SOUTH EAST ENERGY AGENCY

Tier 2 Baseline Emission Inventory
April 2023

Comhairle Contae Thiobraid Árann
Tipperary County Council

PREPARED BY: Alex Hamilton
CLIENT NAME: Tipperary County Council

Contents

Revision:	Prepared by:	Reviewed and prepared by:
Rev 1:	Initials: KT Date: 30/03/23	Initials: AH Date:
Rev 2:	Initials: AH & MD Date: 24/03/23	Initials: AH Date: 31/03/23
Rev 3:	Initials: JM & MD Date: 19/04/23	Initials: AH Date: 22/04/23
Rev 4:	Initials: KMcK Date: 14/06/23	Initials: AH Date: 16/06/23
Rev 5:	Initials: AH Date: 12/09/23	Initials:

Glossary of Terms

BER - Building Energy Rating
CIBSE - Chartered Institution of Building Energy Services Engineers
CNG - Compressed Natural Gas
CO_2 - 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
National Baseline Period – National Baseline for Ireland is 2018, as set out in the Climate Action Plan 2021
PSVs – Public Service Vehicles
Public Sector Baseline Period – Public Sector baseline, including for Tipperary County Council is 2016-2018, as set out in the Climate Action Plan 2021
SEAI - Sustainable Energy Authority of Ireland
SEU – Significant Energy User
TCC - Tipperary County Council
TFC - Total Final Consumption
WWTP - Wastewater Treatment Plant

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.

Tipperary 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 CAP will outline the pathway for Tipperary County Council to reduce its Greenhouse Gas Emissions (GHG) by the required 51% by 2030. This is compared to GHG emission levels from 2018, which has been set as the baseline.

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_2eq. GHG emissions in some sectors (where applicable).

Energy consumption in 2018 for County Tipperary is 5,605.2 Gigawatt hours (GWh). It should be noted that energy from on-site renewables only contributed to 4.9% of the total fuel mix. Renewables associated with grid electricity is 33.2%[1], see Figure 1.
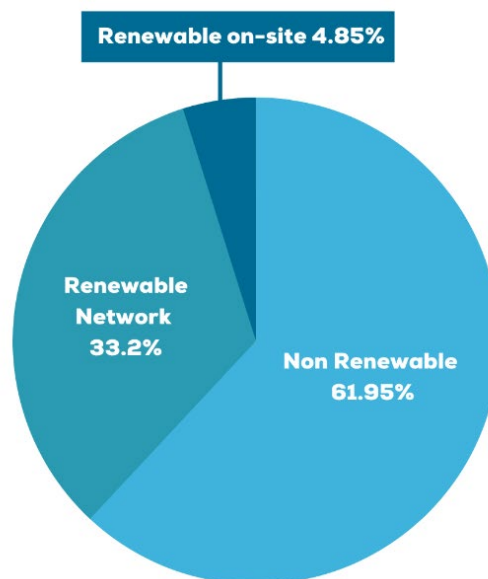

Figure 1. Energy from Renewable Sources, County Tipperary, 2018

The non-energy related GHG emissions include Methane (CH_4), Nitrous Oxide (N_2O), sulfur Hexafluoride (SF_6) and are mainly associated with agriculture, industrial processes, waste & F-gases sectors.

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[1] 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 2, and is as follows:

Tipperary County Council (TCC)
- Total final emissions produced by TCC in County Tipperary in 2018 were 8.5 $ktCO_2eq$.
- Total final energy used by TCC in 2018 was 31.8 GWh

Residential
- Total residential emissions were 509.0 $ktCO_2eq$.
- Total energy consumed by residential sector was 1,654.5 GWh

Manufacturing and Commercial
- Total commercial and manufacturing emissions were 472.4 $ktCO_2eq$.
- Total energy consumed by commercial and manufacturing sector was 1,861.5 GWh

Industrial Processes
- Total emissions from industrial processes were 24.5 $ktCO_2eq$.

Agriculture
- Total emissions from Agriculture Sector were 1,848.9 ktCO2eq.
- Total final energy used in 2018 was 291 GWh

Transport
- Total final emissions from transport were 488.5 $ktCO_2$ eq.
- Total final energy used in 2018 was 1,766.4 GWh

Land Use, Land Use Change and Forestry (LULUCF)
- Total emissions from LULUCF sector were 317.2 kt of CO_2 eq.

Waste
- Total emissions from waste sector were 34.4 $ktCO_2$ eq.

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

Baseline GHG Emissions for County Tipperary were 3,703.4 $ktCO_2$

Agriculture was the highest GHG emitter, with 49.9% of the County GHG emissions.

Residential is second with 13.7% and Transport is third with 13.2% GHG emissions. Manufacturing & Commercial accounts for a further 12.8% of GHG emissions across the County.

GHG emissions for Tipperary County Council in 2018 were **8.5kt of CO$_2$eq,** or 0.2% of the County wide GHG emissions.

It is the role of Tipperary County Council to influence, co-ordinate and advocate for GHG emissions across the County, however, individual Sectors are responsible for their own GHG emission reductions.
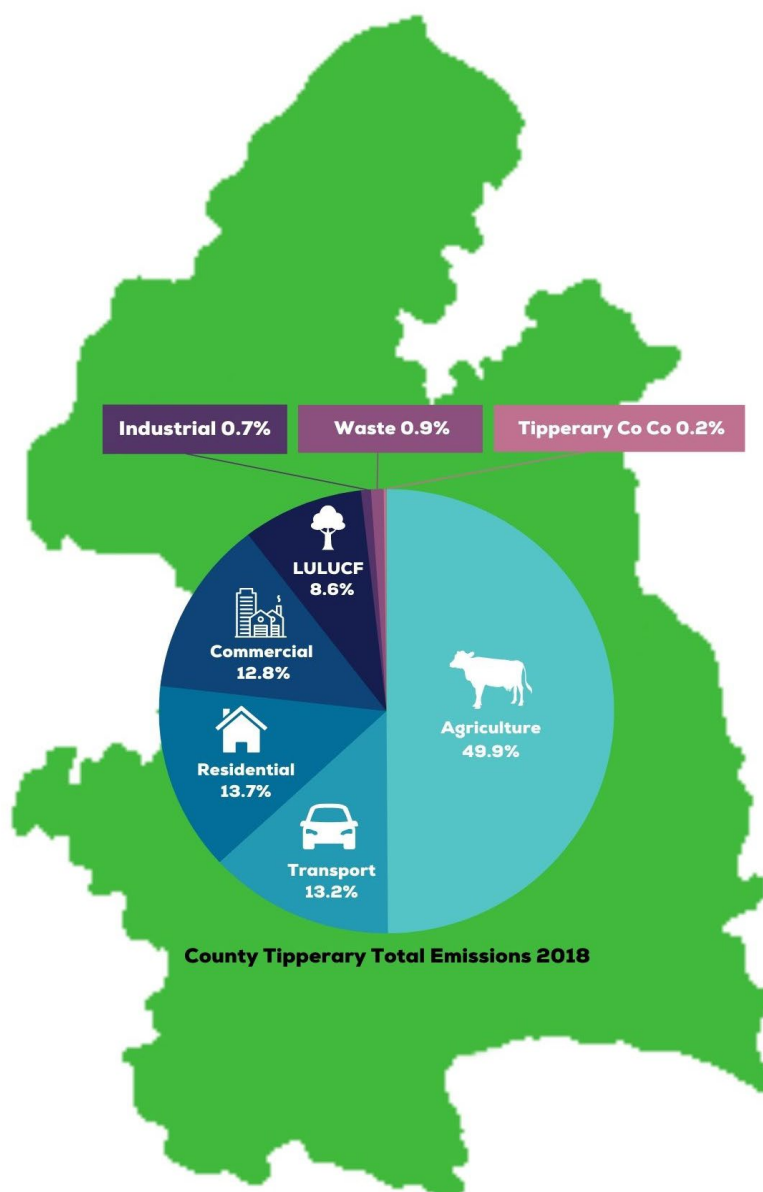

Figure 2. CO$_2$eq emissions per Sector in County Tipperary, 2018

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 County Tipperary 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 CO_2eq, then the total allowable GHG emissions by 2030 is 49kt CO_2eq. The absolute target must be met regardless of growth or changes within the County's sectors.

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. This County Wide Baseline Emissions Inventory (BEI) therefore outlines the 2018 baseline data for County Tipperary as a whole, which includes Tipperary County Councils 2018 data. However, for Tipperary County Councils own targets, the 2016-2018 baseline period must be used, as outlined in the Climate Action Plan 2021. Both sets of data are included in this report.

The South East Energy Agency (SEEA), on behalf of Tipperary County Council, has prepared this Tier 2 Baseline Emissions Inventory (BEI) for County Tipperary to serve as an evidence-base for mitigation planning in County Tipperary, and to inform the development of the 5-year County Tipperary Local Authority Climate Action Plan.

For the purpose of this report and the data analysis, all GHG are converted and reported as CO_2eq emissions, or CO_2eq. Some emissions are actual carbon dioxide (CO_2), some are methane (CH_4) and some are Nitrous Oxide (N_2O). All emissions are converted into CO_2eq.

