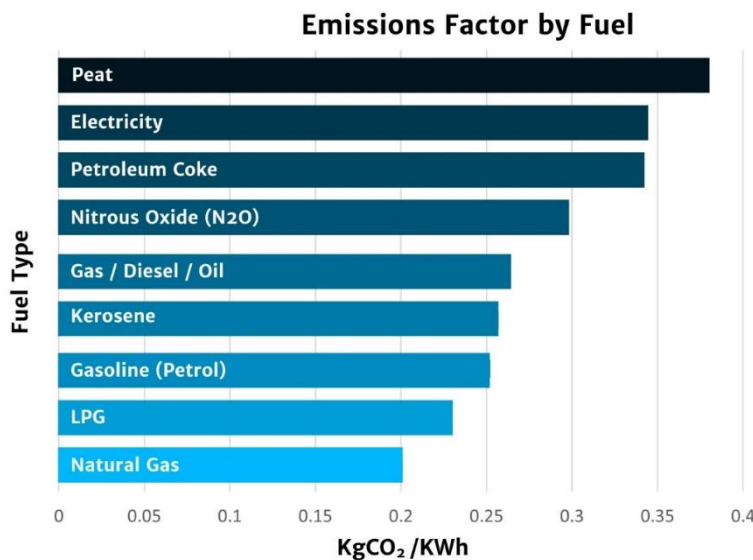


Figure 5: Emission Factors for Different Fuel Types

<sup>5</sup> <https://www.seai.ie/data-and-insights/seai-statistics/conversion-factors/>



## 3.5 CARBON-OFFSETTING

Calculations on ‘carbon offsetting’ are not included in this analysis as currently offsetting cannot be used to meet the public sector’s mandatory emissions and energy targets. Carbon offsetting is a practice which involves an organisation removing or offsetting the same amount of carbon emissions from the atmosphere to compensate for the carbon emissions that it emits.

Large renewable energy projects like wind and solar farms that are connected to the national electricity grid contribute to the reduction of emissions at a national level and are reflected in reduced emissions intensity of electricity generation. Therefore, the associated reductions cannot be counted separately at a local level, as this would be ‘double-counting’ the emission reduction.

## 3.6 ASSUMPTIONS

It is important to note that there are assumptions used in all methodologies for local level emissions baseline. These are required as it is impossible to create a completely accurate picture of all emissions.

All data from the Central Statistics Office is from the Census 2016 data set. The Census 2022 data was not fully available at time of analysis. This is as per the Technical Annex C: Climate Mitigation Assessment” of the Local Authority Climate Action Plan Guidelines” (DECC, 2023).

Assumptions and data sources for each sector are highlighted below.

| Sector                 | Data source                            | Data source link  | Data assumption   |
|------------------------|--|---|---|
| Wexford County Council | SEAI Monitoring & Reporting (M&R)      | <a href="https://psmr.seai.ie/Account/LogOn?ReturnUrl=%2f">https://psmr.seai.ie/Account/LogOn?ReturnUrl=%2f</a>   | Data on the M&R system has been submitted as per the SEAI methodology guidelines and are categorised correctly by the Local Authority at submission. Energy and carbon conversion factors used in the system are set by the SEAI.   |
| Residential            | Census data 2016                       | <a href="https://data.cso.ie/">https://data.cso.ie/</a>   | 2016 Census data was used - there is no specific 2018 census data so 2016 data was closest to the baseline period of 2018. The house types provided by the Census were grouped into 4 main house types of semi-detached, detached, terraced and apartments. All bedsits were assumed to be apartments.              |
|                        | BER data                               | <a href="https://ndber.seai.ie/BERResearchTool/ber/search.aspx">https://ndber.seai.ie/BERResearchTool/ber/search.aspx</a>   | All BER's for properties published post 2018 were removed from the data sets analysed. The remaining BERs are used to ascertain the average energy consumption per house type and per BER rating. These averages are used to estimate the total energy consumption per house type for all houses across the county. |
|                        | SEAI Energy in Residential Sector 2018 | <a href="https://www.seai.ie/publications/Energy-in-the-Residential-Sector-2018-Final.pdf">https://www.seai.ie/publications/Energy-in-the-Residential-Sector-2018-Final.pdf</a> | This data was used to give an average breakdown between electricity, space heating & hot water in the residential sector. It was assumed that 20% of energy is electrical energy and 80% is thermal energy  |
|                        | SEAI Energy Balance 2018               | <a href="https://www.seai.ie/publications/2018-National-Energy-Balance-Final.pdf">https://www.seai.ie/publications/2018-National-Energy-Balance-Final.pdf</a>                   | This gives the national average breakdown of fuel types used for thermal energy in homes for 2018. This was used to calculate the average consumption per fuel type across the residential sector   |
|                        | CSO Metered electricity data           | <a href="https://www.cso.ie/en/statistics/energy/meteredelectricityconsumption/">https://www.cso.ie/en/statistics/energy/meteredelectricityconsumption/</a>                     | The total metered electrical data for residential sector for County Wexford was downloaded from CSO   |
|                        | CSO metered natural gas data           | <a href="https://www.cso.ie/en/statistics/energy/networkedgasconsumption/">https://www.cso.ie/en/statistics/energy/networkedgasconsumption/</a>                                 | The total metered natural gas data for residential sector for County Wexford was downloaded from CSO  |
|                        | SEAI Conversion Factors                | <a href="https://www.seai.ie/data-and-insights/seai-statistics/conversion-factors/">https://www.seai.ie/data-and-insights/seai-statistics/conversion-factors/</a>               | The fuel type was used to ascertain GHG emissions using the conversion factors per fuel type from the SEAI  |
|                        | Map Eire                               | <a href="https://projects.au.dk/mapeire/spatial-results/download">https://projects.au.dk/mapeire/spatial-results/download</a>   | Methane and nitrous oxide emissions relating to the residential sector were obtained from the MapEire datasets and added to the total energy related GHG emissions calculated from the localised data sets.   |

|                            |  |   |  |
|----------------------------|--|---|--|
|                            | USA EPA GHG Conversion Factors                   | <a href="https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#results">https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#results</a>   | GHG conversion factors were used to convert methane and nitrous oxide into CO2 equivalents. 1 unit of methane emissions is equivalent to 25 units of CO2eq. 1 unit of nitrous oxide is equivalent to 298 units of CO2eq.   |
| Manufacturing & Commercial | Map Eire   | <a href="https://projects.au.dk/mapeire/spatial-results/download">https://projects.au.dk/mapeire/spatial-results/download</a>   | This data set includes Local Authority data. As such the total Wexford Co Co data as outlined in Section 4 of the report was removed from the final M&C data results so as not to double account   |
|                            | CSO non-residential Metered Electricity data     | <a href="https://www.cso.ie/en/statistics/energy/meteredelectricityconsumption/">https://www.cso.ie/en/statistics/energy/meteredelectricityconsumption/</a>   | assume that all data provided in this data set was associated with M&C sector, minus the LA specific data  |
|                            | CSO non-residential Natural gas consumption data | <a href="https://www.cso.ie/en/statistics/energy/networkedgasconsumption/">https://www.cso.ie/en/statistics/energy/networkedgasconsumption/</a>   | assume that all data provided in this data set was associated with M&C sector, minus the LA specific data  |
|                            | CSO Energy Balance                               | <a href="https://data.cso.ie/table/SEI01">https://data.cso.ie/table/SEI01</a>   | National averages for fuel types provided from the Energy Balance was used to calculate the thermal breakdown of fuels, other than the natural gas and electricity which was provided by the CSO metered data sets   |
|                            | Valuations Office                                | <a href="https://maps.valoff.ie/maps/VO.html">https://maps.valoff.ie/maps/VO.html</a>   | Assume that the number and categories provided by the Valuations Office for 2018 is correct in terms of number of businesses and floor areas   |
| Industrial Processes       | Map Eire   | <a href="https://projects.au.dk/mapeire/spatial-results/download">https://projects.au.dk/mapeire/spatial-results/download</a>   | No localised data sets available for this sector so a full breakdown was taken from MapEire  |
| Agriculture                | Map Eire   | <a href="https://projects.au.dk/mapeire/spatial-results/download">https://projects.au.dk/mapeire/spatial-results/download</a>   | The data from MapEire categorized as 'off-road vehicles' has been removed from this data set and is reported under the Transport Data (Section 9 of this report). This is reported under the Tractors & Machinery heading. This data was used for the non energy related GHG emissions |
|                            | CSO Census of Agriculture                        | <a href="https://www.cso.ie/en/releasesandpublications/ep/p-coa/censusofagriculture2020-preliminaryresults/kf/">https://www.cso.ie/en/releasesandpublications/ep/p-coa/censusofagriculture2020-preliminaryresults/kf/</a> | Provides the number of livestock (sheep, Pigs, cows and poultry).  |

|           |   |   |  |
|-----------|---|---|--|
|           | Teagasc                                 | <a href="https://www.teagasc.ie/media/website/rural-economy/rural-development/diversification/Energy-12_Poultry-Energy-Efficiency-in-Poultry-Units.pdf">https://www.teagasc.ie/media/website/rural-economy/rural-development/diversification/Energy-12_Poultry-Energy-Efficiency-in-Poultry-Units.pdf</a> | Provides the average energy consumption per poultry.   |
|           | Teagasc                                 | <a href="https://www.teagasc.ie/media/website/rural-economy/rural-development/diversification/Energy-14-Energy-Use-on-Pig-Farms.pdf">https://www.teagasc.ie/media/website/rural-economy/rural-development/diversification/Energy-14-Energy-Use-on-Pig-Farms.pdf</a>                                       | Provides the average energy consumption per pig  |
|           | Teagasc                                 | <a href="https://www.teagasc.ie/rural-economy/rural-development/diversification/energy-auditing-in-agriculture/">https://www.teagasc.ie/rural-economy/rural-development/diversification/energy-auditing-in-agriculture/</a>   | Provides the average energy consumption per cow  |
| Transport | CSO Transport Omnibus 2018              | <a href="https://www.cso.ie/en/statistics/transport/transportomnibus/">https://www.cso.ie/en/statistics/transport/transportomnibus/</a>   | Wexford County Council transport data was removed from the Transport sector data as it is reported separately Under Section 4 of this report. This data provides the number and breakdown of vehicle types in County Wexford. The data also provides the average breakdown of fuel types and km travelled by each vehicle type. This average was used against the number of vehicles specified for County Wexford. The national dataset shows that an average of 1% of transport fuel is related to Compressed Natural Gas (CNG). Without data specific to County Wexford, this national average has been used to estimate the fuel mix breakdown. It is not known if there are any actual CNG vehicles in County Wexford. |
|           | Map Eire                                | <a href="https://projects.au.dk/mapeire/spatial-results/download">https://projects.au.dk/mapeire/spatial-results/download</a>   | Provides rail data and shipping data for County Wexford  |
|           | SEAI Energy in Transport 2014           | <a href="https://www.seai.ie/publications/Energy-in-Transport-2014-report.pdf">https://www.seai.ie/publications/Energy-in-Transport-2014-report.pdf</a>   | gCO2/km travelled for the different vehicle types - factors used to calculate the overall GHG emissions from the road vehicle in County Wexford  |
| LULUCF    | Map Eire                                | <a href="https://projects.au.dk/mapeire/spatial-results/download">https://projects.au.dk/mapeire/spatial-results/download</a>   | Only MapEire data used for LULUCF figures  |
| Waste     | Map Eire                                | <a href="https://projects.au.dk/mapeire/spatial-results/download">https://projects.au.dk/mapeire/spatial-results/download</a>   | This sector accounts for non-energy related emissions. Energy related emissions for waste services is covered under Manufacturing & Commercial emissions reported in Section 7 of this report (under industrial uses)  |
|           | National Waste Collection Permit Office | <a href="https://www.nwcpo.ie/permitsearch.aspx">https://www.nwcpo.ie/permitsearch.aspx</a>   | Provided the number of waste collection licences in the County. No other data was provided   |

|         |                                |   |  |
|---------|--------------------------------|---|--|
|         | Pollutant Release and Transfer | <a href="https://gis.epa.ie/EPAMaps/PRTR">https://gis.epa.ie/EPAMaps/PRTR</a>   | Provided the number of facilities reporting under waste & waste water management in the County. No other data was provided |
| F-Gases | Map Eire                       | <a href="https://projects.au.dk/mapeire/spatial-results/download">https://projects.au.dk/mapeire/spatial-results/download</a> | There are no F-gases related GHG emissions attributed to County Wexford  |



# SECTORAL GHG EMISSIONS 2018 IN COUNTY WEXFORD

This section of the report outlines the GHG emissions associated with the individual sections highlighted above, the methodology and results of each and summarises the emissions from each sector in 2018. They are presented in the following order:

- Wexford County Council
- Residential
- Manufacturing & Commercial
- Industrial Processes
- Agriculture
- Transport
- Waste
- Land Use, Land Use Change & Forestry (LULUCF)
- Fluorinated Gases (F-Gases)

## 4.0 WEXFORD COUNTY COUNCIL

Wexford County Council (WCC) is responsible for the energy use and emissions from its buildings and facilities, its public lighting, and its vehicle fleet.

This Chapter outlines both the 2018 data for Wexford County Council and the average 2016-2018 public sector baseline period.

The 2018 data is used in the overall County Wide final figures and 2030 target, and the 2016-2018 data is used for Wexford County Councils own 2030 target.

### 4.1 METHODOLOGY

In Ireland, public sector bodies are required to report on their annual energy use to the Sustainable Energy Authority of Ireland (SEAI). This is done through the Monitoring and Reporting system<sup>6</sup> (M&R), which is used to track the local authorities progress towards 2030, compared to the baseline year. The baseline year for Wexford County Council's energy efficiency targets is 2009. The National Climate Action Plan 2023, Section 10 requires all public sector bodies including local authorities to calculate their baseline GHG's for 2018 using an average of years 2016-2018.

The methodology for reporting Wexford County Councils data to the SEAI via the Monitoring & Reporting system is set out by the SEAI<sup>7</sup>. Wexford County Council has reported using this system since 2012, and all data has been verified and accepted by SEAI. The results are published in the Annual Report on Public Sector Energy Efficiency Performance (see most recent 2021 report - Sustainable Authority of Ireland, 2021<sup>8</sup>)

From the M&R system, the 2018 energy & CO<sub>2</sub> emissions data for Wexford County Council was extracted and is broken down by fuel type:

- Electricity – imports from national grid
- Electricity - generated by on-site PV
- Natural Gas
- LPG
- Kerosene
- Woodchip
- Woodpellet
- Gasoil
- Petrol
- Road Diesel
- Marked Diesel

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<sup>6</sup> <https://psmr.seai.ie/Account/LogOn?ReturnUrl=%2f>

<sup>7</sup> <https://www.seai.ie/business-and-public-sector/public-sector/monitoring-and-reporting/supports/MR-2030-Methodology-Guidance.pdf>

<sup>8</sup> <https://www.seai.ie/publications/Public-Sector-Annual-Report-2021.pdf>



- Marine Gasoil

The fuel types are categorised by energy use:

1. Electricity
2. Thermal
3. Transport

To outline where the energy and GHG emissions are coming from within Wexford County Council, the energy use was broken down into three categories for reporting GHG emissions in this BEI. This will allow for targeted projects within the LA Climate Action Plan to reduce GHG emissions most effectively:

- Local Authority Buildings/Facilities
- Public Lighting
- Transport

## 4.2 RESULTS

### 4.2.1 ENERGY RESULTS – 2018 COUNTY WIDE BEI DATA

From the results obtained from the M&R system, Wexford County Council's energy use in 2018 was **21.37 GWh**.