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 Tipperary County Council and therefore included in this BEI is the extraction of Tipperary County Council's direct GHG emissions from the above sectors. Tipperary County Councils data is reported as a separate sector in this report. Tipperary County Council has full accountability and obligations to reduce its own GHG emissions by 51% by 2030, and can influence, co-ordinate, facilitate and advocate for all other sectors to reduce their own GHG emissions by the same 51% by 2030. The BEI therefore outlines the 2018 baseline data for County Tipperary as a whole and Tipperary County Council as a separate sector, Figure 3.
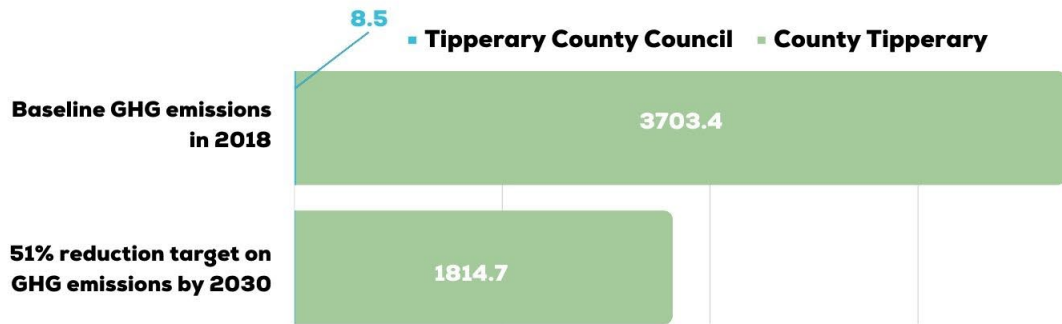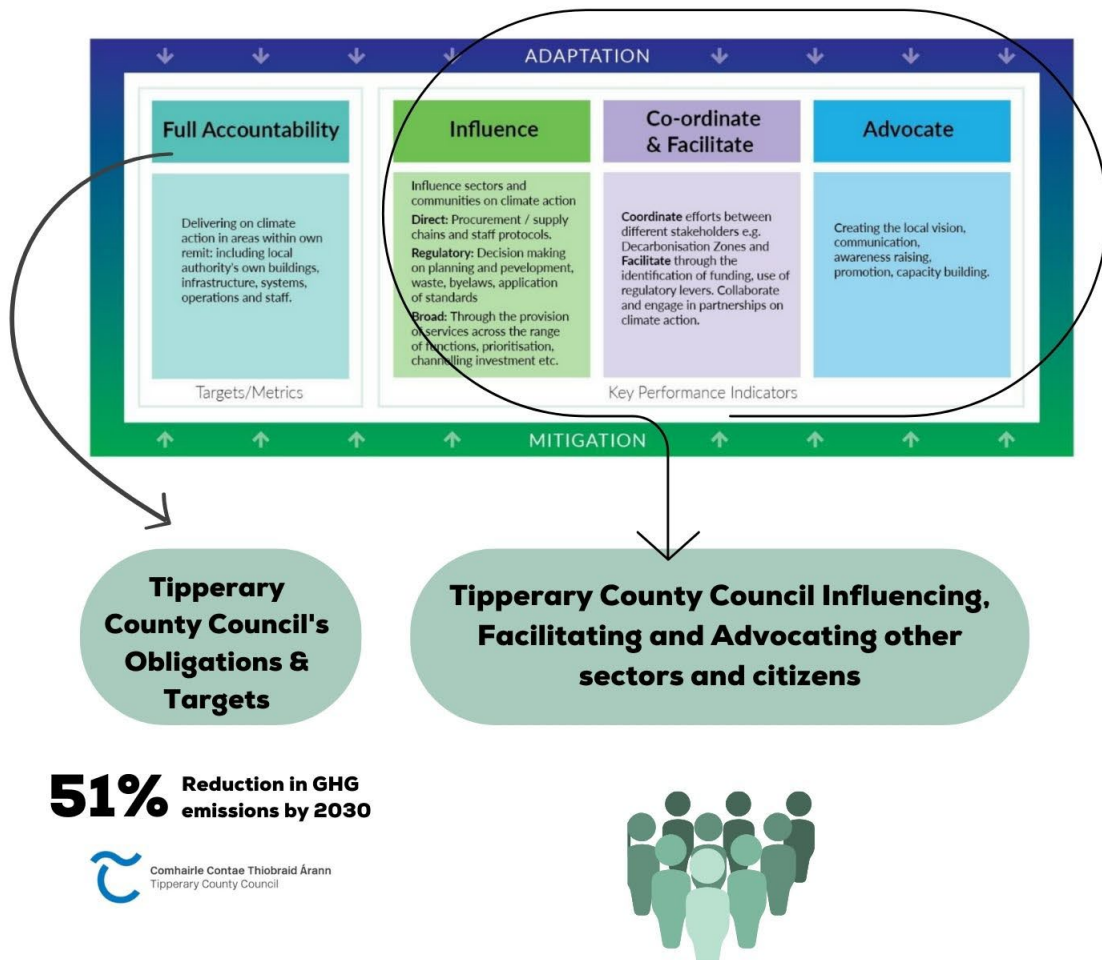
GHG Emissions in ktCO$_2$eq

Figure 3. Local Authority Scope for Climate Action Plan, Tipperary County Council

This baseline report aims to raise awareness of climate change and the impact that different sectors in County Tipperary have on Ireland's overall carbon emissions and energy use. It provides Tipperary 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 17 (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[2]
- Central Statistics Office's household census, agricultural census and transport Omnibus[3]
- SEAI's latest Energy in Ireland report[4], emission factors for fuels and grid electricity[5]
- M&R system and National Building Energy Rating Database[6]
- Valuation Office data on commercial buildings[7]
- 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).

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[2] [Metered Electricity Consumption 2020 - CSO - Central Statistics Office](#)
[3] [Introduction and Overview of Results - CSO - Central Statistics Office](#)
[4] [Energy in Ireland 2019 Report (seai.ie)](#)
[5] https://www.seai.ie/data-and-insights/seai-statistics/conversion-factors/
[6] https://ndber.seai.ie/BERResearchTool/ber/search.aspx
[7] https://opendata.valoff.ie/api/

2.0   SCOPE OF REQUIREMENTS

The following elements for the Baseline Emissions Inventory (BEI) were required by Tipperary County Council, as outlined in Annex C[8] of the Local Authority Climate Action Plan Guidelines;

- A calculation of the Greenhouse Gas (GHG) emissions resulting from activity within the geographical boundary of the local authority 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.

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 in each sector. 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 is made directly – for example running boilers and vehicles.
- **Scope 2 emissions –** This covers the GHG emissions that is 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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[8] https://assets.gov.ie/250051/e165c6b5-3eed-487d-b4ec-1db46dcec7e1.pdf

3.0 METHODOLOGY

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 September 2022 (pages 24-30).

The Baseline Emissions Inventory (BEI) is a key instrument that will enable Tipperary 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 over time.

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 17 (DECC, 2023)).

3.1 TIPPERARY COUNTY COUNCIL DIRECT GHG EMISSIONS

Tipperary 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[9]. 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 Tipperary County Councils data to the SEAI via the Monitoring & Reporting system is set out by the SEAI. Tipperary 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[10])

It is necessary that Tipperary 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 Tipperary 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.

3.2 COUNTY WIDE GHG EMISSIONS

This report focuses on energy use and GHG emissions from defined sectors within County Tipperary which align with the sectors addressed by the National Emissions Inventory (Enivronmental Protection Agency, 2020). The sectors are:

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[9] https://psmr.seai.ie/Account/LogOn?ReturnUrl=%2f

[10] https://www.seai.ie/publications/Public-Sector-Annual-Report-2021.pdf

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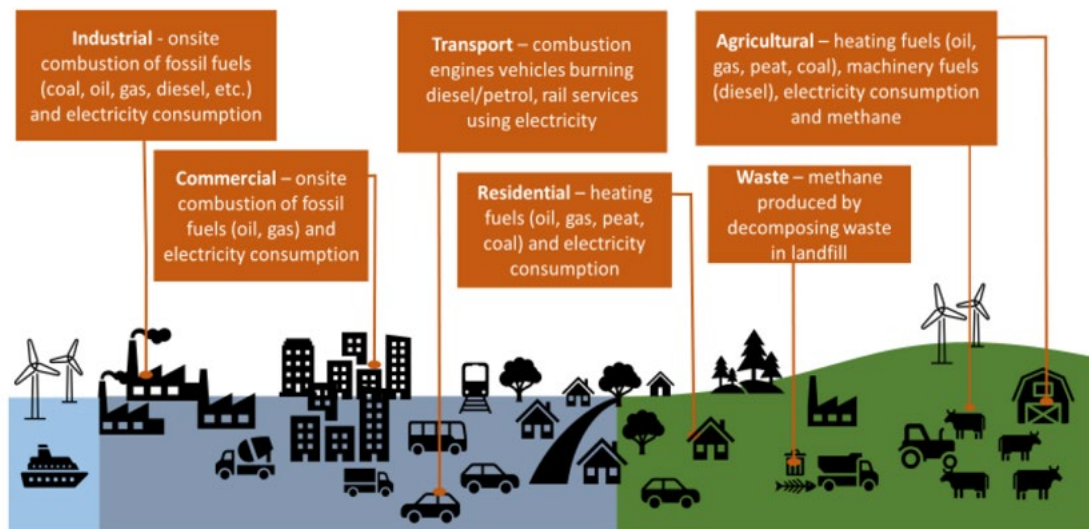9. Fluorinated Gases (F-Gases).

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

Tipperary County Council's own emissions are captured within the Manufacturing & Commercial and Transport sectors datasets provided by MapEIre. For this report Tipperary 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 Tipperary County Council are also extracted from the general Transport data and reported under Tipperary County Council direct emissions.

The analysis focused on the current energy demand and fuels that were used to provide energy, and the associated CO_2eq emissions and GHG emissions related to activities within County Tipperary. 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. Domestic aviation is also accounted for however, it does not include emissions from intra-EU aviation as those are not considered part of Ireland's total reportable greenhouse gas emissions. 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_2eq 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[11]. 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_2eq for every 1 kWh of energy use.
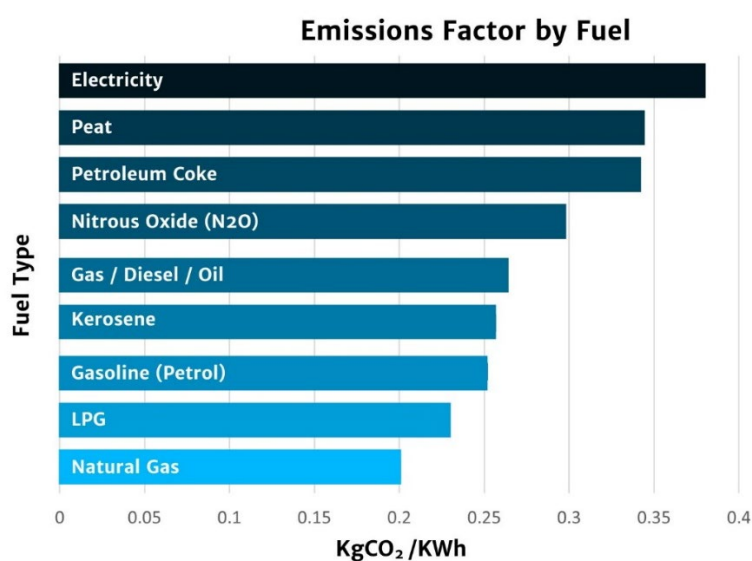

Figure 5: Emission Factors for Different Fuel Types

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[11] 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 outlined in **Appendix A.**

SECTORAL GHG EMISSIONS 2018 IN COUNTY TIPPERARY

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:

- Tipperary County Council
- Residential
- Manufacturing & Commercial
- Industrial Processes
- Agriculture

- Transport
- Waste
- Land Use, Land Use Change & Forestry (LULUCF)
- Fluorinated Gases (F-Gases)

4.0 TIPPERARY COUNTY COUNCIL

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

This Chapter outlines the 2018 data for Tipperary County Council which is used for the County Wide Inventory. The public sector baseline data for the period 2016-2018 is reported in Appendix B. The 2018 data is used in the overall County Wide final figures and 2030 target, and the 2016-2018 data is used for Tipperary 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[12] (M&R), which is used to track the local authorities progress towards 2030, compared to the baseline year. The baseline year for Tipperary County Council's energy efficiency targets is 2006-2008, and for GHG emissions the baseline is 2016-2018.