- Wexford County Council building & facilities were the highest energy consumer, accounting for 9.68 GWh (45%) of the total energy consumption
- Public lighting accounted for 6.63 GWh of energy (31%)
- Transport fuels accounted for 5.06 GWh of energy (24%)

The fuel type breakdown is provided in Table 1: Wexford County Council 2018 County Wide BEI data, Energy and CO<sub>2</sub>eq Emissions.

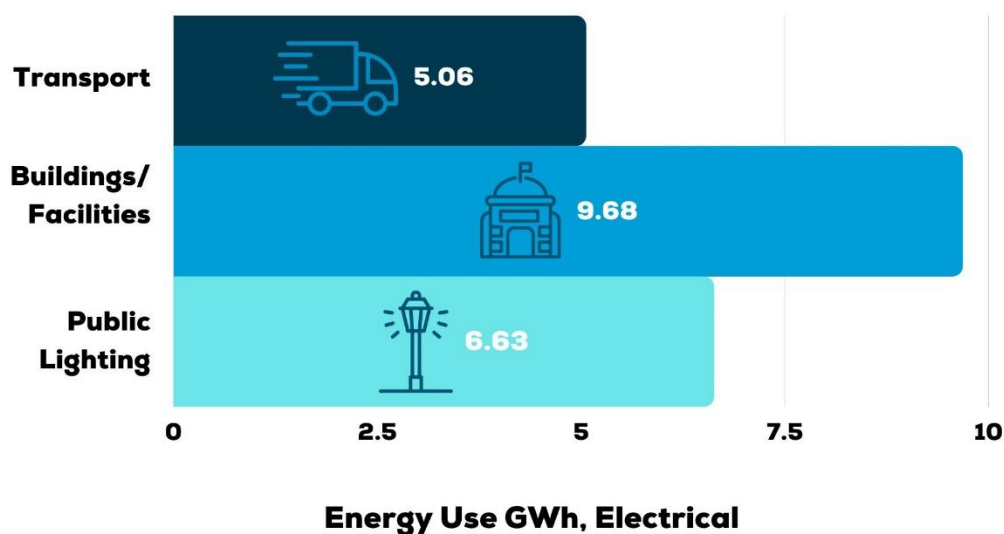


Figure 6: Breakdown of 2018 energy consumption, in GWh, by Wexford County Council - split by SEU Category

## 4.2.2 GHG EMISSIONS RESULTS – 2018 COUNTY WIDE BEI DATA

When energy use was converted into GHG emissions, the council's total emissions amounted to 6.06ktCO<sub>2</sub>eq.

- Public lighting accounted for 2.45 ktCO<sub>2</sub>eq (41%) of Wexford County Council total carbon emissions
- This was followed by buildings/facilities with 2.31 ktCO<sub>2</sub>eq (38%)
- Transport accounted for 1.30 ktCO<sub>2</sub>eq (21%)

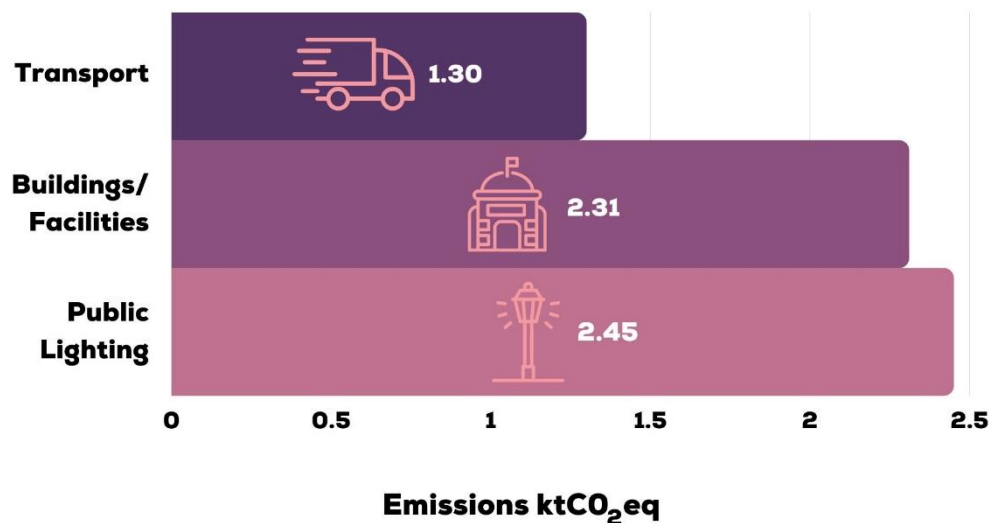


Figure 7: Breakdown of 2018 GHG emissions in ktCO<sub>2</sub>eq, by Wexford County Council - split by SEU Category

### 4.2.3 ENERGY RESULTS – WEXFORD Co Co 2016-2018 DATA

From the results obtained from the M&R system, Wexford County Council's annual average energy consumption for the period 2016-2018 was **22.68 GWh**.

- Wexford County Council building & facilities were the highest energy consumer, accounting for 9.90 GWh (44%) of the total energy consumption
- Public lighting accounted for 6.86 GWh of energy (30%)
- Transport fuels accounted for 5.92 GWh of energy (26%)

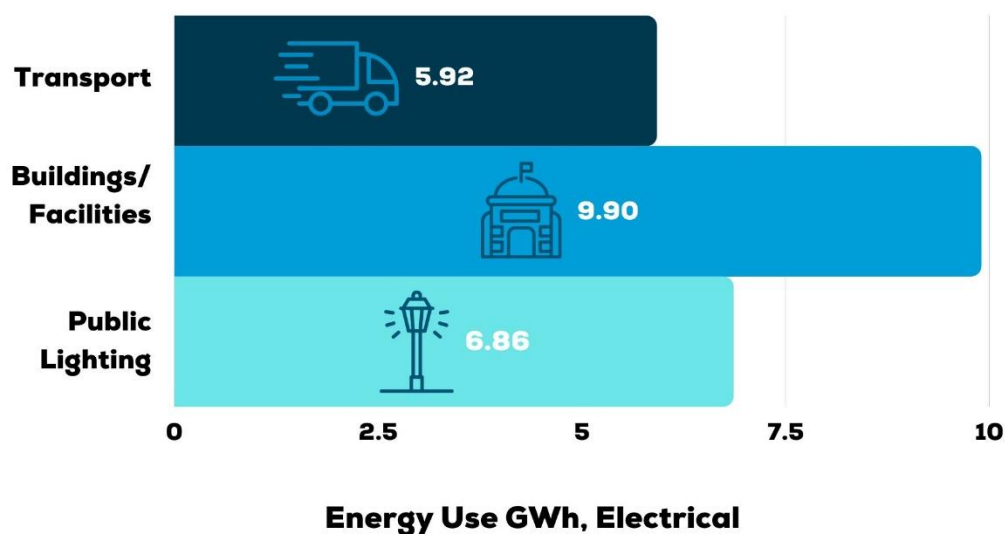


Figure 8: Breakdown of 2016-2018 energy consumption, in GWh, by Wexford County Council - split by SEU Category

#### 4.2.4 GHG EMISSIONS RESULTS – WEXFORD CO CO 2016-2018 DATA

When energy use was converted into GHG emissions, the council's average annual emissions for the 2016-2018 period amounted to 7.11ktCO<sub>2</sub>eq.

- Buildings and Facilities accounted for 3.05 ktCO<sub>2</sub>eq (43%) of Wexford County Council total carbon emissions
- This was followed by Public lighting with 2.54 ktCO<sub>2</sub>eq (36%)
- Transport accounted for 1.52 ktCO<sub>2</sub>eq (21%)

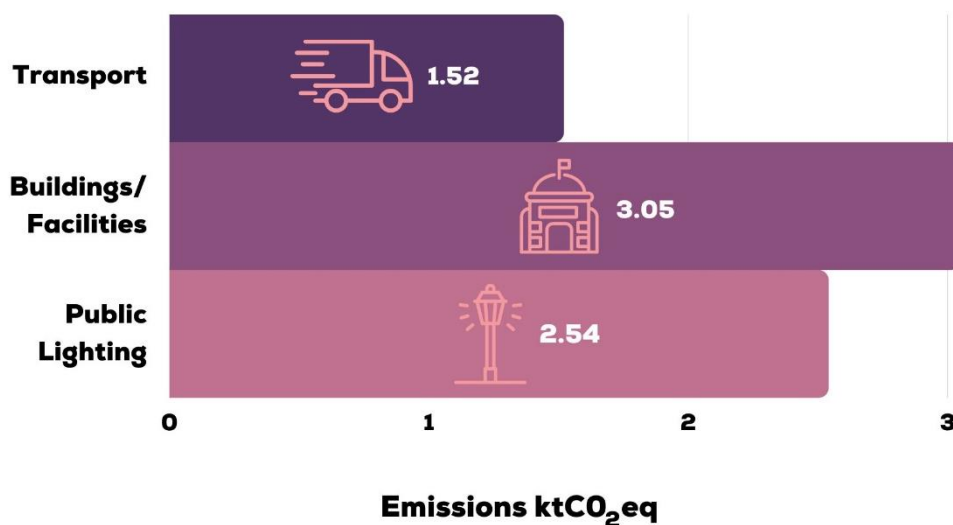


Figure 9: Breakdown of 2016-2018 GHG emissions in ktCO<sub>2</sub>eq, by Wexford County Council - split by SEU Category

## 4.3 KEY FINDINGS

The key findings from Wexford County Council analysis are summarised below.

- Total final energy used in 2018 county wide BEI was 21.37 GWh
- Total final energy for Wexford County Council 2030 targets, based on average 2016-2018 was 22.68 GWh
- Total final GHG emissions produced by Wexford County Council in County Wexford in 2018 were 6.05 ktCO<sub>2</sub>eq.
- Total GHG emissions for Wexford Co Co 2030 targets, based on average 2016-2018 was 7.11 ktCO<sub>2</sub>eq.

| Wexford County Council                        | Electricity  | Fossil Fuels |              |             |             |             | Renewable Energies |             |             | Total        |
|---|--------------|--------------|--------------|-------------|-------------|-------------|--------------------|-------------|-------------|--------------|
|   |              | Thermal      |              |             | Transport   |             | Electricity        | Thermal     | Transport   |              |
|   |              | Natural Gas  | Heating Oils | LPG         | Road Diesel | Petrol      | Solar PV           | WoodChip    | Biofuel     |              |
| Building/ Facilities (GWh)                    | 3.69         | 0.03         | 1.20         | 2.38        |             |             | 0.08               | 2.30        |             | 9.68         |
| Public Lighting (GWh)                         | 6.63         |              |              |             |             |             |                    |             |             | 6.63         |
| Transport (GWh)                               |              |              |              |             | 4.89        | 0.02        |                    |             |             | 5.06         |
| <b>Total Energy (GWh)</b>                     | <b>10.32</b> | <b>0.03</b>  | <b>1.20</b>  | <b>2.38</b> | <b>4.89</b> | <b>0.02</b> | <b>0.08</b>        | <b>2.30</b> | <b>0.14</b> | <b>21.37</b> |
| Buildings / Facilities (ktCO <sub>2</sub> eq) | 1.44         | 0.01         | 0.31         | 0.55        |             |             |                    |             |             | 2.31         |
| Public Lighting (ktCO <sub>2</sub> eq)        | 2.45         |              |              |             |             |             |                    |             |             | 2.45         |
| Transport (ktCO <sub>2</sub> eq)              |              |              |              |             | 1.29        | 0.00        |                    |             |             | 1.30         |
| <b>Total Emissions (ktCO<sub>2</sub>eq)</b>   | <b>3.89</b>  | <b>0.01</b>  | <b>0.31</b>  | <b>0.55</b> | <b>1.29</b> | <b>0.00</b> | -                  | -           | -           | <b>6.06</b>  |

Table 1: Wexford County Council 2018 County Wide BEI data, Energy and CO<sub>2</sub>eq Emissions

## 5.0 RESIDENTIAL

This section looks at the emissions arising from the residential sector. In Ireland, the residential sector is the second largest energy user after transportation (SEAI, 2019), thus monitoring energy use and emissions in this sector is crucial.

### 5.1 METHODOLOGY

Domestic dwellings are responsible for emissions from the use of energy for space heating, hot water and electricity. This methodology is based on five main data sources:

- Central Statistics Office's Census 2016<sup>9</sup> (CSO, 2016)
- EPA's national emissions inventories - MapElre (AARHUS University, 2022)
- SEAI BER research tool (SEAI, 2021)
- Central Statistics Office's Metered Electricity Consumption data
- Central Statistics Office's Natural Gas Consumption data

Firstly, the total number of houses in County Wexford is obtained from the Census data. This is split by category, which was simplified into 4 main house types:

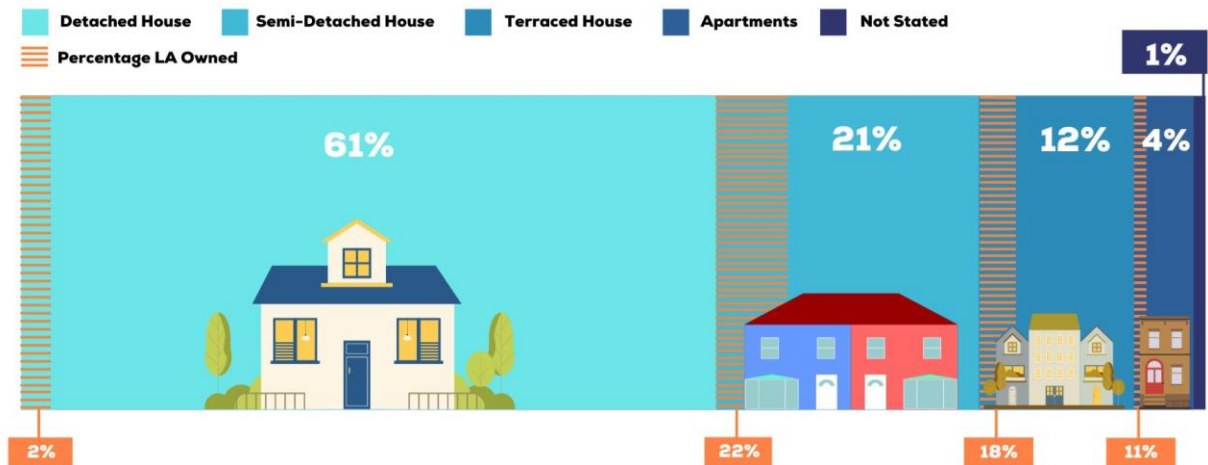
- Semi-detached
- Detached
- Terraced
- Apartment

The Census 2016 data shows that there are 54,006 residential properties in Wexford, see Figure 10, of which:

- 33,134 (61%) are Detached houses
- 11,467 (21%) are Semi-Detached houses
- 6,432 (12%) are Terraced houses
- 2,344 (4%) are Apartments
- 629 (1%) - Not stated

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<sup>9</sup> Census 2022 not available at time of analysis. Preliminary data published post analysis



**Figure 10: Breakdown of household types in County Wexford**

The total number of houses across the county includes all social houses. Wexford County Council in 2018 had a total of 4,486 social houses under its remit, which is equivalent to 8% of the total houses in the County. The LA social houses are not included in Section 4 above, which outlines the Local Authority's own energy. That is because even though the homes are owned or under the remit of Wexford County Council, it is individual tenants that use the energy, and therefore it is reported under the Residential sector and not the Local Authorities section.

However, the Local Authority still has accountability in relation to upgrading its own social housing stock and therefore GHG savings in the Residential sector can be completed directly by the Local Authority.