The methodology for reporting Tipperary County Councils data to the SEAI via the Monitoring & Reporting system is set out by the SEAI[13]. Tipperary 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[14])

From the M&R system, the 2018 energy & CO_2 emissions data for Tipperary 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 & Gasoil
- Wood Chips & Wood Pellets
- Solar Thermal
- Petrol
- Road Diesel & Marked Diesel

The fuel types are categorised by energy use:

1. Electricity
2. Thermal
3. Transport

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[12] https://psmr.seai.ie/Account/LogOn?ReturnUrl=%2f

[13] https://www.seai.ie/business-and-public-sector/public-sector/monitoring-and-reporting/supports/MR-2030-Methodology-Guidance.pdf

[14] https://www.seai.ie/publications/Public-Sector-Annual-Report-2021.pdf

To outline where the energy and GHG emissions are coming from within Tipperary County Council, the energy use was broken down into three categories of Significant Energy Use (SEU) 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, Tipperary County Council's energy use in 2018 was **31.8 GWh.**

- Tipperary County Council building & facilities were the highest energy consumer, accounting for 14.0 GWh (44%) of the total energy consumption.
- Transport fuels accounted for 9.4 GWh of energy (29%).
- Public lighting accounted for 8.5 GWh of energy (27%).

The fuel type breakdown is provided in Table 1: Tipperary County Council Inventory, Energy and CO_2eq Emissions.
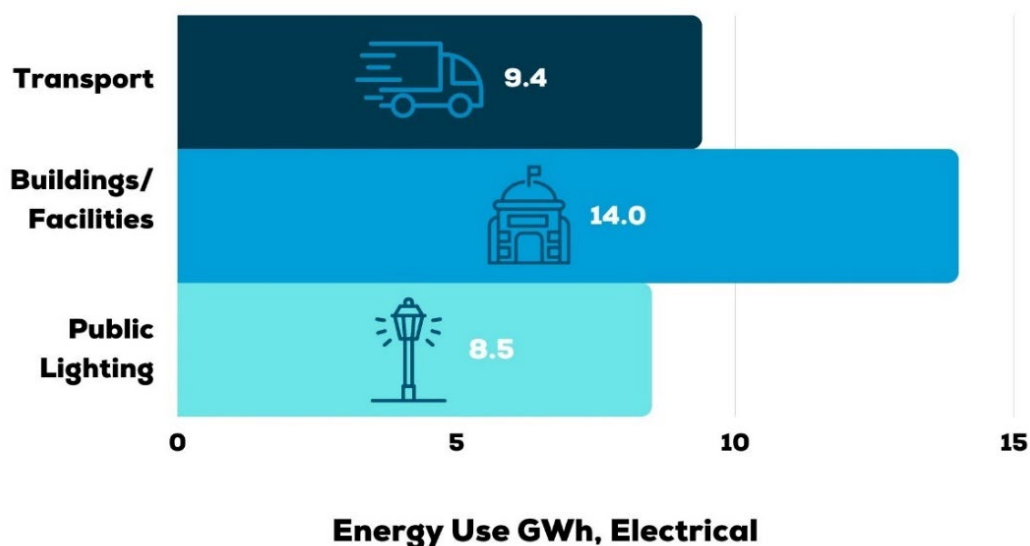

Figure 6: Breakdown of 2018 energy consumption, in GWh, by Tipperary County Council - split by SEU Category

4.2.2 GHG EMISSION RESULTS - 2018 COUNTY WIDE BEI DATA

When energy use was converted into GHG emissions, the council's total emissions amounted to **8.5ktCO$_2$eq.**

- Public lighting accounted for 3.2 ktCO$_2$eq (37%) of Tipperary County Council total GHG emissions.
- This was followed by buildings/facilities with 2.9 ktCO$_2$eq (35%).
- Transport accounted for 2.4 ktCO$_2$eq (28%)
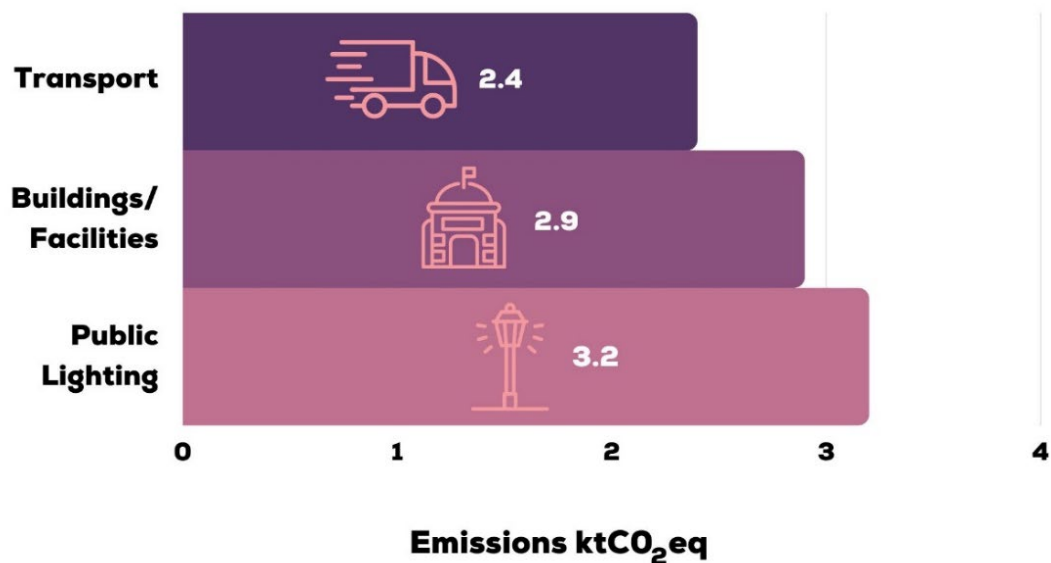
Figure 7: Breakdown of 2018 GHG emissions in ktCO$_2$eq, by Tipperary County Council - split by SEU Category

4.3 KEY FINDINGS

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

- Total final energy used in 2018 was 31.8 GWh.
- Buildings/Facilities was the largest consumer of energy in the sector, accounting for 44% of the total energy consumption, followed by Transport at 29% and Public lighting at 27%.
- Total final emissions produced by TCC in County Tipperary in 2018 were 8.5 ktCO$_2$eq.
- Public Lighting, with 3.2 ktCO$_2$eq (37%), was responsible for the highest GHG emissions from Tipperary County Council, followed by Buildings/Facilities at 2.9 ktCO$_2$eq (35%) and Transport 2.4 ktCO$_2$eq (28%).

Tipperary County Council	Electricity	Fossil Fuels					Renewable Energies			Total
		Thermal			Transport		Electricity	Thermal	Transport	
		Natural Gas	Heating Oils	LPG	Road Diesel	Petrol	Solar PV	Biomass	Biofuel	
Building/ Facilities (GWh)	4.5	3.5	1.6	0.3			0.1	3.9		14.0
Public Lighting (GWh)	8.5									8.5
Transport (GWh)					8.9	0.2			0.3	9.4
Total Energy (GWh)	**13.0**	**3.5**	**1.6**	**0.3**	**8.9**	**0.2**	**0.1**	**3.9**	**0.3**	**31.8**
Buildings / Facilities (ktCO$_2$eq)	1.7	0.7	0.4	0.1						2.9
Public Lighting (ktCO$_2$eq)	3.2									3.2
Transport (ktCO$_2$eq)					2.3	0.0				2.4
Total Emissions (ktCO$_2$eq)	**4.9**	**0.7**	**0.4**	**0.1**	**2.3**	**0.0**	**-**	**-**	**-**	**8.5**

Table 1: Tipperary County Council Inventory, Energy and CO$_2$eq Emissions

Tipperary County Council's Public Sector Baseline data is outlined in Appendix B of this report.

5.0 RESIDENTIAL

This section looks at the emissions arising from the residential sector in County Tipperary. 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[15] (CSO, 2016)
- EPA's national emissions inventories - MapEIre [7]
- SEAI BER research tool [9]
- Central Statistics Office's Metered Electricity Consumption data
- Central Statistics Office's Natural Gas Consumption data.

Firstly, the total number of houses in County Tipperary 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 59,071 residential properties in Tipperary, see Figure 8, of which:

- 58.2% is Detached house,
- 23.5% is Semi-Detached house,
- 13.3% are Terraced house and
- 3.5% are Apartments
- 1.5% - Not stated.

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[15] Census 2022 not available at time of analysis. Preliminary data published post analysis
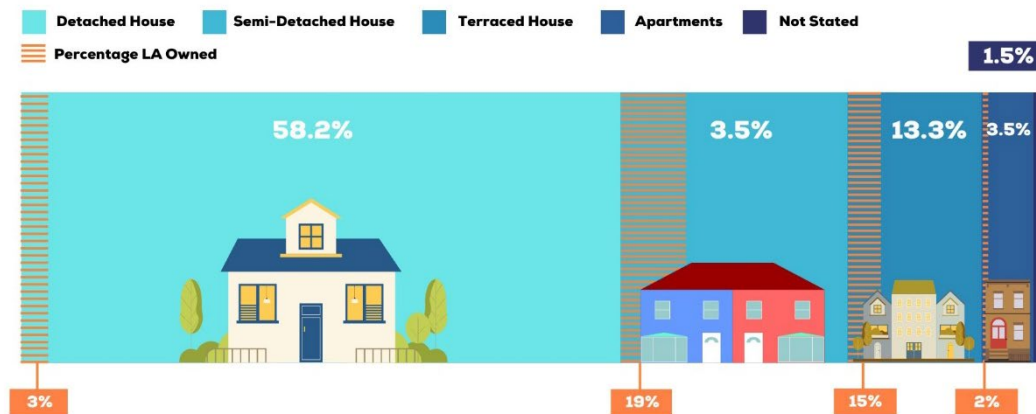
Figure 8. Domestic dwellings by Type, County Tipperary, 2018

The total number of houses across the county includes all social houses. Tipperary County Council in 2018 had a total of 4,938 social houses under its remit, which is equivalent to 8.4% 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 Tipperary 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 impacted 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[16]. 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 Tipperary. The BERs were filtered per County for County Tipperary and information is available on theoretical energy demand and emissions from those dwellings. The data 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 9 below shows the number of published BERs in 2018 for each BER rating for County Tipperary, which totaled 32,779 houses, or 55% of the total housing stock in County Tipperary.
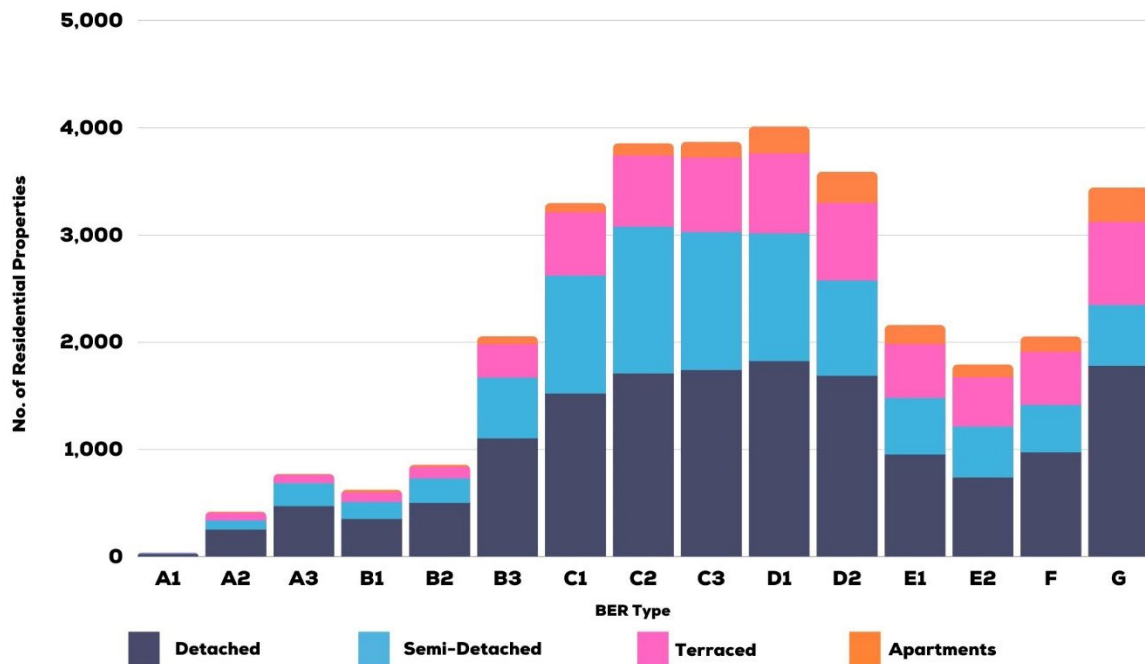
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[16] https://ndber.seai.ie/BERResearchTool/ber/search.aspx

Figure 9: BER ratings of residential sector, County Tipperary, 2018

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 Tipperary.

The average consumption per house type and BER rating is shown in Table 2 and Figure 10 below.

BER	Detached (kWh)	Semi-Detached (kWh)	Terraced (kWh)	Apartments (kWh)
A1	6,254	3,583	2,456	-
A2	6,099	3,246	2,231	3,747
A3	8,448	3,244	3,029	3,206
B1	14,704	5,573	4,203	4,163
B2	22,392	9,033	8,576	5,447
B3	24,266	12,125	9,913	8,138
C1	25,260	13,875	12,120	9,742
C2	26,912	16,028	13,497	9,269
C3	26,960	17,236	14,368	10,480
D1	27,993	18,209	16,121	9,598
D2	29,696	19,323	17,948	9,855
E1	32,671	22,154	20,679	11,592
E2	34,484	23,147	23,650	10,849
F	38,719	26,126	26,735	14,924
G	48,782	34,673	34,982	20,770

Table 2: Average Consumption per House and BER Type for County Tipperary, 2018
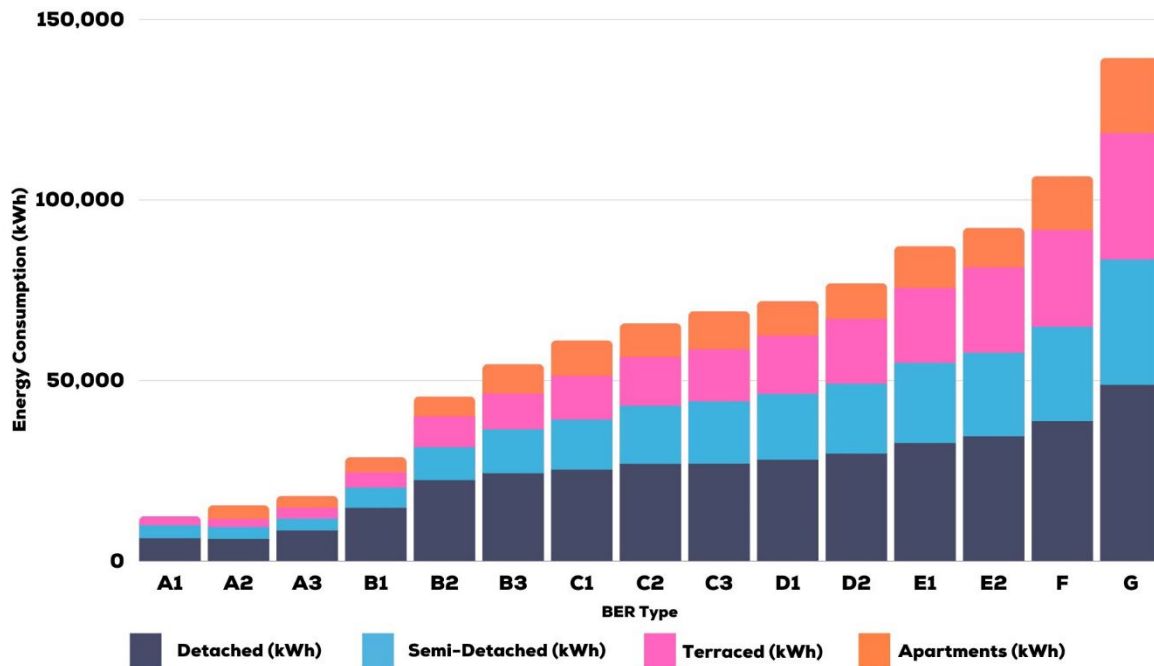
Figure 10. Average Consumption per House and BER Type, County Tipperary, 2018

The electricity and natural gas data comes directly from the Central Statistics Office's Metered Electricity Consumption data[17] and Natural Gas Consumption data[18].

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 Tipperary residential sector.

To summarise:

- The total homes and house types in County Tipperary was found from the Census 2016 data.
- The total thermal energy consumption was found from the BER data and extrapolated against the total number of homes and house types in the County to get the total energy consumption in homes in County Tipperary.
- The electricity and natural gas data comes directly from the Central Statistics Office's Metered Electricity Consumption data[19] and Natural Gas Consumption data[20].
- 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[21] taken from the CSO data.

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[17] https://www.cso.ie/en/statistics/energy/meteredelectricityconsumption/

[18] https://www.cso.ie/en/statistics/energy/networkedgasconsumption/

[19] https://www.cso.ie/en/statistics/energy/meteredelectricityconsumption/

[20] https://www.cso.ie/en/statistics/energy/networkedgasconsumption/

[21] https://data.cso.ie/table/SEI01

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- The total electricity data from the Metered Electricity Consumption data, minus the thermal electricity found from the average fuel mix breakdown, gave the non-thermal electricity consumption.

All energy data was then converted into equivalent GHG emissions using the CO_2eq. conversion factors for each fuel type.

MapEIre data set provides additional emissions produced in the form of Methane (CH_4) and Nitrous Oxide (N2O) by residential sectors, i.e. in addition to CO_2 emissions from the combustion of fossil fuels such as natural gas, heating oil, coal, etc. These emissions are converted into CO_2eq using the conversion factors provided by EPA ((EPA, 2023).

5.2   RESULTS

The total number of houses in County Tipperary from the 2016 Census data was 59,071. The BER ratings for County Tipperary showed that 37,799 houses had a BER rating – this is equal to 55% of the total domestic dwellings.

The breakdown of heating fuel types for houses is shown in Table 3 and Figure 11. This shows that 60% of homes in County Tipperary use heating oil to heat their homes. A total of 86.1% of homes use fossil fuels to heat their homes.

Type of Central Heating	No. of Houses	% of homes
No central heating	1,023	1.7%
Heating Oil	35,443	60.0%
Natural Gas	7,045	11.9%
Electricity	2,748	4.7%
Coal (incl. anthracite)	4,287	7.3%
Peat (incl. turf)	3,762	6.4%
Liquid Petroleum Gas (LPG)	323	0.5%
Wood (incl. wood pellets)	3,041	5.1%
Other fuels	439	0.7%
Not stated	960	1.6%

Table 3: Thermal Fuel Sources for Houses, County Tipperary, 2018
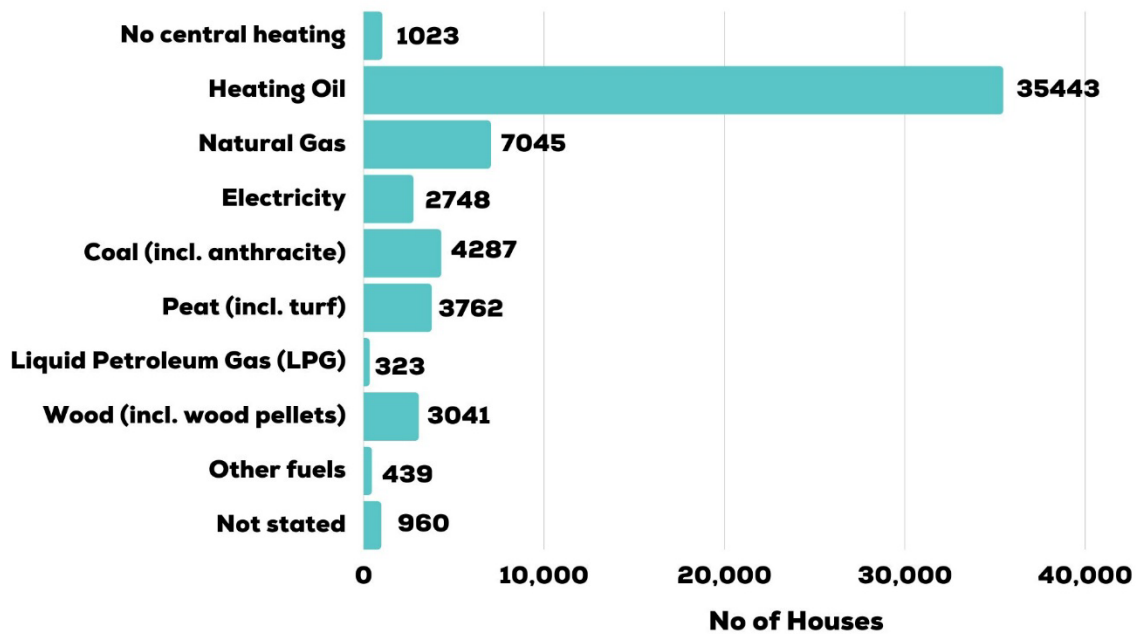
Figure 11. Thermal Fuel Sources for Houses in County Tipperary, 2018

Total energy use in the residential sector was **1654.5 GWh**. The residential fuel split is shown in Table 4 and Figure 12, and mainly comes from:

- Electricity - making up 20.3% of the fuel mix
- Heating Oils accounts for 50.8%
- Natural Gas accounts for 5.4% of the fuel mix
- 18% of homes are heated by coal and peat
- Total renewable fuels accounted for 3.4% of the final energy consumption. The majority of this came from biomass sources (mainly wood).