These simplified house types allows for comparison with the breakdown provided by the Building Energy Rating Certificates (BER) data, so that the same house type categories are used for the analysis. The BER data is downloaded from SEAI BER research tool<sup>10</sup>. The database does not provide exact addresses, however the BER data provided the number of houses with BER ratings. All houses constructed after 2018 were removed from the BER data set. The BER data provides a breakdown of BER rating (A1 – G) for each house type categorised above.

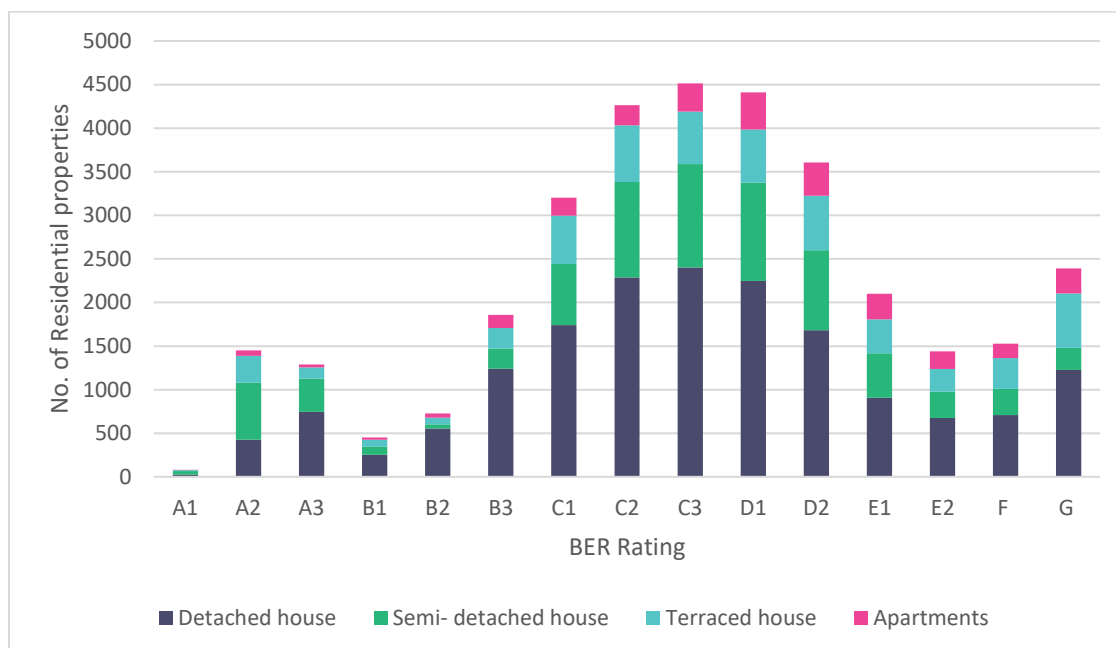
Additional data from published Building Energy Rating Certificates (BER) helped further inform the breakdown of emissions based on the average BER rating of the homes across County Wexford. The BERs were filtered per County for County Wexford, and information is available on theoretical energy demand and emissions from those dwellings. The data

<sup>10</sup> <https://ndber.seai.ie/BERResearchTool/ber/search.aspx>



provides us with detailed information for each BER rating. The average BER rating per house type is then applied to the total domestic dwellings across the County.

Figure 11 below shows the number of published BERs in 2018 for each BER rating for County Wexford, which totaled 33,308 houses, or 62% of the total housing stock in County Wexford.



**Figure 11: Wexford County Level Residential Sector breakdown into BER categories**

The BER ratings of the Wexford County Council owned social housing was provided by Wexford County Council, and showed that out of the 4,486 social houses 2,124 (47%) have BER's. The BER ratings were

The BER data was used to calculate the average energy demand for each house type at each BER rating (A1-G). This average demand was then applied to the total number of dwellings of each house type and each BER rating in each category. This gave a total energy and emissions for the residential sector in County Wexford.

The average consumption per house type and BER rating is shown in Table 2 and Figure 12 below.

The total energy consumption for residential sector is then broken down into electricity (non-thermal) & thermal. Using the SEAI Energy in Residential Sector 2018 (SEAI, 2018), the average % of household energy consumption was

- Space heating – 61%
- Water heating – 19%
- Lighting/Appliances/Cooking – 20%

Therefore, the average figure of 80% thermal and 20% electricity was applied to the domestic data.

The electricity and natural gas data comes directly from the Central Statistics Office's Metered Electricity Consumption data<sup>11</sup> and Natural Gas Consumption data<sup>12</sup>.

The Central Statistics Office Energy Balance (2018) was used to get a national average breakdown between the thermal fuel types. The average % breakdown was used to calculate the breakdown of the thermal fuel for County Wexford residential sector.

| BER | Detached (kWh) | Semi-Detached (kWh) | Terraced (kWh) | Apartments (kWh) |
|-----|----------------|---------------------|----------------|------------------|
| A1  | 5,468          | 2,442               | 2,130          | 1,401            |
| A2  | 5,013          | 3,263               | 2,070          | 1,919            |
| A3  | 8,111          | 4,314               | 3,185          | 2,503            |
| B1  | 16,345         | 5,561               | 5,062          | 1,914            |
| B2  | 22,918         | 10,438              | 8,349          | 7,574            |
| B3  | 24,808         | 11,569              | 11,396         | 9,721            |
| C1  | 25,886         | 14,476              | 12,306         | 9,349            |
| C2  | 26,516         | 15,798              | 13,417         | 10,002           |
| C3  | 26,462         | 17,237              | 15,047         | 10,033           |
| D1  | 26,827         | 17,379              | 15,517         | 9,818            |
| D2  | 27,810         | 18,587              | 16,850         | 10,421           |
| E1  | 30,452         | 20,135              | 19,321         | 11,146           |
| E2  | 34,560         | 21,780              | 22,243         | 12,667           |
| F   | 38,184         | 22,548              | 24,049         | 14,679           |
| G   | 49,168         | 38,019              | 35,297         | 17,474           |

**Table 2: Average Consumption per year, per House and BER Type**

<sup>11</sup> <https://www.cso.ie/en/statistics/energy/meteredelectricityconsumption/>

<sup>12</sup> <https://www.cso.ie/en/statistics/energy/networkedgasconsumption/>

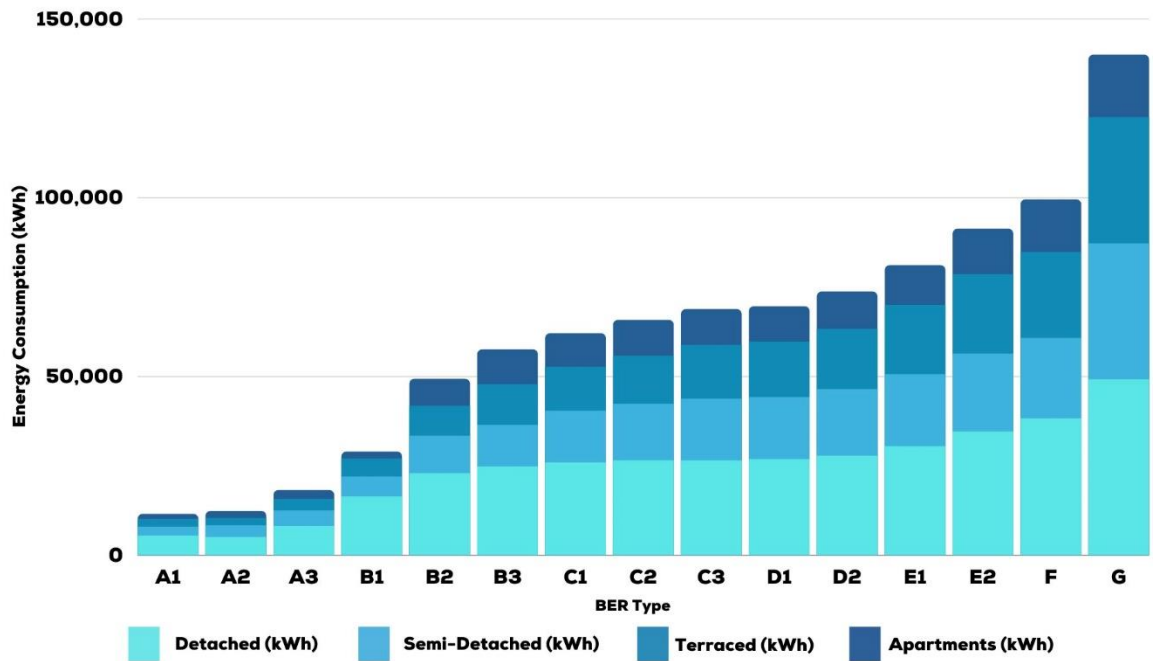


Figure 12. Average Consumption per House and BER Type

To summarise, the total thermal energy consumption was found from the BER data. This was assumed to be equivalent to 80% of the total residential energy consumption. The thermal breakdown, in terms of what fuel is used to heat a home, was calculated using the actual metered gas data and the national average fuel mix breakdown from the Residential Fuel Mix in 2018<sup>13</sup> taken from the CSO data.

The remaining 20% was non-thermal electricity.

All energy data was then converted into equivalent GHG emissions using the CO<sub>2</sub>eq. conversion factors for each fuel type.

MapElre data set provides additional emissions produced in the form of Methane (CH<sub>4</sub>) and Nitrous Oxide (N<sub>2</sub>O) by residential sectors, i.e. in addition to CO<sub>2</sub> emissions from the combustion of fossil fuels such as natural gas, heating oil, coal, etc. These emissions are converted into CO<sub>2</sub>eq using the conversion factors provided by the United States Environmental Protection Agency (US EPA) (EPA, 2023)

## 5.2 RESULTS

The total number of houses in County Wexford from the 2016 Census data was 54,006. The BER ratings for County Wexford showed that 33,308 houses had a BER rating – this is equal to 61.7% of the total domestic dwellings.

The breakdown of heating fuel types for houses is shown in Table 3 and Figure 3. This shows that 66.8% of homes in County Wexford use heating oils to heat their homes. A total of 89% of homes use fossil fuels to heat their homes.

| Type of Central Heating    | No of Houses | % of homes |
|----------------------------|--------------|------------|
| No central heating         | 1064         | 2.0%       |
| Oil                        | 36,098       | 66.8%      |
| Natural Gas                | 550          | 1.0%       |
| Electricity                | 3,316        | 6.1%       |
| Coal (incl. anthracite)    | 8,790        | 16.3%      |
| Peat (incl. turf)          | 201          | 0.4%       |
| Liquid Petroleum Gas (LPG) | 444          | 0.8%       |
| Wood (incl. wood pellets)  | 2,291        | 4.2%       |
| Other fuels                | 428          | 0.8%       |
| Not stated                 | 824          | 1.5%       |

**Table 3: Thermal Fuel Sources for Houses, County Wexford**

<sup>13</sup> <https://data.cso.ie/table/SEI01>

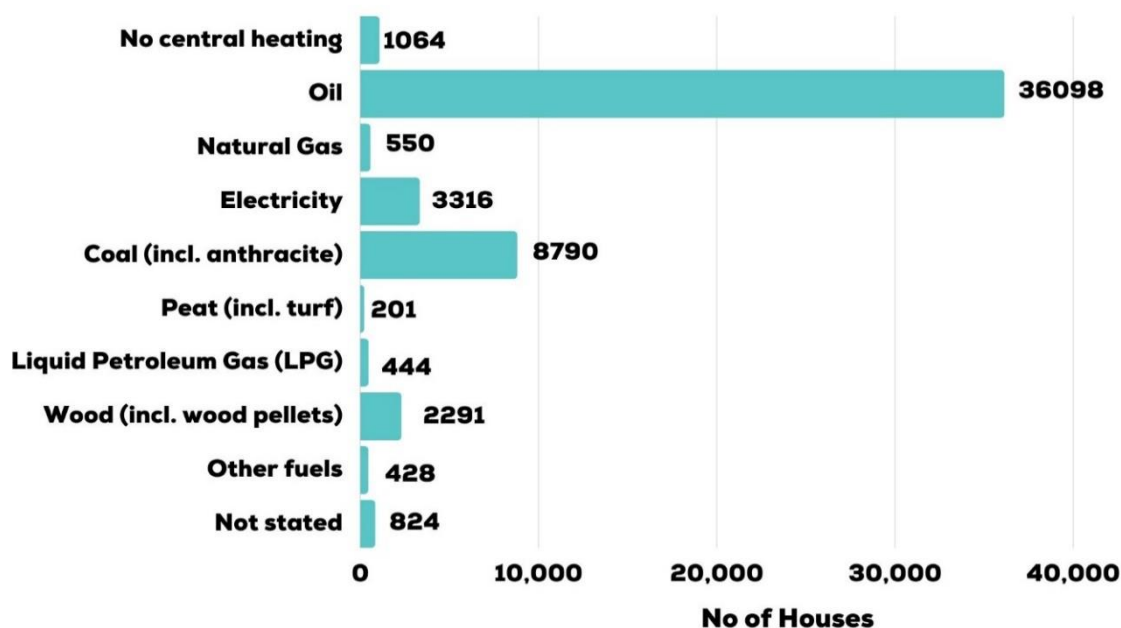


Figure 13. Thermal Fuel Sources for Houses in County Wexford

## 5.2.1 ENERGY RESULTS

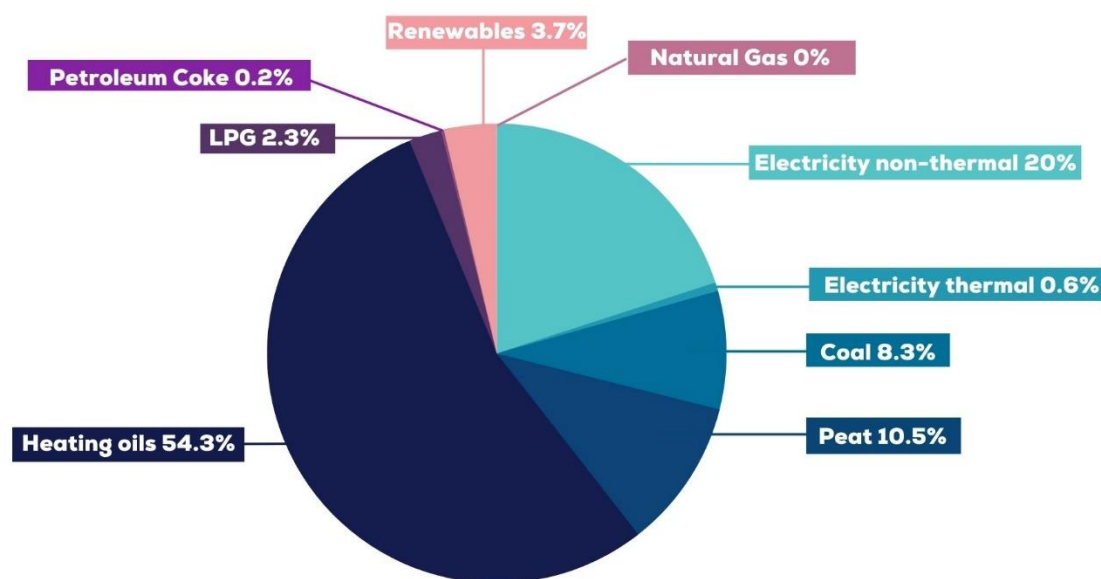
Total energy use in the residential sector was **1,468.2 GWh**. The residential energy demand mainly comes from heating oil, which makes up 54.3% of the total energy use in County Wexford. Electricity is the second highest fuel in demand, making up 20.65% of the fuel mix.

The percentage of the LA energy contribution is also outlined, and equates for 96.5GWh (7%) of the counties energy demand in the residential sector.