Total Consumption GWh	GWh	%
Electricity (non-thermal)	271.7	**16.4%**
Electricity (thermal)	64.3	**3.9%**
Coal	129.0	**7.8%**
Peat	163.4	**9.9%**
Heating Oils	841.1	**50.8%**
LPG	36.3	**2.2%**
Petroleum Coke	2.9	**0.2%**
Natural Gas	89.0	**5.4%**
Renewables	56.8	**3.4%**
Total Energy Consumption	**1654.5**	

Table 4: Residential Energy Consumption by Fuel Type, County Tipperary, 2018

Figure 12. Residential Energy Consumption by Fuel Type, County Tipperary, 2018
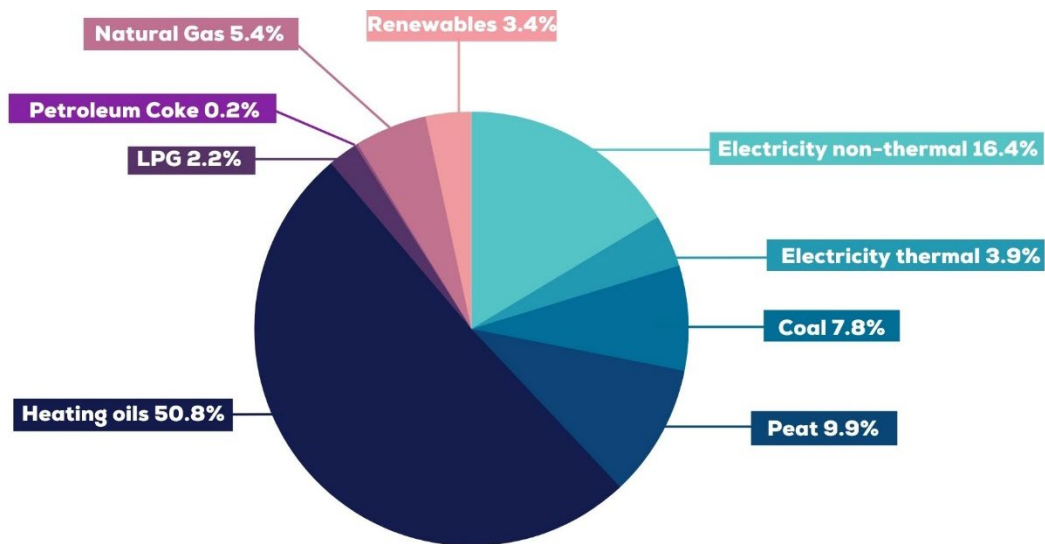
5.2.1 GHG EMISSION RESULTS

The GHG emissions from methane (CH_4), and nitrous Oxide (N_2O) obtained from the MapEIre data equates to 7.0 $ktCO_2eq$. When energy use was converted into GHG emissions, the total GHG emissions in 2018 for the Residential Sector in County Tipperary was **509.0$ktCO_2$eq.**

Figure 13 below shows the total emissions for the residential sector in County Tipperary by fuel type. The highest emissions in the residential sector come from electricity and heating oils, which contribute 30.1% and 42.5% respectively.

Total GHG Emissions	ktCO2Eq	%
Electricity (non-thermal)	129.3	**25.4%**
Electricity (thermal)	24.1	**4.7%**
Coal	43.9	**8.6%**
Peat	61.2	**12.0%**
Heating Oil	216.2	**42.5%**
LPG	8.3	**1.6%**
Petroleum Coke	0.8	**0.2%**
Natural Gas	18.2	**3.6%**
Renewables	0.0	**0.0%**
CH_4 to CO2eq	6.3	**1.2%**
N_2O to CO2eq	0.7	**0.1%**
Total GHG Emissions	**509.0**	

Table 5: Residential GHG Emissions, County Tipperary, 2018
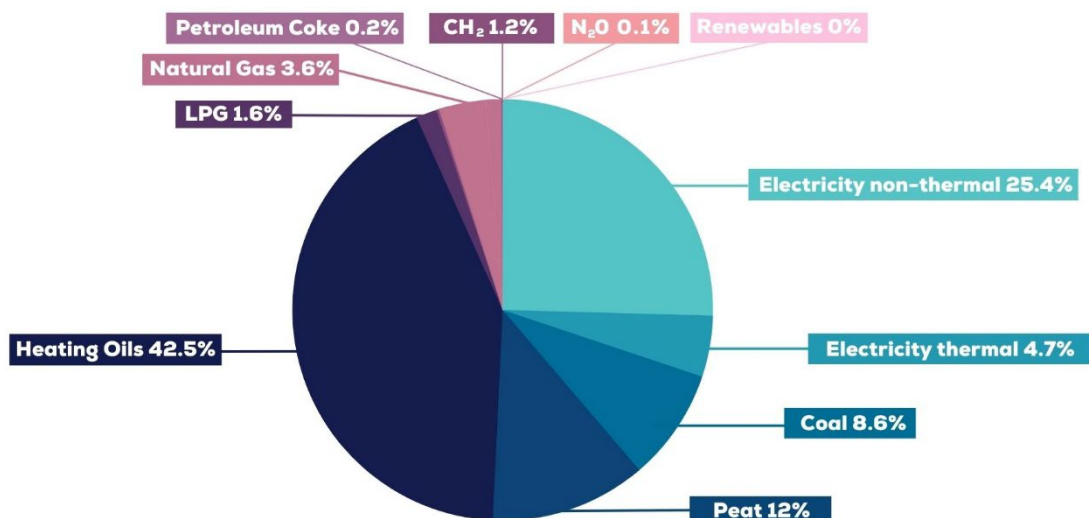
Figure 13. Residential GHG Emissions, County Tipperary, 2018

5.3 KEY FINDING - 2018

- Total energy consumed by residential sector in 2018 was 1,654.5 GWh.
- 50.8% of the residential fuel mix was made up heating oil followed by 20.3% electricity along with 17.7% of homes heated by coal and peat.
- Total residential emissions were 509.0 $ktCO_2eq$ in 2018.
- 42.5% of residential emissions came from heating oil, followed by electricity at 30.1% and coal and peat with 20.6%.

Residential Sector	Electricity	Fossil Fuels	Renewable Energies	CH4/N2O	Total
Total Energy (GWh)	336.0	1,261.7	56.8	-	1,654.5
Total Emissions (ktCO₂eq)	153.4	348.6	-	7.0	509.0

Table 6: County Tipperary Residential Inventory; Energy and CO₂eq Emissions, 2018

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" [2].

The data provided for the Baseline Emissions Inventory (BEI) has Tipperary County Councils data included within this sector [4]. Tipperary 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 MapEIre[22], CSO non-residential metered consumption data[23], CSO Energy Balance[24] and Valuation Office[25] 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 Tipperary 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)
- **Leisure** includes (Clubhouse, Community hall, Stable, Stadium, Swimming Pool, Gymnasium/Fitness Centre, Cinema, Equestrian Centre, Theatre)
- **Minerals** includes (Quarries).

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[22] https://projects.au.dk/mapeire/spatial-results/download
[23] https://www.cso.ie/en/statistics/energy/meteredelectricityconsumption/
[24] https://data.cso.ie/table/SEI01
[25] https://maps.valoff.ie/maps/VO.html

Table 7 shows the total number of businesses and the associated floor area for each category. 53% of the commercial properties can be categorised as Retail (shops), 16% as Industrial and 12% as Office, see Figure 14.

	No. of Buildings	Total Floor Area (m^2)
Industrial Uses	905	1,596,098
Office	689	71,632
Retail (Warehouse)	172	94,129
Hospitality	217	331
Health	158	45,532
Fuel/Depot	110	2,621,721
Miscellaneous	125	117,414
Retail (Shops)	2,935	154,969
Leisure	124	76,474
Minerals	121	1,005,313
TOTAL	**5,556**	**5,783,611**

Table 6: Number of Properties & Floor Area of Manufacturing & Commercial Businesses, County Tipperary, 2018
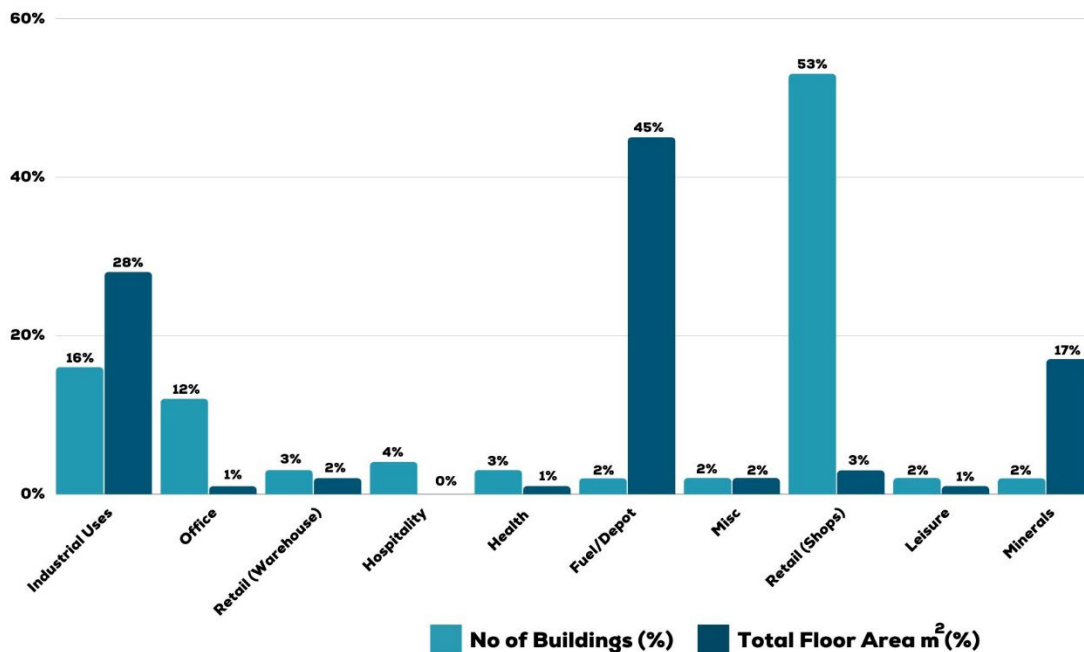

Figure 14. Number of Properties & Floor Area of Manufacturing & Commercial Businesses, County Tipperary, 2018

The Chartered Institute for Building Service Engineers [6] produce benchmarks, given in kilowatt-hours per meter squared floor area (kWh/m^2) for heat and electricity, in each building category.

	kWh/m^2	CO$_2$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[26] and the Electricity Metered Data[27] 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.

MapEIre data set provides additional emissions produced in the form of Methane (CH$_4$) and Nitrous Oxide (N2O) by Manufacturing & Commercial sector. These emissions are converted into CO$_2$eq using the conversion factors provided by EPA [11].

6.2   RESULTS

6.2.1 ENERGY RESULTS

Total energy use in the Manufacturing & Commercial sector in 2018 was **1,861.5 GWh**. The energy demand mainly comes from thermal consumption, which accounts for 1,391.4 GWh (74.7%, of which 11.3% is renewables) of the energy. The remaining 470 GWh (25.3%) of energy is from electricity, see Figure 15.

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[26] https://www.cso.ie/en/statistics/energy/networkedgasconsumption/
[27] https://www.cso.ie/en/statistics/energy/meteredelectricityconsumption/

Fuel Type	Energy GWh	%
Electricity	470.0	25.3%
Natural Gas	485.5	26.1%
Heating Oils	489.5	26.3%
LPG	102.9	5.5%
Coal/Peat	102.9	5.5%
Renewables	210.6	11.3%
TOTAL	1,861.5	100%

Table 8: Breakdown of Consumption by Fuel Type, County Tipperary, 2018
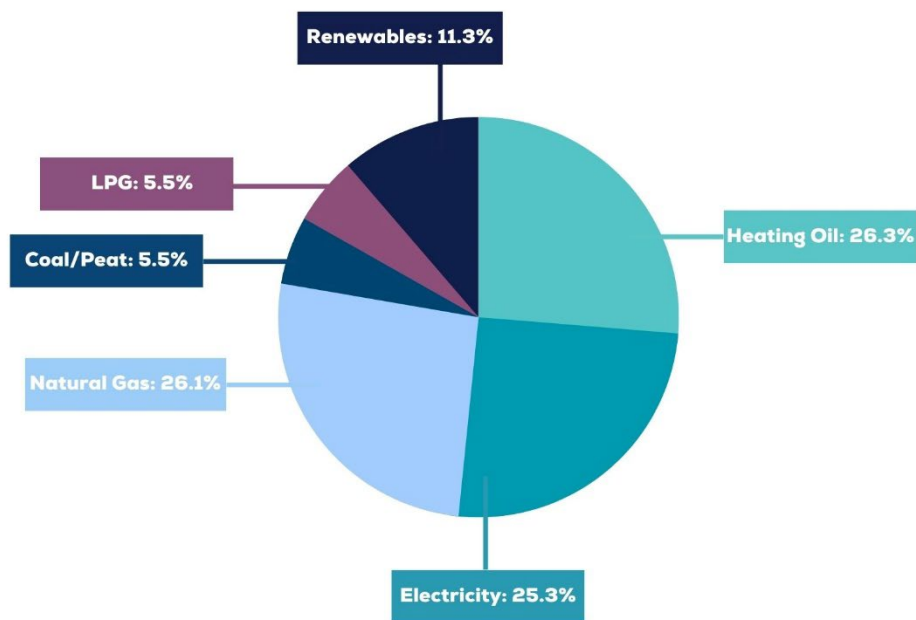
Figure 1515. Breakdown of energy source for Manufacturing and Commercial sector, County Tipperary, 2018

6.2.2 GHG Emission Results

The GHG emissions from methane (CH_4), and nitrous Oxide (N_2O) obtained from the MapEIre data equates to 1.0 $ktCO_2eq$.

When energy use was converted into GHG emissions, the energy related GHG emissions from the Manufacturing & Commercial sector in 2018 was calculated at 471.4 $ktCO_2eq$.

Therefore, the total GHG emissions from the Manufacturing & Commercial sector in County Tipperary in 2018 was **472.4 ktCO$_2$eq.**

As can be seen from Figure 16, the categories of properties that produced the most emissions were:

Property Type	GHG Emissions ktCO2eq	%
Industrial Uses	275.8	58.4%
Office	18.9	4.0%
Retail (Warehouse)	6.8	1.5%
Hospitality	0.6	0.1%
Health	0.9	0.2%
Fuel/Depot	1.3	0.3%
Miscellaneous	2.5	0.5%
Retail (Shops)	54.5	11.5%
Leisure	41.2	8.7%
Minerals	69.8	14.8%
Total	**472.4**	**100%**

Table 1016. Manufacturing and Commercial Sector Breakdown of GHG Emission per Property Type, County Tipperary, 2018
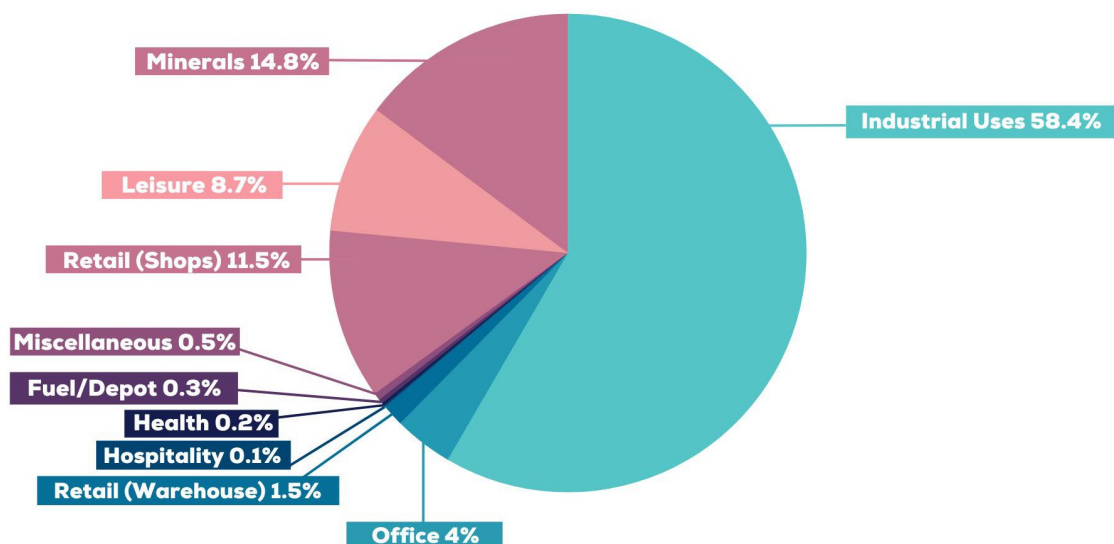

Figure 1617: Manufacturing and Commercial Emissions by Property Category, County Tipperary, 2018

Figure 17 below gives an indication of emissions in comparison to the number of buildings for different commercial properties in the region.
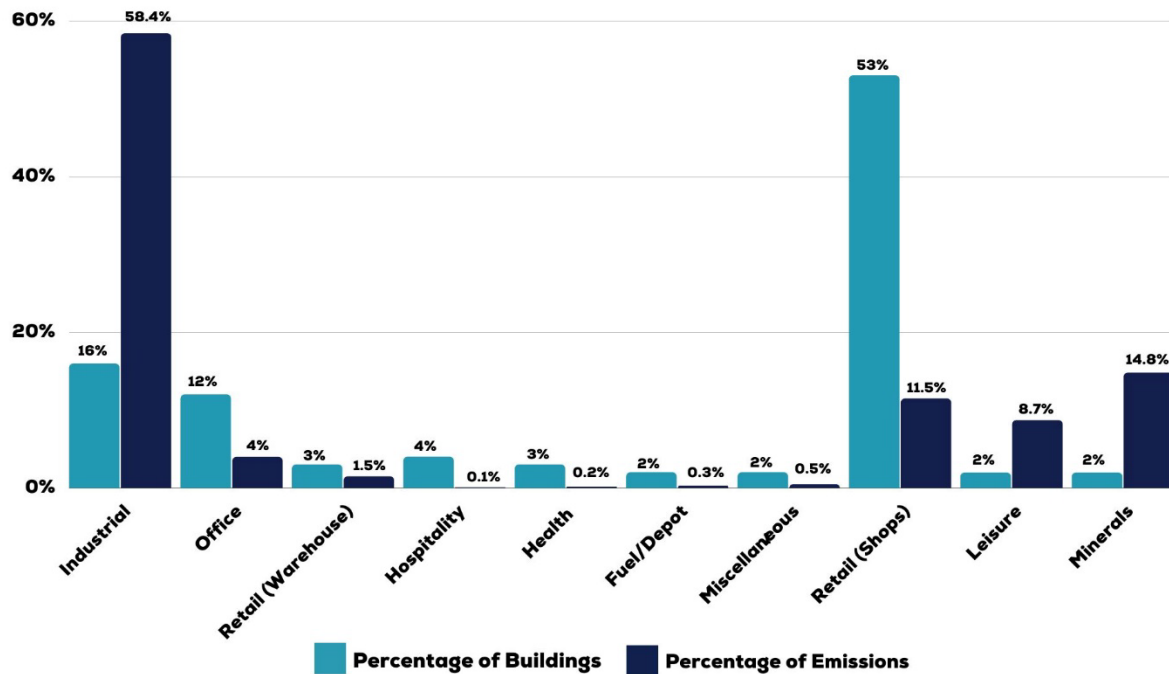
Figure 18: Share of Total Emissions and Number of Commercial Properties in Tipperary County, 2018

Industrial uses, Minerals, Retail (Shops) and Leisure are the main CO_2 emitters, as altogether they make up 93.4% 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 18 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 oil hold the highest share of use (37.3%) and (28.3%) 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$_2$eq emissions	%
Electricity	176.4	37.3%
Natural Gas	99.0	21.0%
Heating Oils	133.9	28.3%
LPG	23.6	5.0%
Coal/Peat	38.5	8.2%
Renewables	-	0.0%
CH$_4$	0.5	0.1%
N$_2$0	0.5	0.1%
TOTAL	472.4	100%

Table 91: Manufacturing & Commercial Emissions by Fuel Type, County Tipperary, 2018
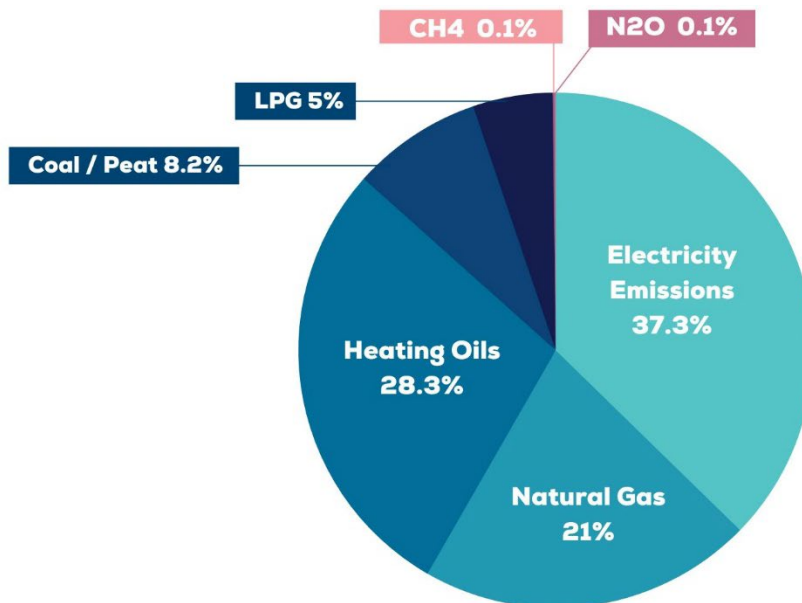
Figure 1819: Electricity and Fossil Fuel Use in the Manufacturing & Commercial Sector by Category, County Tipperary, 2018

6.3 KEY FINDING

- Total energy consumed by Manufacturing & Commercial sector in 2018 was 1,861.5 GWh.
- 25.3% of the energy was electricity, 26.3% was Heating Oils. 11.3% was from Renewable energy systems.
- Total Manufacturing & Commercial emissions were 472.4 ktCO$_2$eq in 2018
- 28.3% of the emissions came from electrical consumption and 37.6% from heating oils.
- 24.6% of emissions came from Industrial uses and 40.4% from Fuel/Depots and 15.5% from Minerals.