Total renewable fuels only accounted for 3.7% of the final energy consumption. The majority of this came from biomass sources (mainly wood). See figure 14.

| Total Consumption GWh           | Total Residential GWh | LA Social Housing GWh | % breakdown of each Fuel Type |
|---------------------------------|-----------------------|-----------------------|-------------------------------|
| Electricity (non-thermal)       | 293.6                 | 19.3                  | <b>20.0%</b>                  |
| Electricity (thermal)           | 9.4                   | 0.6                   | <b>0.65%</b>                  |
| Coal                            | 122.2                 | 8.0                   | <b>8.3%</b>                   |
| Peat                            | 154.8                 | 10.2                  | <b>10.55%</b>                 |
| Heating Oils                    | 797.1                 | 52.4                  | <b>54.3%</b>                  |
| LPG                             | 34.4                  | 2.3                   | <b>2.3%</b>                   |
| Petroleum Coke                  | 2.8                   | 0.2                   | <b>0.2%</b>                   |
| Natural Gas                     | 0.0 <sup>14</sup>     | -                     | <b>0.0%</b>                   |
| Renewables                      | 53.9                  | 3.5                   | <b>3.7%</b>                   |
| <b>Total Energy Consumption</b> | <b>1468.2</b>         | <b>96.5</b>           | <b>100%</b>                   |

**Table 4: Breakdown of Energy Consumption by Fuel Type**



**Figure 14: Share of Total Energy Demand in the Residential Sector by Fuel Mix**

<sup>14</sup> CSO Data shows 550 homes with natural gas which is equal to 0.01GWh = 0.001%

## 5.2.2 GHG EMISSIONS RESULTS

The GHG emissions from methane (CH<sub>4</sub>), and nitrous Oxide (N<sub>2</sub>O) obtained from the MapElre data equates to 1.8 ktCO<sub>2</sub>eq. When energy use was converted into GHG emissions, the total GHG emissions in 2018 for the Residential Sector in County Wexford was **433.88 ktCO<sub>2</sub>eq.**

The percentage of the LA energy contribution is also outlined, and equates for 28.6 ktCO<sub>2</sub>eq (7%) of the counties GHG emissions in the residential sector.

Figure 15 below shows the total emissions for the residential sector in County Wexford by fuel type. The highest emissions in the residential sector come from electricity and heating oils, which contribute 26.1% and 47.2% respectively.

| Total GHG Emissions                    | Total Residential ktCO <sub>2</sub> Eq | LA Social Housing GHG Emissions ktCO <sub>2</sub> Eq | %            |
|--|--|--|--------------|
| Electricity (non-thermal)              | 109.8                                  | 7.2  | <b>25.3%</b> |
| Electricity (thermal)                  | 3.5                                    | 0.2  | <b>0.8%</b>  |
| Coal                                   | 41.6                                   | 2.7  | <b>9.6%</b>  |
| Peat                                   | 58.0                                   | 3.8  | <b>13.3%</b> |
| Kerosene                               | 204.8                                  | 13.5   | <b>47.2%</b> |
| LPG                                    | 7.9                                    | 0.5  | <b>1.8%</b>  |
| Petroleum Coke                         | 0.7                                    | 0.0 <sup>15</sup>                                    | <b>0.2%</b>  |
| Natural Gas                            | 0.0                                    | 0.0  | <b>0.0%</b>  |
| Renewables                             | 0.0                                    | 0.0  | <b>0.0%</b>  |
| CH <sub>4</sub> to CO <sub>2</sub> eq  | 6.8                                    | 0.6  | <b>1.6%</b>  |
| N <sub>2</sub> O to CO <sub>2</sub> eq | 0.7                                    | 0.1  | <b>0.2%</b>  |
| <b>Total GHG Emissions</b>             | <b>433.8</b>                           | <b>28.6</b>  |              |

Table 5: Breakdown of GHG emissions

<sup>15</sup> Petroleum Coke – 0.05



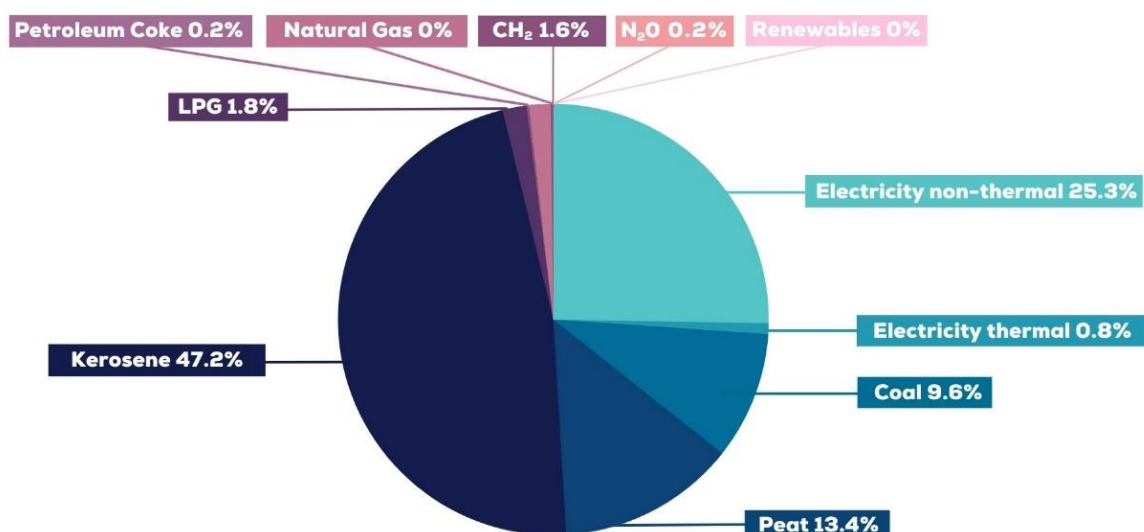


Figure 15: Share of Total Emissions in the Residential Sector by Fuel Type

### 5.3 KEY FINDING

- Total energy consumed by residential sector in 2018 was 1,468.2 GWh
- 54.3% of the residential fuel mix was made up heating oil followed by 20.6% electricity and 18.9% from peat & coal
- Total residential emissions were 433.8 ktCO<sub>2</sub>eq in 2018
- 47.2% of residential emissions came from heating oil, 26.1% from electricity and 23% from peat & coal

| Residential Sector                     |             |              |                    |                                   | Total   |
|--|-------------|--------------|--------------------|-----------------------------------|---------|
|  | Electricity | Fossil Fuels | Renewable Energies | CH <sub>4</sub> /N <sub>2</sub> O |         |
| Total Energy (GWh)                     | 303.0       | 1,111.3      | 53.9               | -                                 | 1,468.2 |
| Total Emissions (ktCO <sub>2</sub> eq) | 113.3       | 313.0        | -                  | 7.5                               | 433.8   |

Table 6: Wexford County Residential Inventory; Energy and CO<sub>2</sub>eq Emissions

## 6.0 MANUFACTURING & COMMERCIAL

Manufacturing & Commercial data is reported as one sector as outlined in “Technical Annex C: Climate Mitigation Assessment” of the Local Authority Climate Action Plan Guidelines” (DECC, 2023).

The data provided for the Baseline Emissions Inventory (BEI) has Wexford County Councils data included within this sector (EPA, 2022). Wexford County Council’s data is presented and analysed separately in this report (see Section 4). Therefore, the data presented in this section is for the Manufacturing & Commercial sector only, without the Local Authority data, which has been extracted from this data set.

These sectors are responsible for emissions from the operation of manufacturing plants as well as space heating, water heating, cooking and laundry involved in commercial services. The main data sources for these sectors are MapElre<sup>16</sup>, CSO non-residential metered consumption data<sup>17</sup>, CSO Energy Balance<sup>18</sup> and Valuation Office<sup>19</sup> data set.

### 6.1 METHODOLOGY

The CSO data and the data provided from the Valuations Office form the foundation of data collection for this sector.

The Valuation Office (VO) provides data on number of businesses in County Wexford and the associated floor area of each. The properties are categorised by the Valuation Office as follow:

- **Industrial Uses** includes (Warehouse, Workshops, Factory, Livestock Mart, Showrooms, workshop offices)
- **Office** includes (Business parks, industrial offices, studio)
- **Retail (Warehouse)** includes (Garden Yard, Motor showroom Yard)
- **Hospitality** includes (Pubs, Night Clubs, Guesthouse, Funeral homes, Caravan parks, Hostel, Hotels)
- **Health** includes (Nursing home, Clinic, Surgery centers, Surgery office)
- **Fuel/Depot** includes (Oil/Fuel Depot store, Service station, Motorway service station, Oil/Fuel Depot yard)
- **Miscellaneous** includes (Crèche, Car park, Advertising station)
- **Retail (Shops)** includes (retail shops, Supermarket, Restaurant, Post Office, Department store, Café, Bank, ATM, Pharmacy)

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<sup>16</sup> <https://projects.au.dk/mapeire/spatial-results/download>

<sup>17</sup> <https://www.cso.ie/en/statistics/energy/meteredelectricityconsumption/>

<sup>18</sup> <https://data.cso.ie/table/SEI01>

<sup>19</sup> <https://maps.valoff.ie/maps/VO.html>

- **Leisure** includes (Clubhouse, Community hall, Stable, Stadium, Swimming Pool, Gymnasium/Fitness Centre, Cinema, Equestrian Centre, Theatre)
- **Minerals** includes (Quarries)

Table 6 shows the total number of businesses and the associated floor area for each category. 35.3% of the commercial properties can be categorised as retail shops, 33.1% as industrial and 15.4% as office, see Figure 16.

|                    | No. of Buildings | Total Floor Area (m <sup>2</sup> ) |
|--------------------|------------------|------------------------------------|
| Industrial Uses    | 1,514            | 4,766,822                          |
| Office             | 704              | 108,276                            |
| Retail (Warehouse) | 72               | 141,485                            |
| Hospitality        | 360              | 302,539                            |
| Health             | 17               | 32,926                             |
| Fuel/Depot         | 75               | 1,040,964                          |
| Miscellaneous      | 136              | 40,401                             |
| Retail (Shops)     | 1,615            | 377,928                            |
| Leisure            | 64               | 44,961                             |
| Minerals           | 16               | 836,126                            |
| <b>TOTAL</b>       | <b>4,573</b>     | <b>7,692,428</b>                   |

Table 6: Number of Properties & Floor Area of Manufacturing & Commercial Businesses

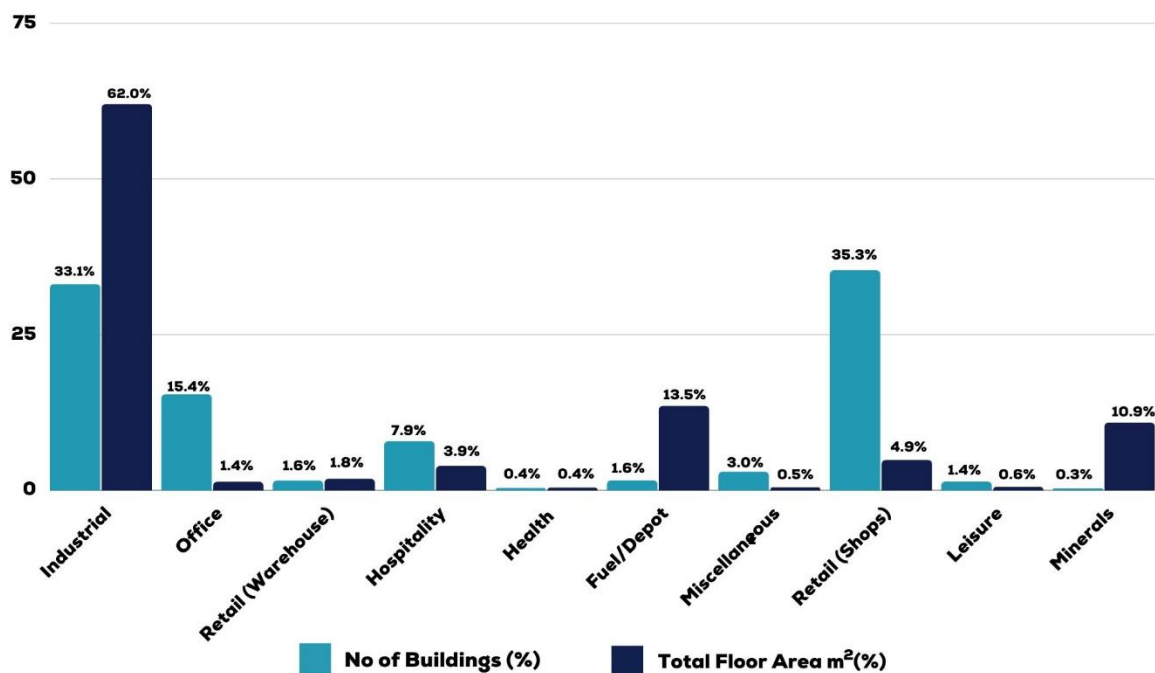


Figure 106. Number of Properties & Floor Area of Manufacturing & Commercial Businesses

The Chartered Institute for Building Service Engineers (CIBSE, 2008) produce benchmarks, given in kilowatt-hours per meter squared floor area (kWh/m<sup>2</sup>) for heat and electricity, in each building category.

|                    | kWh/m <sup>2</sup> | CO <sub>2</sub> eq |
|--------------------|--------------------|--------------------|
| Industrial Uses    | 195                | 49.7               |
| Office             | 215                | 75.1               |
| Retail (Warehouse) | 195                | 49.7               |
| Hospitality        | 435                | 120.5              |
| Health             | 270                | 76.5               |
| Fuel/Depot         | 195                | 49.7               |
| Miscellaneous      | 70.39              | 112.6              |
| Retail (Shops)     | 165                | 90.8               |
| Leisure            | 1375               | 349.5              |
| Minerals           | 195                | 49.7               |

**Table 7: CIBSE Benchmarks used for each Manufacturing & Commercial Category**

The advantage of using CIBSE energy benchmarks is that they are based on a large sample set, and as Irish building regulations follow the UK regulations, the energy figures are applicable in the Irish context. The relevant benchmarks can be matched by property type and multiplied by the floor areas from the Valuation Office for all Manufacturing & Commercial businesses in the County.

The CSO Natural Gas Consumption data<sup>20</sup> and the Electricity Metered Data<sup>21</sup> for non-residential buildings was obtained from CSO data. The Local Authority data was also used and subtracted from the electricity and thermal data to obtain the split between thermal and electrical consumption for the Manufacturing & Commercial sector.