Manufacturing and Commercial Sector	Electricity	Thermal	CH4 & N2O	Total
Total Energy (GWh)	470.0	1,391.4		**1,861.5**
Total Emissions (ktCO$_2$eq)	176.4	295.0	1.0	**472.4**

Table 12: County Tipperary Manufacturing & Commercial Inventory; Energy and CO$_2$eq Emissions, 2018

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" [2]. MapEIre provides emission data for industrial processes across County Tipperary.

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_4), Nitrous Oxide (N_2O), sulfur Hexafluoride (SF_6). These are all converted into CO_2eq using the conversion factors from EPA[28].

GHG	CO_2eq/kg
CO_2	1
CH_4	25
N_2O	298
SF_6	228000

Table 103: CO₂eq. Conversion Factors for Various GHG Emissions

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[28] 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 [12], the CO_2eq emissions from the industrial processes are **24.46 ktCO$_2$eq**.

Figure 19 below shows non-energy related emissions = 20.32 ktCO$_2$eq
- o Lime Production: 0 ktCO$_2$eq
- o Ceramic: 0.03 ktCO$_2$eq
- o Lubricant use: 1.15 ktCO$_2$eq
- o Paraffin wax use: 0.90 ktCO$_2$eq
- o Food and Beverages Industry: 4.69 ktCO$_2$eq
- o Domestic solvent use: 1.46ktCO$_2$eq
- o Other solvent use: 16.23 ktCO$_2$eq.
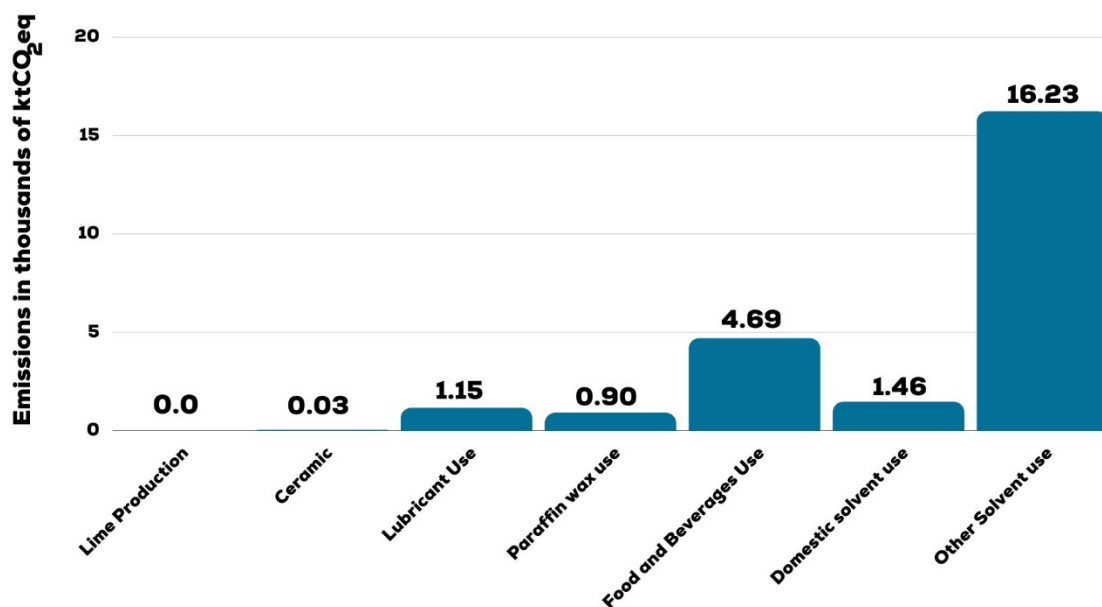
Figure 19: CO$_2$ Emissions from the Industrial Processes, ktCO$_2$eq, County Tipperary, 2018

7.3 KEY FINDINGS

- Total emissions from industrial processes are 24.46 ktCO$_2$eq.
- 16.23 ktCO$_2$eq (66%) emissions were from other solvent use.
- The remaining 8.23 ktCO$_2$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	Domestic Solvent Use	Other Solvent use	Total
Total Emissions (ktCO$_2$eq)	0.00	0.03	1.15	0.90	4.69	1.46		24.46

Table 114: County Tipperary Industrial Processes CO$_2$eq emissions, 2018

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

MapEIre 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 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.

MapEIre data set provides emissions produced in the form of Methane (CH_4) and Nitrous Oxide (N_2O). These emissions are converted into CO_2eq using the conversion factors provided by EPA[29]. 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 [13], [14], see Figure 20. In County Tipperary there are a total of:

- 700,341 Cows of which 180,352 dairy cows and 519,989 other cows in 6,180 farms
- 160,109 Sheep of which 77,217 are Ewes and 82,892 other sheep in 868 farms
- 31,400 Poultry of which 7,200 are laying birds, 500 breeding birds and 23,700 other birds in 297 farms
- 108,700 Pigs of which 9,900 are breeding pigs, 100 boars and 62,000 are other pigs over 20 kgs and 36,700 are other pigs under 20kg, in 83 farms.

Figure 2020. Number of livestock per animal type & farms, County Tipperary, 2018

[29] https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#results

Benchmarks from Teagasc were used to estimate energy and non-energy related emissions [15]. 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
- 280 kWh of energy by sheep
- 10.7 kWh of energy by poultry
- 6.55 kWh of energy by pigs.

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

MapEIre data provides methane emissions from livestock and emissions from crop farming.

The non-energy related GHG emissions include Methane (CH_4) and Nitrous Oxide (N_2O).

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 Tipperary in 2018 was **291.0GWh.**

84.3% of this is associated with cattle and 15.4% associated with sheep.

	Electrical GWh	Thermal GWh	Total	%
Cattle	245.1	-	245.1	84.3%
Sheep	44.8	-	44.8	15.4%
Poultry	0.0	0.3	0.3	0.1%
Pigs	0.6	0.1	0.7	0.2%
TOTAL	**290.6**	**0.4**	**291.0**	

Table 15: Energy Related Energy Consumption Associated with the Livestock in County Tipperary, 2018

8.2.2 GHG Emission Results

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

The energy related emissions associated with the 291.0GWh outlined above are calculated using the electricity and thermal conversion factors.

The total energy related emissions are 109.1 ktCO$_2$eq, see Table 16.

	ktCO$_2$eq	%
Cattle	92.0	84.3%
Sheep	16.8	15.4%
Poultry	0.1	0.1%
Pigs	0.3	0.2%
TOTAL	**109.1**	

Table 126: Energy Related GHG Emissions Associated with the Livestock in County Tipperary, 2018
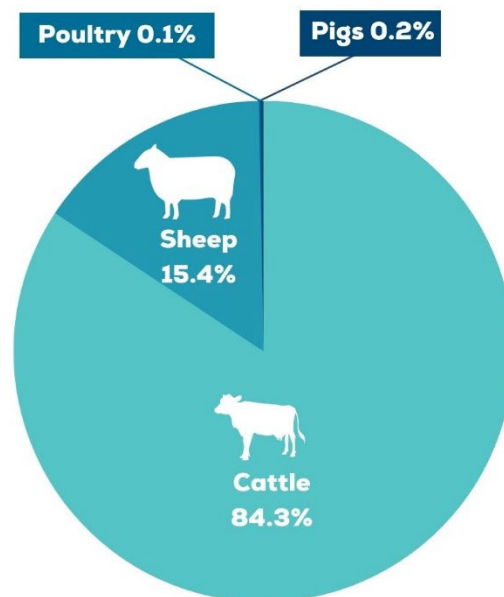

Figure 21. Breakdown of Energy Related GHG Emissions Associated with the Livestock in County Tipperary, 2018

The non-energy related emissions calculated using the MapEIre data and the energy related emissions above, gave a total of 1,739.8 ktCO$_2$eq, see Figure 22.

NFR_Code	NFR Name	ktCO$_2$eq
1A4ci	Agriculture/ Forestry/ Fisheries: Stationary	3.8
1A4ciii	Agriculture/ Forestry/ Fisheries: National Fishing	0.0
3A1a	Dairy Cattle	458.6
3A1b	Non-dairy Cattle	568.6
3A2	Sheep	24.3
3A3	Swine	5.6
3A4d	Goats	0.1
3A4e	Horses	3.2
3A4f	Mules and asses	0.2
3B1a	Manure management - Dairy Cattle	52.0
3B1b	Manure management - Non-Dairy Cattle	84.6
3B2	Manure management - Sheep	2.8
3B3	Manure management - Swine	31.6
3B4d	Manure management - Goats	0.0
3B4e	Manure management - Horses	0.8
3B4f	Manure management - Mules and asses	0.0
3G	liming	23.6
3Da1	Inorganic N-fertilizers	201.6
3Da2a	Animal manure applied to soils	58.2
3Da2b	Sewage sludge applied to soils	0.9
3Da3	Urine and dung deposited by grazing animals	115.3
3Da4	Crop residues applied to soils	15.7
3Da5	Mineralization	1.4
3Da6	Cultivation of organic soils	35.3
3Db1	Atmospheric deposition	16.5
3Db2	Nitrogen leaching and run-off	13.0
3H	Urea application	6.6
3B4giv	Manure management - Other poultry	0.4
3B5	Manure Management - Other animals	15.1
	Total	**1,739.8**

Table 137: Non-Energy Related Emissions from the Agriculture sector in County Tipperary by Category

Therefore, the total emission from agriculture is **1,848.9 ktCO$_2$eq** in 2018.