MapElre data set provides additional emissions produced in the form of Methane (CH<sub>4</sub>) and Nitrous Oxide (N<sub>2</sub>O) by Manufacturing & Commercial sector. These emissions are converted into CO<sub>2</sub>eq using the conversion factors provided by EPA (EPA, 2023)

<sup>20</sup> <https://www.cso.ie/en/statistics/energy/networkedgasconsumption/>

<sup>21</sup> <https://www.cso.ie/en/statistics/energy/meteredelectricityconsumption/>

## 6.2 RESULTS

### 6.2.1 ENERGY RESULTS

Total energy use in the Manufacturing & Commercial sector in 2018 was **1,611.4 GWh**. The energy demand mainly comes from thermal consumption, which accounts for 1,265.8 GWh (79%) of the energy. 345.7 GWh (21%) is electricity, see Figure 17.

| Fuel Type    | Energy GWh     |
|--------------|----------------|
| Electricity  | 345.6          |
| Natural Gas  | 64.0           |
| Heating Oils | 649.4          |
| LPG          | 136.5          |
| Coal/Peat    | 136.5          |
| Renewables   | 279.4          |
| <b>TOTAL</b> | <b>1,611.4</b> |

Table 8: Breakdown of Consumption by Fuel Type

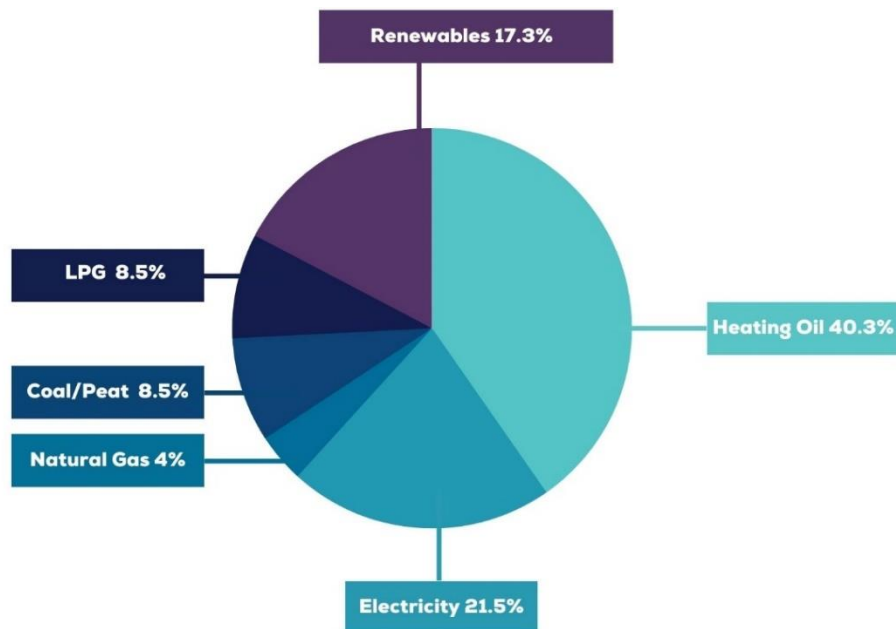


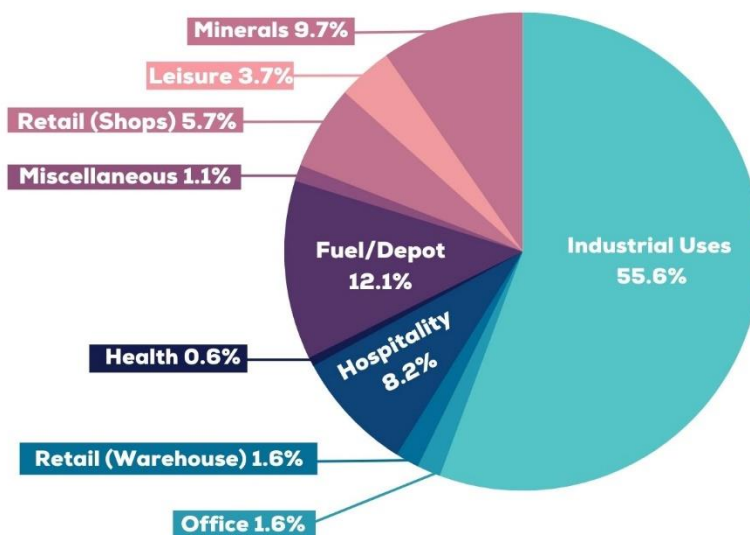
Figure 17. Breakdown of energy source for Manufacturing and Commercial sector

## 6.2.2 GHG EMISSION RESULTS

When energy use was converted into GHG emissions, the total GHG emissions from the Manufacturing & Commercial sector in 2018 was calculated at **403.2 ktCO<sub>2</sub>eq**. As can be seen from Figure 18, the categories of properties that produced the most emissions were:

- Industrial uses: 227.2 ktCO<sub>2</sub>eq (55.6%)
- Fuel/Depot: 49.6 ktCO<sub>2</sub> eq (12.1%)
- Minerals: 39.6 ktCO<sub>2</sub> eq (9.7%)
- Hospitality: 33.5 ktCO<sub>2</sub> eq (8.2%)

Figure 9 below gives an indication of emissions in comparison to the number of buildings for different commercial properties in the region.



**Figure 18: Commercial Emissions by Property Category**

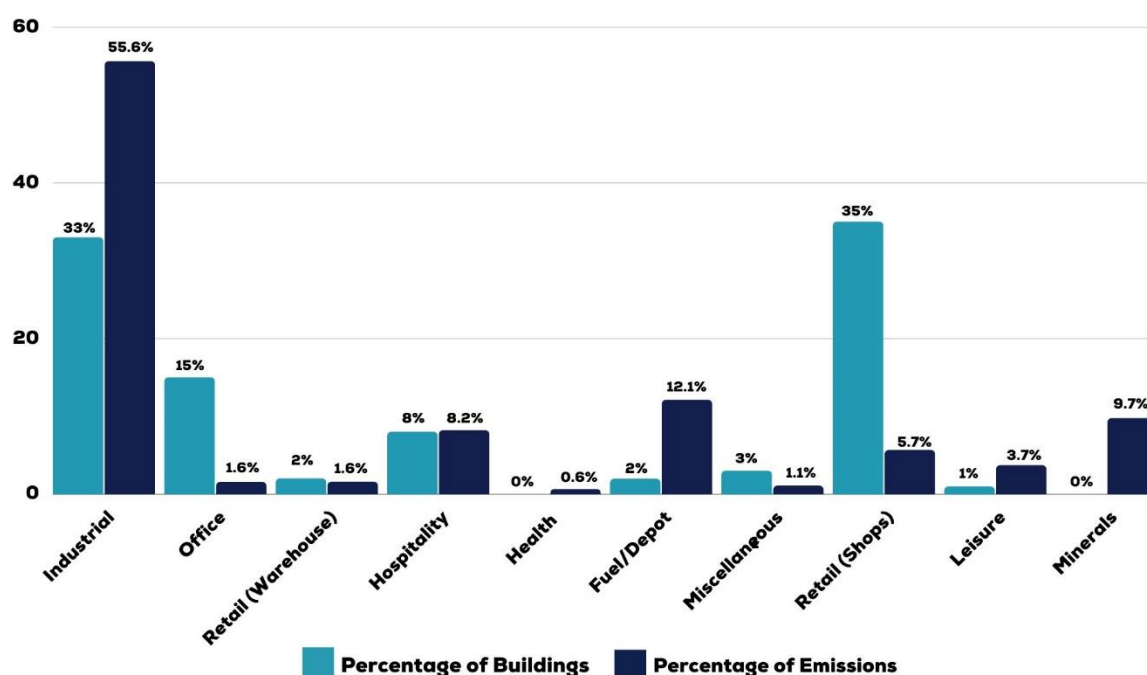


Figure 19: Share of Total Emissions and Number of Commercial Properties in Wexford County

Industrial uses, Minerals, Fuel/Depot and Hospitality are the main CO<sub>2</sub> emitters, as altogether they make up 85.7% of the commercial sector's total emissions. From this analysis, these four categories should be the main targets of energy and emission reduction initiatives within the commercial sector.

Figure 20 below shows the electricity and types of fossil fuel consumption of commercial buildings by category. These figures are representative of the CIBSE energy benchmark. Electricity and heating oils hold the highest share of use (32.2%) and (44.1%) respectively. CIBSE only breaks down fuel use into fossil fuels and electricity. Therefore, CSO energy balance 2018 was used to take a national average use by fuel type to calculate the emissions.

| Fuel Type        | ktCO <sub>2</sub> eq emissions |
|------------------|--------------------------------|
| Electricity      | 129.7                          |
| Natural Gas      | 13.0                           |
| Heating Oils     | 177.7                          |
| LPG              | 31.3                           |
| Coal/Peat        | 51.1                           |
| Renewables       | -                              |
| CH <sub>4</sub>  | 0.2                            |
| N <sub>2</sub> O | 0.2                            |
| <b>TOTAL</b>     | <b>403.2</b>                   |

Table 9: Manufacturing & Commercial Emissions by Fuel Type



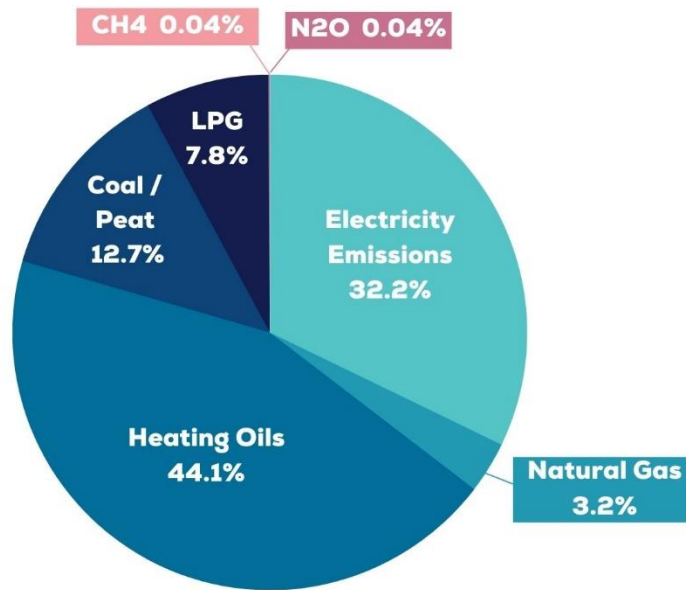


Figure 20: Wexford County Electricity and Fossil Fuel Use in the Commercial Sector by Category

## 6.3 KEY FINDING

- Total energy consumed by Manufacturing & Commercial sector in 2018 was 1,611.4 GWh
- 21% of the energy was electricity, 40% was Heating Oils. 17% was from Renewable energy systems
- Total Manufacturing & Commercial emissions were 403.2 ktCO<sub>2</sub>eq in 2018
- 32.2% of the emissions came from electrical consumption and 44.1% from heating oils
- 55.6% of emissions came from Industrial uses and 12.1% from Fuel/Depots and 9.7% from Minerals

| Manufacturing and Commercial Sector         |             |         |           | Total          |
|---|-------------|---------|-----------|----------------|
|   | Electricity | Thermal | CH4 & N2O |                |
| <b>Total Energy (GWh)</b>                   | 345.6       | 1,265.8 |           | <b>1,611.4</b> |
| <b>Total Emissions (ktCO<sub>2</sub>eq)</b> | 129.7       | 273.1   | 0.4       | <b>403.2</b>   |

Table 11: Wexford County Manufacturing & Commercial Inventory; Energy and CO<sub>2</sub> Emissions

## 7.0 INDUSTRIAL PROCESSES

The industrial processes sector estimates GHG emissions occurring from industrial processes, from the use of greenhouse gases in products, and from non-energy uses of fossil fuel carbon (EPA). For example, emissions caused by the processes that convert raw materials to a range of chemical, mineral or metal products like cement and fertilisers. These are a mix of energy related and non-energy related GHG emissions.

Industrial Processes differs from industrial uses outlined in Section 6 in that industrial uses is the GHG emissions that come from energy consumption from manufacturing & delivering of services.

The emission sources relating to this sector include cement production, ceramics, lime production, uses of carbonates, and solvent use.

### 7.1 METHODOLOGY

As per the methodology provided on page 28 of Technical Annex C: Climate Mitigation Assessment” of the Local Authority Climate Action Plan Guidelines” (DECC, 2023). MapEIre provides emission data for industrial processes across County Wexford.

GHG emissions from the processing of cement, lime and other solvents is split by MapEIre into main categories including:

- Lime Production
- Ceramic
- Lubricant use
- Paraffin wax use
- Food and Beverages Industry
- Domestic solvent use
- Other solvent use

The non-energy related GHG emissions include Methane (CH<sub>4</sub>), Nitrous Oxide (N<sub>2</sub>O), sulfur Hexafluoride (SF<sub>6</sub>). These are all converted into CO<sub>2</sub>eq using the conversion factors from EPA<sup>22</sup>

| GHG              | CO <sub>2</sub> eq/kg |
|------------------|-----------------------|
| CO <sub>2</sub>  | 1                     |
| CH <sub>4</sub>  | 25                    |
| N <sub>2</sub> O | 298                   |
| SF <sub>6</sub>  | 228000                |

**Table 10: CO<sub>2</sub>eq. Conversion Factors for Various GHG Emissions**

<sup>22</sup> <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#results>

## 7.2 RESULTS

Using the methodology outlined in the Technical Annex C: Climate Mitigation Assessment (EPA, 2023), the CO<sub>2</sub>eq emissions from the industrial processes are **14.55ktCO<sub>2</sub>eq**.

Figure 21 below shows non-energy related emissions = 20.32 ktCO<sub>2</sub>eq

- Lime Production: 0 ktCO<sub>2</sub>eq
- Ceramic: 0.02 ktCO<sub>2</sub>eq
- Lubricant use: 0.76 ktCO<sub>2</sub>eq
- Paraffin wax use: 0.81 ktCO<sub>2</sub>eq
- Food and Beverages Industry: 0.90 ktCO<sub>2</sub>eq
- Domestic solvent use: 1.32ktCO<sub>2</sub>eq
- Other solvent use: 10.74 ktCO<sub>2</sub>eq

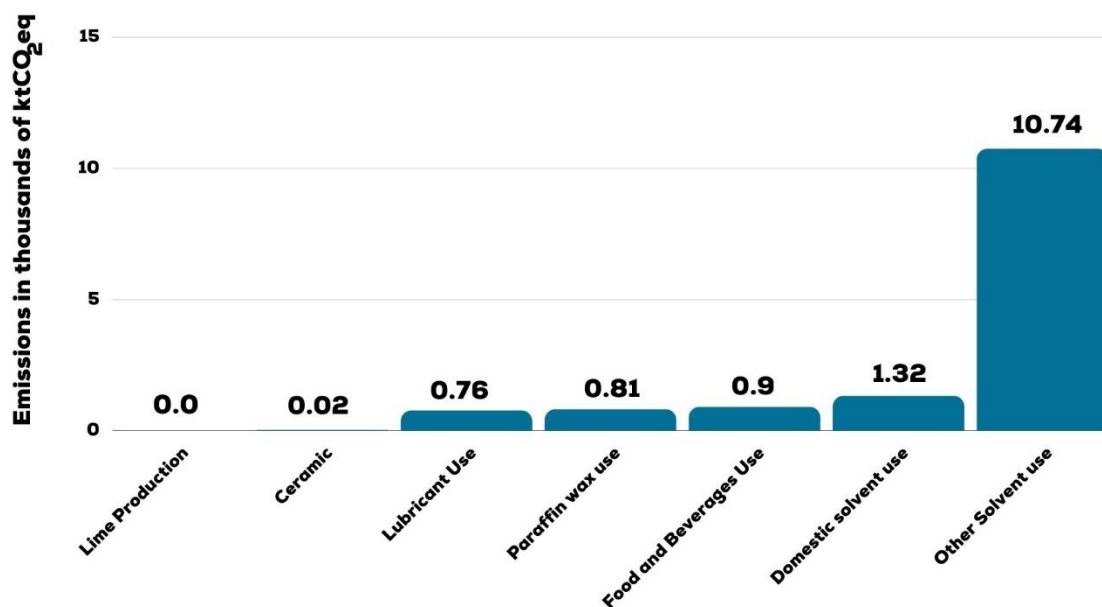


Figure 21: CO<sub>2</sub> Emissions from the Industrial Processes, ktCO<sub>2</sub>eq

## 7.3 KEY FINDINGS

- Total emissions from industrial processes are 14.55 ktCO<sub>2</sub>eq.
- 10.74 ktCO<sub>2</sub>eq (74%) emissions were from other solvent use
- The remaining 3.81 ktCO<sub>2</sub>eq emissions were from ceramics, lubricant use, paraffin wax use, food and beverage industry and domestic solvents

| Industrial Process Sector              | Lime Production | Ceramics | Lubricant Use | Paraffin Wax Use | Food Industry | Solvent Use | Other Solvent use | Total |
|--|-----------------|----------|---------------|------------------|---------------|-------------|-------------------|-------|
| Total Emissions (ktCO <sub>2</sub> eq) | 0.00            | 0.02     | 0.76          | 0.81             | 0.9           | 1.32        | 10.74             | 14.55 |

Table 11: County Wexford Industrial Processes CO<sub>2</sub>eq emissions

## 8.0 AGRICULTURE

This sector's emissions are from both energy and non-energy related actions.

The non-energy related emissions come from a range of sources, including, livestock units (dairy cows, sheep, horses, poultry, fisheries), enteric fermentation, manure management, agricultural soils, liming, and use of fertilisers and urea.

Energy related emissions are for electricity and fuels used within the agricultural sector.

Transport related emissions from the Agricultural sector are reported under the Transport Sector, as per the methodology outlined page 28 of the Technical Annex C: Baseline Mitigation Assessment.

### 8.1 METHODOLOGY

MapElre data provides a breakdown of emissions within this sector covering a wide range of categories, including:

- Agriculture/ Forestry/ Fisheries: Stationary
- Dairy Cattle
- Non-dairy Cattle
- Sheep
- Swine
- Goats
- Horses
- Mules and asses
- Manure management - Dairy Cattle
- Manure management - Non-Dairy Cattle
- Manure management - Sheep
- Manure management - Swine
- Manure management - Goats
- Manure management - Horses
- Manure management - Mules and asses
- Liming
- Inorganic N-fertilizers
- Animal manure applied to soils
- Sewage sludge applied to soils
- Urine and dung deposited by grazing animals
- Crop residues applied to soils
- Mineralization
- Atmospheric deposition
- Nitrogen leaching and run-off
- Urea application

The data from MapElre categorized as ' off-road vehicles' has been removed from this data set and is reported under the Transport Data (Section 9 of this report). This is reported under the Tractors & Machinery heading.

MapElre data set provides emissions produced in the form of Methane (CH<sub>4</sub>) and Nitrous Oxide (N<sub>2</sub>O). These emissions are converted into CO<sub>2</sub>eq using the conversion factors provided by EPA<sup>23</sup>. This data is for both energy and non-energy related emissions.

For the energy related emissions, additional data from CSO Census of Agriculture is broken down to County level and gives information on the number of farms, the number of livestock units (dairy cow, sheep, pig, poultry etc.), and the crops grown (Central Statistics Office, 2020), (EPA, 2022), see Figure 22112. In County Wexford there are a total of:

- 301,601 Total cattle of which 83,741 dairy cows, and 217,860 other cattle & other cows in 2,758 farms
- 197,314 Sheep of which 89,989 are Ewes and 107,325 other sheep in 1,048 farms
- 10,100 Poultry in 219 farms
- 82,300 Pigs of which 6,900 are breeding pigs and 75,400 are other pigs in 79 farms

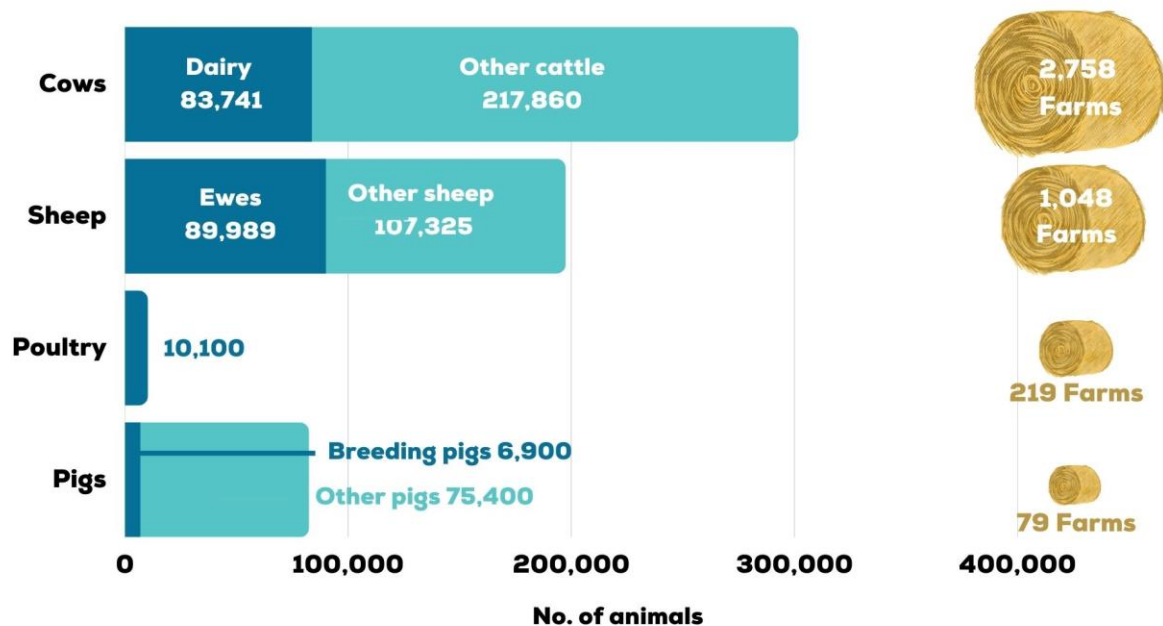


Figure 2211. Breakdown of Livestock Units and a Number of Farms in County Wexford

<sup>23</sup> <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#results>



Benchmarks from Teagasc were used to estimate energy and non-energy related emissions (Teagasc, 2017). These provide benchmarks in formats such as kWh electricity/dairy, cow/year, methane/dairy, cow/year, kWh. This methodology allows a detailed breakdown of agricultural emissions. Average energy consumption in the agriculture sector, by livestock, in Ireland are:

- 350 kWh of energy per cow<sup>24</sup>
- 280 kWh of energy by sheep
- 10.7 kWh of energy by poultry<sup>25</sup>
- 28 kWh of energy by pigs<sup>26</sup>

The energy related emissions calculated from the CSO data and Teagasc benchmarks is subtracted from the total emissions provided by MapElre to give energy and non-energy related GHG emissions for the agricultural sector.

## 8.2 RESULTS

### 8.2.1 ENERGY RESULTS

Using the Teagasc Benchmarks and the number of different livestock from the CSO data, as outlined above, the total Energy related emissions associated with the Agriculture sector in County Wexford in 2018 was **163.2GWh**.

65% of this is associated with cattle and 34% associated with sheep.

|                | Electrical GWh | Thermal GWh | Total | %   |
|----------------|----------------|-------------|-------|-----|
| <b>Cattle</b>  | 105.6          | -           | 105.6 | 65% |
| <b>Sheep</b>   | 55.2           | -           | 55.2  | 34% |
| <b>Poultry</b> | 0.0            | 0.1         | 0.1   | 0%  |
| <b>Pigs</b>    | 2.3            | 0.0         | 2.3   | 1%  |
| <b>TOTAL</b>   | 163.1          | 0.1         | 163.2 |     |

Table 12: Energy Related Energy Consumption Associated with the Livestock in County Wexford

### 8.2.2 GHG EMISSION RESULTS

The GHG emissions are split between energy related and non-energy related emissions.

<sup>24</sup> <https://www.teagasc.ie/rural-economy/rural-development/diversification/energy-auditing-in-agriculture/>

<sup>25</sup> [https://www.teagasc.ie/media/website/rural-economy/rural-development/diversification/Energy-12\\_Poultry-Energy-Efficiency-in-Poultry-Units.pdf](https://www.teagasc.ie/media/website/rural-economy/rural-development/diversification/Energy-12_Poultry-Energy-Efficiency-in-Poultry-Units.pdf)

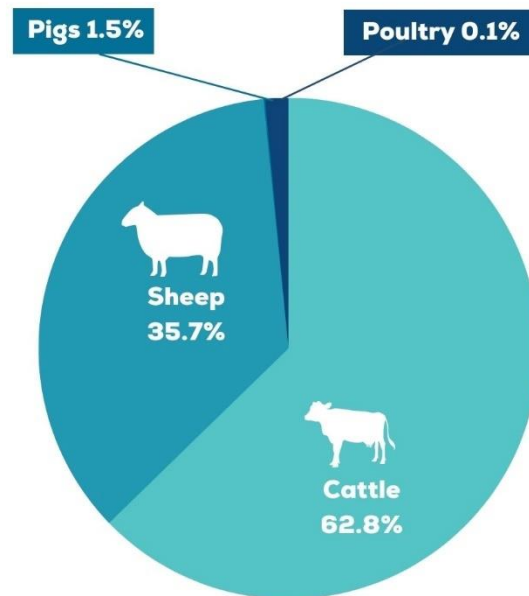
<sup>26</sup> <https://www.teagasc.ie/media/website/rural-economy/rural-development/diversification/Energy-14-Energy-Use-on-Pig-Farms.pdf>

The energy related emissions associated with the 163.2GWh outlined above are calculated using the electricity and thermal conversion factors.

The total energy related emissions are 58.1 ktCO<sub>2</sub>eq, see Figure 23123.

|                | ktCO <sub>2</sub> eq | %     |
|----------------|----------------------|-------|
| <b>Cattle</b>  | 36.5                 | 62.8% |
| <b>Sheep</b>   | 20.7                 | 35.6% |
| <b>Poultry</b> | 0.0                  | 0.1%  |
| <b>Pigs</b>    | 0.9                  | 1.5%  |
| <b>TOTAL</b>   | <b>58.1</b>          |       |

**Table 13: Energy Related GHG Emissions Associated with the Livestock in County Wexford**



**Figure 2312. Breakdown of Energy Related GHG Emissions Associated with the Livestock in County Wexford**

The non-energy related emissions calculated using the MapElre data and the energy related emissions above, gave a total of 844.3 ktCO<sub>2</sub>eq, see Figure4.

| NFR_Code | NFR Name   | ktCO <sub>2</sub> eq |
|----------|--|----------------------|
| 1A4ci    | Agriculture/ Forestry/ Fisheries: Stationary       | 2.2                  |
| 1A4ciii  | Agriculture/ Forestry/ Fisheries: National Fishing | 0.1                  |
| 3A1a     | Dairy Cattle                                       | 196.7                |
| 3A1b     | Non-dairy Cattle                                   | 231.5                |
| 3A2      | Sheep  | 25.9                 |
| 3A3      | Swine  | 0.7                  |
| 3A4d     | Goats  | 0.0                  |
| 3A4e     | Horses   | 2.4                  |
| 3A4f     | Mules and asses                                    | 0.2                  |
| 3B1a     | Manure management - Dairy Cattle                   | 23.4                 |
| 3B1b     | Manure management - Non-Dairy Cattle               | 37.9                 |
| 3B2      | Manure management - Sheep                          | 3.2                  |
| 3B3      | Manure management - Swine                          | 3.9                  |
| 3B4d     | Manure management - Goats                          | 0.0                  |
| 3B4e     | Manure management - Horses                         | 0.6                  |
| 3B4f     | Manure management - Mules and asses                | 0.0                  |
| 3G       | liming   | 12.1                 |
| 3Da1     | Inorganic N-fertilizers                            | 150.4                |
| 3Da2a    | Animal manure applied to soils                     | 29.9                 |
| 3Da2b    | Sewage sludge applied to soils                     | 1.9                  |
| 3Da3     | Urine and dung deposited by grazing animals        | 52.6                 |
| 3Da4     | Crop residues applied to soils                     | 33.8                 |
| 3Da5     | Mineralization                                     | 3.0                  |
| 3Da6     | Cultivation of organic soils                       | 1.0                  |
| 3Db1     | Atmospheric deposition                             | 8.8                  |
| 3Db2     | Nitrogen leaching and run-off                      | 7.5                  |
| 3H       | Urea application                                   | 14.6                 |
|          | <b>Total</b>                                       | <b>844.3</b>         |

**Table 14: Non-Energy Related Emissions from the Agriculture sector in County Wexford by Category**

Therefore, the total emission from agriculture is 902.4 ktCO<sub>2</sub>eq in 2018.

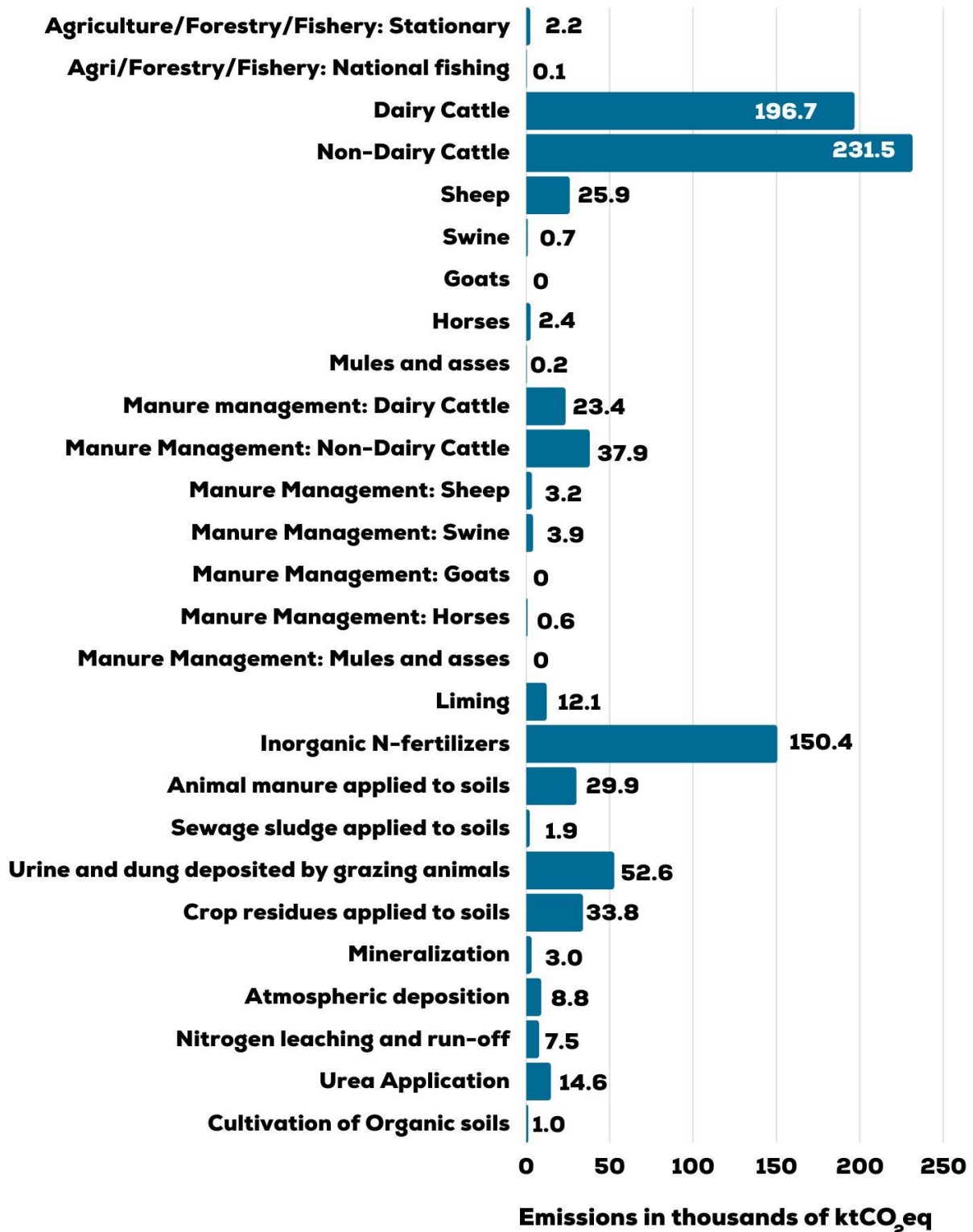


Figure 24. Non-Energy Related Emissions from the Agriculture sector in County Wexford by Category

## 8.3 KEY FINDINGS

- Energy Consumption from agriculture sector accounts for 163.2 GWh
- Non-energy related GHG emissions totaled 844.3 ktCO<sub>2</sub>eq
- Total emissions from agriculture sector accounts for 902.4 ktCO<sub>2</sub>eq

| Agriculture Sector                          |             |         |                                    | Total        |
|---|-------------|---------|------------------------------------|--------------|
|   | Electricity | Thermal | CH <sub>4</sub> & N <sub>2</sub> O |              |
| <b>Total Energy (GWh)</b>                   | 163.1       | 0.1     |                                    | <b>163.2</b> |
| <b>Total Emissions (ktCO<sub>2</sub>eq)</b> | 58.1        | 0.0     | 844.3                              | <b>902.4</b> |

**Table 17: County Wexford Agriculture Sector CO<sub>2</sub>eq Emissions**

## 9.0 TRANSPORT

Transport is a complicated sector to develop an accurate baseline for an area due to the number of different transport modes and movement across boundaries.

This section does not include Wexford County Councils direct transport emissions, which is presented separately in Section 4 of this report. This data was subtracted from the total transport emissions for this sector to avoid ‘double-counting’.

The Central Statistics Office (CSO) published ‘Census 2018, Commuting in Ireland’, which shows that commuting has increased nationally, and is in line with the changes and growth in the Irish economy (SEAI, 2019).

Comparing 2016<sup>27</sup> and 2011 census data, the number of people commuting to work increased by 11%. Nationally, commuting by car increased by 8%, public transport rose by 21%, walking by 3%, and cycling was up by 43% in 2018.

Significant improvements have been made to the sustainability of the transport system in recent years at national levels. The national vehicle road tax system was revised, and as of July 2008, the system moved away from assessing vehicles based on their engine size to one that is based on CO<sub>2</sub>eq emissions per kilometer (CSO- transport, 2018).

### 9.1 METHODOLOGY

The primary source of the Transport sector’s GHG emissions come from the burning of diesel and petrol in combustion engines. MapEire data and CSO Transport Omnibus (CSO- transport, 2018) data both provide a breakdown of transport emissions at a County wide level, covering a range of vehicle type categories as outlined below. As seen in Figure 25, County Wexford had a total number of vehicles of 95,810 in 2018, of which:

- 75,184 are private cars
- 13,989 are goods vehicles
- 1,506 motorcycles
- 4,572 tractors and machinery
- 270 small PSVs (Public Service Vehicle)
- 289 large PSVs

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<sup>27</sup> Census 2022 not available at time of analysis. Preliminary data published post analysis

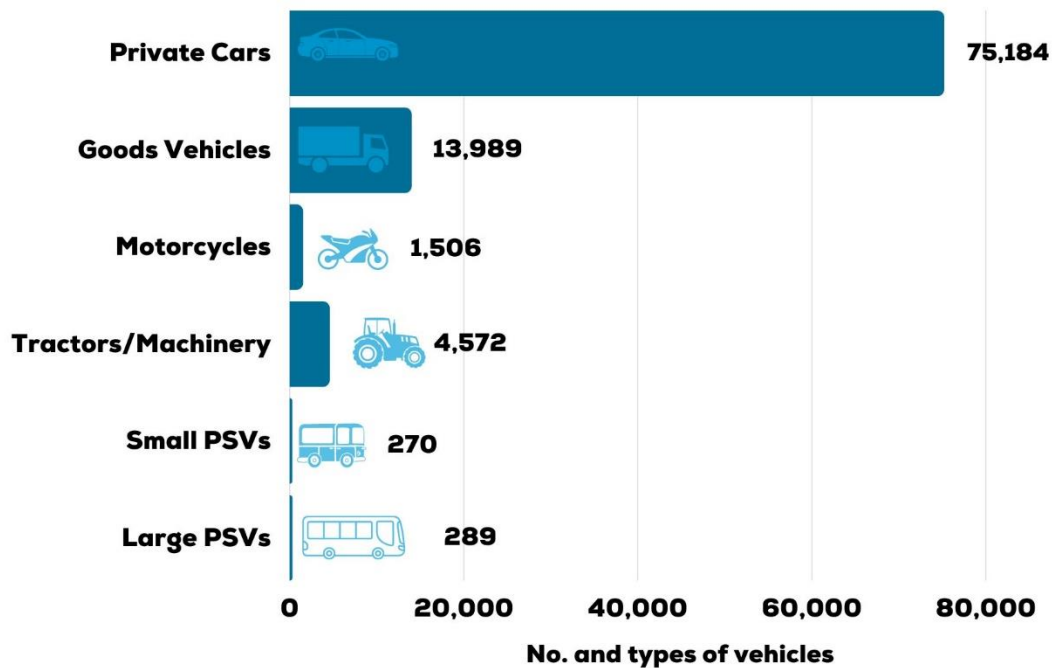


Figure 25. Breakdown of Transport Vehicles in County Wexford, 2018

*\*A public service vehicle is a vehicle that carries passengers for a fee. Small PSV is defined as vehicle that carries up to 8 passengers, and large PSV is defined as more than 8 passengers<sup>28</sup>.*

CSO Transport Omnibus (CSO- transport, 2018) also gives a total number of km travelled by each vehicle type and what fuel is used (Diesel, Petrol, Other). Although no breakdown is given, the 'Other' category is assumed to be a mix of electricity and CNG similar to the national average breakdown.

The SEAI's 'Energy in Ireland 2019' (SEAI, 2019) includes the section on the share of emissions in Transport and gives a breakdown of average fuel use in Ireland in 2018 for Transport Vehicles. The 'Other' category outlined above was split between electric vehicles and Compressed Natural Gas (CNG) vehicles using the national average breakdown. The national dataset shows that an average of 1% of transport fuel is related to Compressed Natural Gas (CNG). Without data specific to County Wexford, this national average has been used to estimate the fuel mix breakdown. It is not known if there are any actual CNG vehicles in County Wexford.

This data was then combined with vehicular efficiency and GHG emissions data from the SEAI report on 'Energy in Transport 2014' (SEAI, 2014) as well as average age of private cars to estimate the overall average energy usage and fuel breakdown for each vehicle type and therefore the Transport Sector as a whole across County Wexford. Carbon emission factors for transport fuels was then used to convert energy to GHG emissions in 2018 for the Transport sector.

<sup>28</sup> Road Safety Authority [https://www.rsa.ie/road-safety/road-users/special-purpose-vehicles/small-public-service-vehicles-\(spsv\)#:~:text=What%20is%20a%20small%20public,Yes](https://www.rsa.ie/road-safety/road-users/special-purpose-vehicles/small-public-service-vehicles-(spsv)#:~:text=What%20is%20a%20small%20public,Yes).



For public transport, providers of public transport differ in each county. Public Service Vehicles are reported as above, and MapElre provides for rail emissions as a subcategory.

The transport data associated with Wexford County Council as reported in Section 4 of this report was subtracted from the total Transport data to avoid ‘double-counting’.

## 9.2 RESULTS

### 9.2.1 ENERGY RESULTS

The total energy consumption related to Transport in 2018 for County Wexford was **1,618.8 GWh**.

Road diesel was the main fuel source for both public and private transport, accounting for 79.2% of CO<sub>2</sub> emissions. This was followed by petrol at 20.2% of CO<sub>2</sub> emissions.

| Fuel Type    | GWh            | %     |
|--------------|----------------|-------|
| Petrol       | 326.5          | 20.2% |
| Road Diesel  | 1,281.3        | 79.2% |
| CNG          | 9.0            | 0.6%  |
| Electricity  | 2.0            | 0.1%  |
| <b>TOTAL</b> | <b>1,618.8</b> |       |

Table 15: County Wexford Total Energy Consumption Related to Transport in 2018

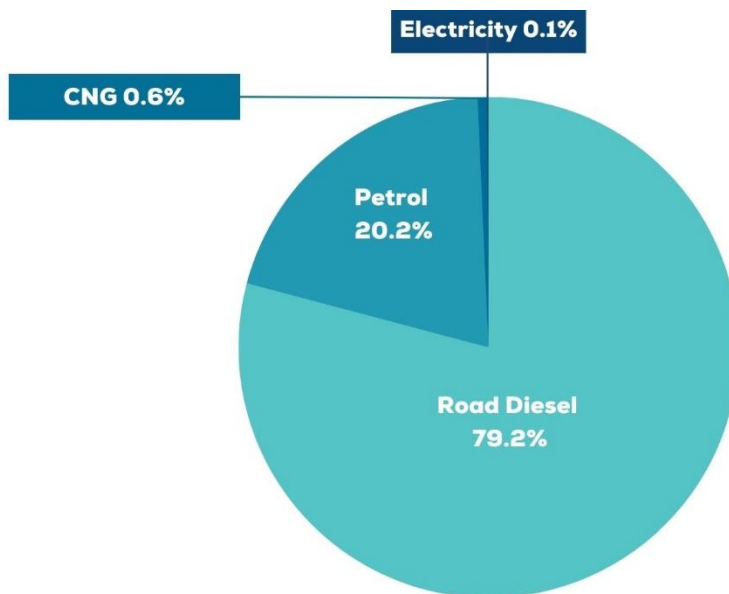


Figure 26: County Wexford Transport Fuel Use %

## 9.2.2 GHG EMISSION RESULTS

The total direct CO<sub>2</sub> emissions from Transport in 2018 were the equivalent of 424.3 ktCO<sub>2</sub> of which:

- 275.1 ktCO<sub>2</sub> from private vehicles
- 108.5 ktCO<sub>2</sub> from goods vehicles
- 0.96 ktCO<sub>2</sub> from motorcycles
- 25.3 ktCO<sub>2</sub> from tractors and machinery
- 3.5 ktCO<sub>2</sub> from small PSVs
- 6.9 ktCO<sub>2</sub> from large PSVs
- 2.5 ktCO<sub>2</sub> from railways
- 1.5 ktCO<sub>2</sub> from national navigation (shipping)

The LA Transport emissions were removed from the total Transport emissions to give a value of 423.0 ktCO<sub>2</sub> direct CO<sub>2</sub> emissions.

The GHG emissions from methane (CH<sub>4</sub>), and nitrous Oxide (N<sub>2</sub>O) obtained from the MapEire data equates to 5.2 ktCO<sub>2</sub>eq.

This gives a total GHG emissions for the Transport Sector of **428.2 ktCO<sub>2</sub>eq.**

As seen in Figure 27, the split of emissions from the different areas is:

| Fuel Type             | ktCO <sub>2</sub> eq | %     |
|-----------------------|----------------------|-------|
| <b>Petrol</b>         | 82.3                 | 19.2% |
| <b>Road Diesel</b>    | 338.1                | 79.0% |
| <b>CNG</b>            | 1.8                  | 0.4%  |
| <b>Electricity</b>    | 0.7                  | 0.2%  |
| <b>CH<sub>4</sub></b> | 0.3                  | 0.1%  |
| <b>N<sub>2</sub>O</b> | 4.9                  | 1.2%  |
| <b>TOTAL</b>          | <b>428.2</b>         |       |

Table 16: Split of Transportation Emissions from different fuel types

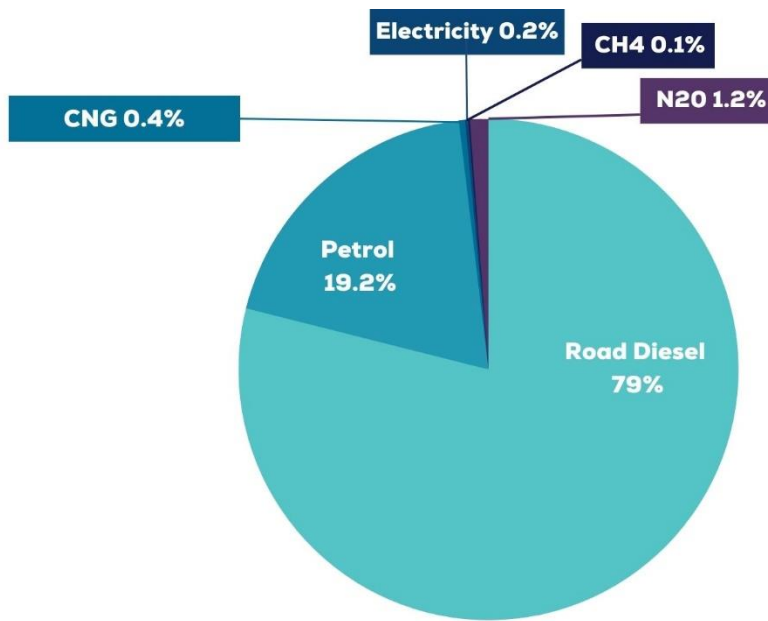


Figure 27. Split of Transportation Emissions from different fuel types %

### 9.3 KEY FINDINGS

- Total energy use in transport was 1,618.8 GWh
- Total final emissions from transport were 428.2 ktCO<sub>2</sub>eq
- Transport emissions came primarily from diesel (78.2%) and Petrol (19.9%)

| Transport Sector                       | Electricity | Fossil Fuels |             |        | Other Emissions |                  | Total |
|--|-------------|--------------|-------------|--------|-----------------|------------------|-------|
|  |             | CNG          | Road Diesel | Petrol | CH <sub>4</sub> | N <sub>2</sub> O |       |
| Total Emissions (ktCO <sub>2</sub> eq) | 0.7         | 1.8          | 338.2       | 82.3   | 0.3             | 4.9              | 428.2 |

Table 20: Wexford County Transport Inventory, Energy and CO<sub>2</sub> Emissions

## 10.0 LAND USE, LAND USE CHANGE & FORESTRY (LULUCF)

Land Use, Land-use Change and Forestry covers the following categories: Forest land, Cropland, Grassland, Wetlands, Settlements, Other land and Harvested Wood products (EPA, 2022). The emissions associated with LULUCF is determined by the CO<sub>2</sub>eq emissions from Grassland and Wetlands, due to drainage of organic soils. This is offset somewhat by Forest Land and harvested wood products, which acts as a carbon sinks. (EPA, 2022).

### 10.1 METHODOLOGY

MapElre<sup>29</sup> provides data on the level of emissions and carbon sinks on a County wide level including forest land, cropland, wetlands, settlements as well as for harvested wood products (EPA, 2022). The data is taken directly from this data source.

The non-energy related GHG emissions include Carbon Dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>) and Nitrous Oxide (N<sub>2</sub>O).

### 10.2 RESULTS

#### 10.2.1 ENERGY RESULTS

There are no energy related results in this Section. GHG emissions in this sector are all non-energy related.

#### 10.2.2 GHG EMISSION RESULTS

CO<sub>2</sub> emissions from LULUCF sector is 155.7kt. CH<sub>4</sub> and N<sub>2</sub>O emissions from LULUCF sector is 21.5kt CO<sub>2</sub>eq. This is equivalent to total emissions from LULUCF sector of **177.2 ktCO<sub>2</sub>eq.**

See Figure 28, emissions from different sectors in LULUCF account for the following:

Emissions from different sectors in LULUCF accounts for:

- Grassland accounts for 271.4 ktCO<sub>2</sub>eq.
- Wetlands accounts for 13.2 ktCO<sub>2</sub>eq.
- Settlements accounts for 7.2 ktCO<sub>2</sub>eq.
- Cropland accounts for -8.2 ktCO<sub>2</sub>eq.
- Harvested wood products accounts for -19.6 ktCO<sub>2</sub>eq.
- Forest land accounts for -87.2 ktCO<sub>2</sub>eq.
- Other Lands for 0.4 ktCO<sub>2</sub>eq.

<sup>29</sup> <https://projects.au.dk/mapeire/spatial-results/download>

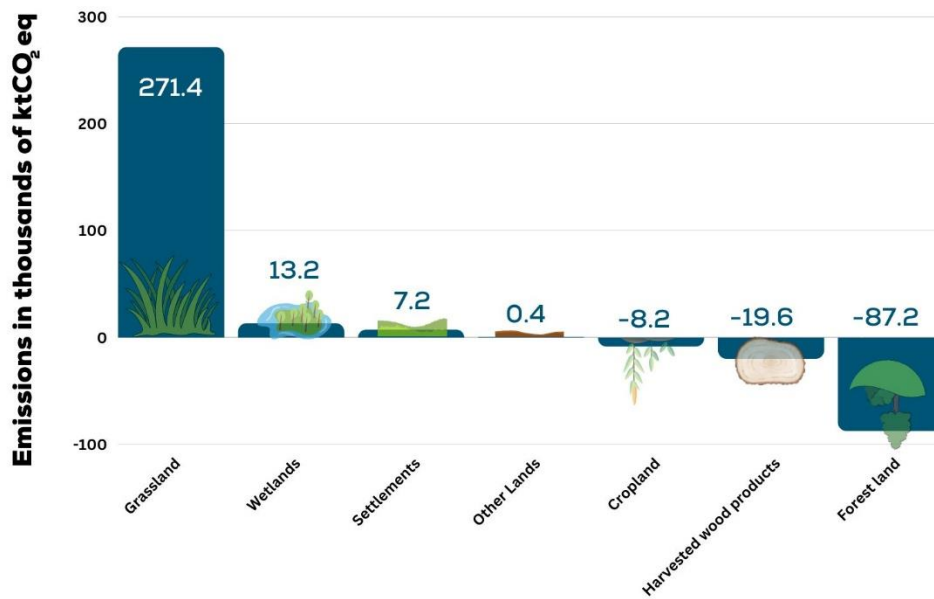


Figure 28. Breakdown of GHG Emissions from LULUCF

Negative emissions accounts for that the amount for CO<sub>2</sub> absorbed by the forests, crops and harvested woods.

## 10.3 KEY FINDINGS

- Total emissions from LULUCF sector accounts for 177.2 ktCO<sub>2</sub>eq.

| LULUCF Sector                          | Grasslands | Wetlands | Settlements | Croplands | Harvested Wood Products | Forest land | Other land | Total |
|--|------------|----------|-------------|-----------|-------------------------|-------------|------------|-------|
| Total Emissions (ktCO <sub>2</sub> eq) | 271.4      | 13.2     | 7.2         | -8.2      | -19.6                   | -87.2       | 0.4        | 177.2 |

Table 17: County Wexford LULUCF sector CO<sub>2</sub>eq emission

## 11.0 WASTE

This sector is responsible from handling of waste, incineration of waste (without energy utilisation), composting, and wastewater handling (EPA, 2022). This sector accounts for non-energy related emissions. Energy related emissions for waste services is covered under Manufacturing & Commercial emissions reported in Section 7 of this report (under industrial uses).

### 11.1 METHODOLOGY

MapElre provides data on the emission levels within this sector (EPA, 2022). For County Wexford the data is split into GHG emissions related to the following waste categories:

- Composting
- Solid waste disposal on land
- Open burning of waste
- Domestic waste-water handling

Additional data collection such as number of landfills and wastewater treatment plants provides further breakdown of emissions within this sector.

The National Waste Collection Permit Office (NWCPO) grant waste collection licenses for providers in each County. In 2018, there was one provider in County Wexford who has a permit for waste collection.

The Pollutant Release and Transfer (PRTR)<sup>30</sup> shows that in 2018 there were 5 facilities reporting under waste and wastewater management.

### 11.2 RESULTS

#### 11.2.1 ENERGY RESULTS

There are no energy related emissions for Waste covered in this section. Energy related emissions for waste services is covered under Manufacturing & Commercial emissions reported in Section 7 of this report (under industrial uses).

#### 11.2.2 GHG EMISSION RESULTS

The total emissions from waste sector accounts for **28.86 kt CO<sub>2</sub>eq**, of which 90% of the emissions by methane (CH<sub>4</sub>) which converted to CO<sub>2</sub>eq.

- 20.97 ktCO<sub>2</sub>eq from solid waste disposal on land
- 4.71 ktCO<sub>2</sub>eq from domestic waste water handling

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<sup>30</sup> <https://gis.epa.ie/EPAMaps/PRTR>

- 2.87 ktCO<sub>2</sub>eq from composting
- 0.31 ktCO<sub>2</sub>eq from open burning of waste

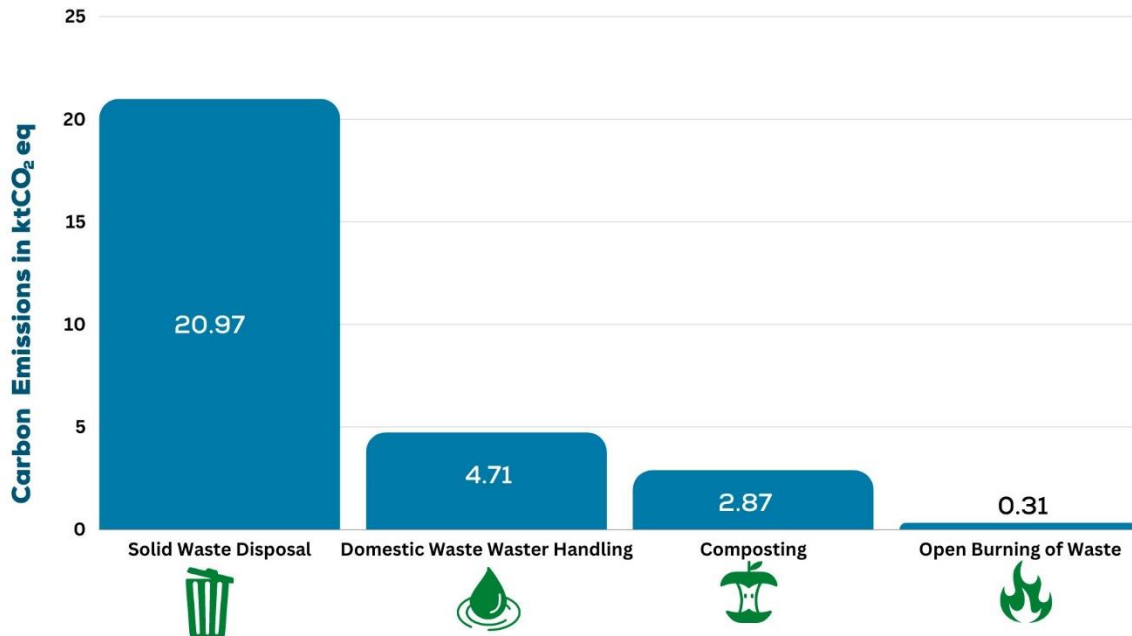


Figure 29. Waste GHG emissions by category, County Wexford, 2018

### 11.3 KEY FINDINGS

- Total emissions from waste sector accounts for 28.86 ktCO<sub>2</sub>eq.

| Waste Sector                           | Solid Waste Disposal | Domestic Wastewater Handling | Composting | Open Burning of Waste | Total |
|--|----------------------|------------------------------|------------|-----------------------|-------|
| Total Emissions (ktCO <sub>2</sub> eq) | 20.97                | 4.71                         | 2.87       | 0.31                  | 28.86 |

Table 18: County Wexford Waste sector CO<sub>2</sub>eq emission

## 12.0 F-GASES

These gases comprise of HFCs (Hydrofluorocarbons), PFCs (Perfluorocarbons), SF<sub>6</sub> (Sulphur Hexafluoride) and NF<sub>3</sub> (Nitrogen Trifluoride). They are much more potent than the naturally occurring greenhouse gas emissions. These were extracted from MapElre dataset for the local authority area and is presented as CO<sub>2</sub>eq (EPA, 2022).

***For Wexford County there is no emissions from these gases. The only recorded producers of these emissions in Ireland are in Limerick city and county, and Kildare County.***



## 13.0 RESULTS SUMMARY

This section examines total emission from the different carbon emitting sectors in County Wexford, as outlined in Chapters 4 – 12.

The total baseline GHG emission for 2018 for County Wexford is 2,460.14 ktCO<sub>2</sub>eq.

At 39.4%, Agriculture accounted for the greatest percentage of total emission in the county. This was followed by Residential (17.6%), Transport (17.4%) and Manufacturing and Commercial (16.4%). Figure8, below illustrates the total emissions by sector.

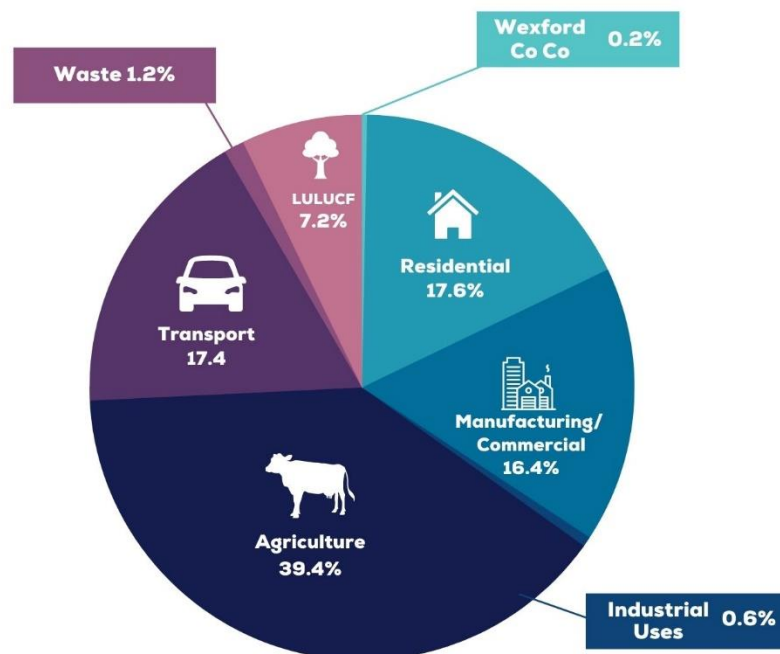


Figure 30: Share of Total Emissions in Wexford

| County Wexford                                      | Fossil Fuels |              |              |              |             |             |             |             |                 |                  |                 |                 | Total          |
|---|--------------|--------------|--------------|--------------|-------------|-------------|-------------|-------------|-----------------|------------------|-----------------|-----------------|----------------|
|   | Electricity  | Fossil Fuels |              |              |             |             |             |             | CH <sub>4</sub> | N <sub>2</sub> O | CO <sub>2</sub> | SF <sub>6</sub> |                |
|   |              | Natural Gas  | Heating Oil  | Diesel       | Petrol      | LPG         | Coal        | Peat        |                 |                  |                 |                 |                |
| Wexford County Council (ktCO <sub>2</sub> eq)       | 3.9          | 0.0          | 0.3          | 1.3          | 0.0         | 0.6         |             |             |                 |                  |                 |                 | <b>6.1</b>     |
| Residential (ktCO <sub>2</sub> eq)                  | 113.3        | -            | 204.8        |              |             | 7.9         | 42.4        | 58.0        | 6.8             | 0.7              |                 |                 | <b>433.9</b>   |
| Manufacturing and Commercial (ktCO <sub>2</sub> eq) | 129.7        | 13.1         | 177.7        |              |             | 31.3        | 50.6        | 0.4         | 0.2             | 0.2              |                 |                 | <b>403.2</b>   |
| Industrial Processes (ktCO <sub>2</sub> eq)         |              |              |              |              |             |             |             |             | -               | 1.4              | 4.3             | 8.9             | <b>14.6</b>    |
| Agriculture (ktCO <sub>2</sub> eq)                  | 58.1         |              | 0.0          |              |             |             |             |             | 570.2           | 339.9            |                 |                 | <b>968.2</b>   |
| Transport (ktCO <sub>2</sub> eq)                    | 0.7          | 1.8          |              | 338.1        | 82.2        |             |             |             | 0.3             | 4.9              |                 |                 | <b>428.2</b>   |
| LULUCF (ktCO <sub>2</sub> eq)                       |              |              |              |              |             |             |             |             | 11.8            | 9.7              | 155.7           |                 | <b>177.2</b>   |
| Waste (ktCO <sub>2</sub> eq)                        |              |              |              |              |             |             |             |             | 26.0            | 2.6              | 0.3             |                 | <b>28.9</b>    |
| <b>Total Emissions (ktCO<sub>2</sub>)</b>           | <b>305.7</b> | <b>14.9</b>  | <b>382.8</b> | <b>339.4</b> | <b>82.2</b> | <b>39.7</b> | <b>93.0</b> | <b>58.4</b> | <b>615.3</b>    | <b>359.4</b>     | <b>160.2</b>    | <b>8.9</b>      | <b>2,460.1</b> |

Table 23: BEI Table for County Wexford

## 14.0 CONCLUSION

The 2030 target for GHG emissions by 2030 is 51% reduction from the baseline year of 2018.

The total baseline GHG emission for 2018 for County Wexford is **2,460.1 ktCO<sub>2</sub>eq.**

Therefore, the allowable GHG emissions in 2030 is **1,205.5 ktCO<sub>2</sub>eq.**

The average GHG emissions for Wexford County Council in 2016-2018 was 7.11ktCO<sub>2</sub>eq.

Due to the public sector targets which outline reduction in Thermal, Transport & Electricity GHG Emissions, the allowable GHG emissions in 2030 by Wexford County Council is **2.27 ktCO<sub>2</sub>eq.**

The National Climate Action Plan 2023, Section 10 requires all public sector bodies including local authorities to calculate their baseline GHG's for 2018 using an average of years 2016-2018.

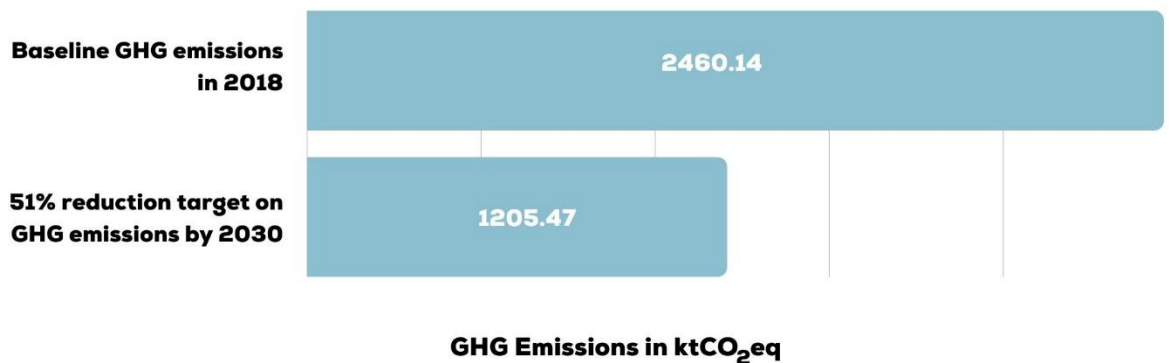


Figure 31. Baseline Emissions and Allowable GHG emissions

The resulting Climate Action Plan for County Wexford must define and outline a clear pathway to achieve this reduction. As part of the climate action plan the individual local authority will be responsible for reducing greenhouse gas emissions from across its own assets and infrastructure, whilst also taking on a broader role of influencing and facilitating others to meet their own targets. This is necessary to ensure the environmental, social and economic benefits that come with climate action can be fully realised.

Wexford County Council must demonstrate alignment with the key principles of the Local Authority Climate Action Planning Guidelines to ensure that the local authority climate action plan is: **Ambitious, Action-focused, Evidence-based, Participative and Transparent.**

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