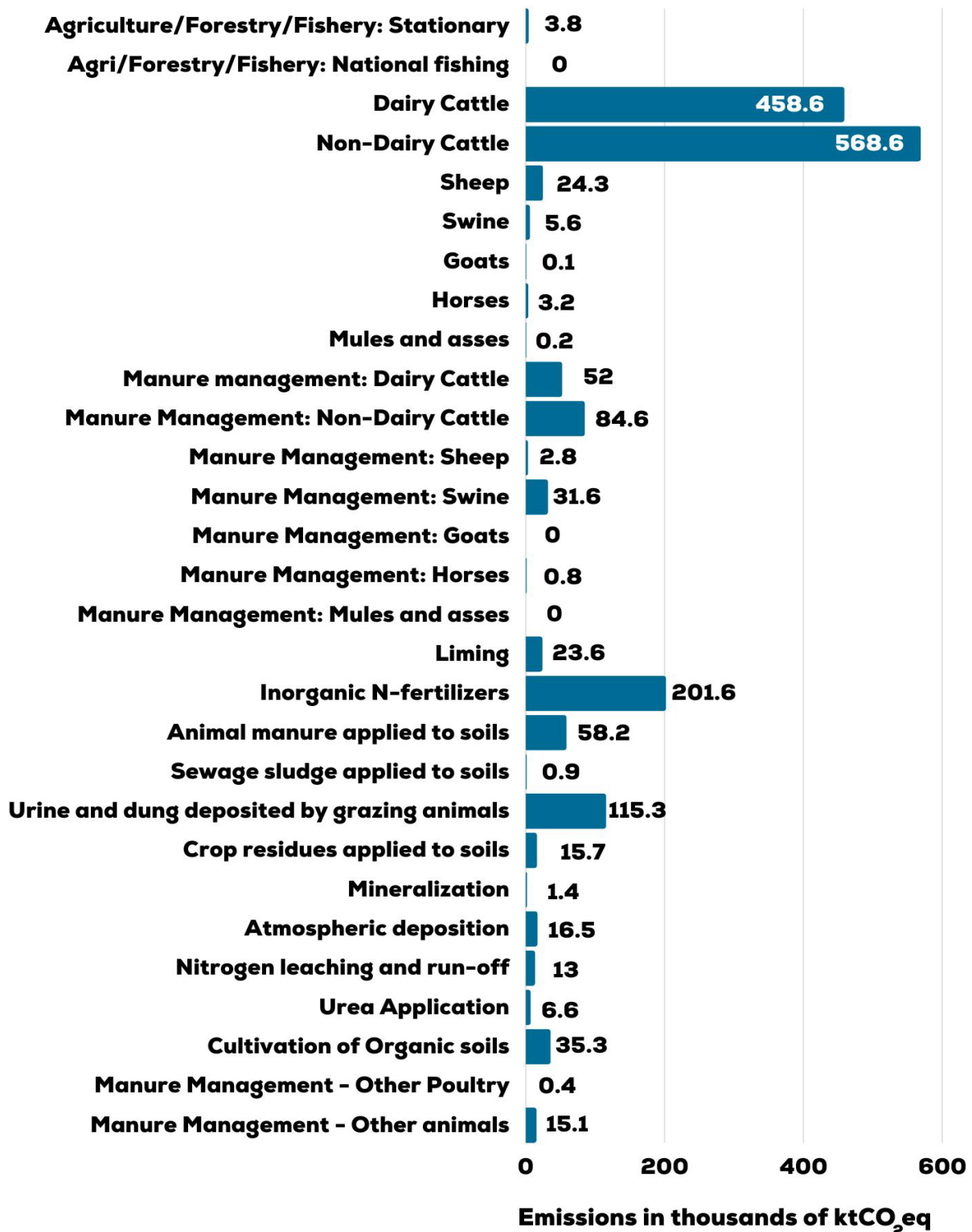| Category	Emissions (ktCO₂eq)
Agriculture/Forestry/Fishery: Stationary	3.8
Agri/Forestry/Fishery: National fishing	0
Dairy Cattle	458.6
Non-Dairy Cattle	568.6
Sheep	24.3
Swine	5.6
Goats	0.1
Horses	3.2
Mules and asses	0.2
Manure management: Dairy Cattle	52
Manure Management: Non-Dairy Cattle	84.6
Manure Management: Sheep	2.8
Manure Management: Swine	31.6
Manure Management: Goats	0
Manure Management: Horses	0.8
Manure Management: Mules and asses	0
Liming	23.6
Inorganic N-fertilizers	201.6
Animal manure applied to soils	58.2
Sewage sludge applied to soils	0.9
Urine and dung deposited by grazing animals	115.3
Crop residues applied to soils	15.7
Mineralization	1.4
Atmospheric deposition	16.5
Nitrogen leaching and run-off	13
Urea Application	6.6
Cultivation of Organic soils	35.3
Manure Management - Other Poultry	0.4
Manure Management - Other animals	15.1

Emissions in thousands of ktCO$_2$eq

Figure 22. Non-Energy Related Emissions from the Agriculture sector by Category, County Tipperary, 2018

8.3 KEY FINDINGS

- Energy Consumption from agriculture sector accounts for 291.0 GWh.
- Non-energy related GHG emissions totaled 1,739.8 ktCO$_2$eq.
- Total emissions from agriculture sector accounts for 1,848.9 ktCO$_2$eq.

Agriculture Sector	Electricity	Thermal	CH4 & N2O	Total
Total Energy (GWh)	290.6	0.4		**291.0**
Total Emissions (ktCO$_2$eq)	109.0	0.1	1,739.80	**1,848.9**

Table 18: County Tipperary Agriculture Sector CO$_2$eq Emissions, 2018

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.

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[30] 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 2016.

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_2eq emissions per kilometer (CSO- transport, 2018).

This section does not include Tipperary County Councils direct transport emissions, which was extracted from this data set and presented separately in Section 4 of this report.

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. County Tipperary has a total of 101,194 vehicles of which:

- 79,392 are private cars
- 13,961 are goods vehicles
- 1,412 motorcycles
- 5,782 tractors and machinery
- 256 small PSVs (Public Service Vehicle)
- 391 large PSVs.

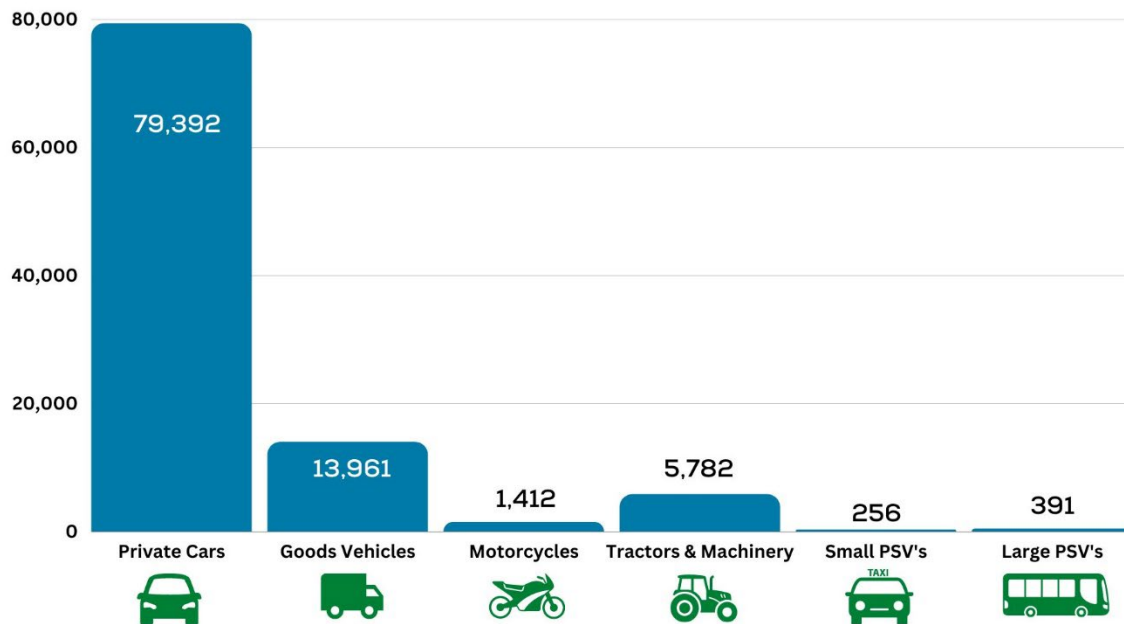[30] Census 2022 not available at time of analysis. Preliminary data published post analysis

Figure 23. Breakdown of Transport Vehicles in County Tipperary, 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[31].

CSO Transport Omnibus [16] 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' [5] 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 Tipperary, 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 Tipperary.

This data was then combined with vehicular efficiency and GHG emissions data from the SEAI report on 'Energy in Transport 2014' [17] 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 Tipperary. Carbon emission factors for transport fuels was then used to convert energy to GHG emissions in 2018 for the Transport sector.

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[31] 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.

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

The transport data associated with Tipperary 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 Tipperary was **1,765.2 GWh.**

Road diesel was the main fuel source for both public and private transport, accounting for 79.6% of CO_2 emissions. This was followed by petrol at 19.8% of CO_2 emissions.

Fuel Type	GWh	%
Petrol	350.2	19.8%
Road Diesel	1,405.0	79.6%
CNG	8.2	0.5%
Electricity	1.8	0.1%
TOTAL	1,765.2	

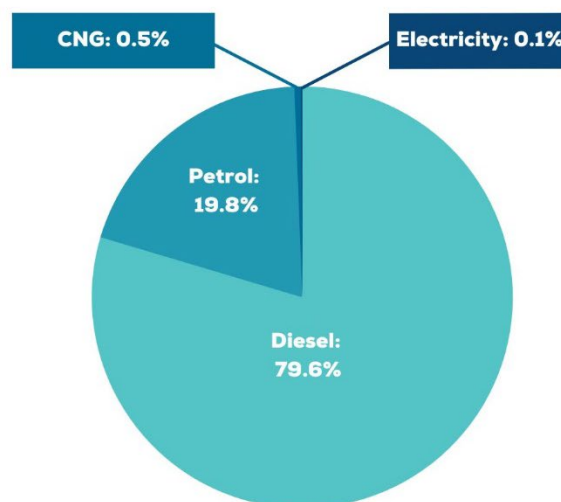**Table 149: County Tipperary Total Energy Consumption Related to Transport in 2018**

Figure 24: Percentage Breakdown of Transport Fuels, County Tipperary, 2018

9.2.2 GHG Emission Results

The total direct CO_2 emissions from Transport in 2018 were the equivalent of 488.5 $ktCO_2$ of which:

- 300.8 $ktCO_2$ from private vehicles
- 98.1 $ktCO_2$ from goods vehicles
- 1.0 $ktCO_2$ from motorcycles
- 32.8 $ktCO_2$ from tractors and machinery
- 3.5 $ktCO_2$ from small PSVs
- 9.0 $ktCO_2$ from large PSVs
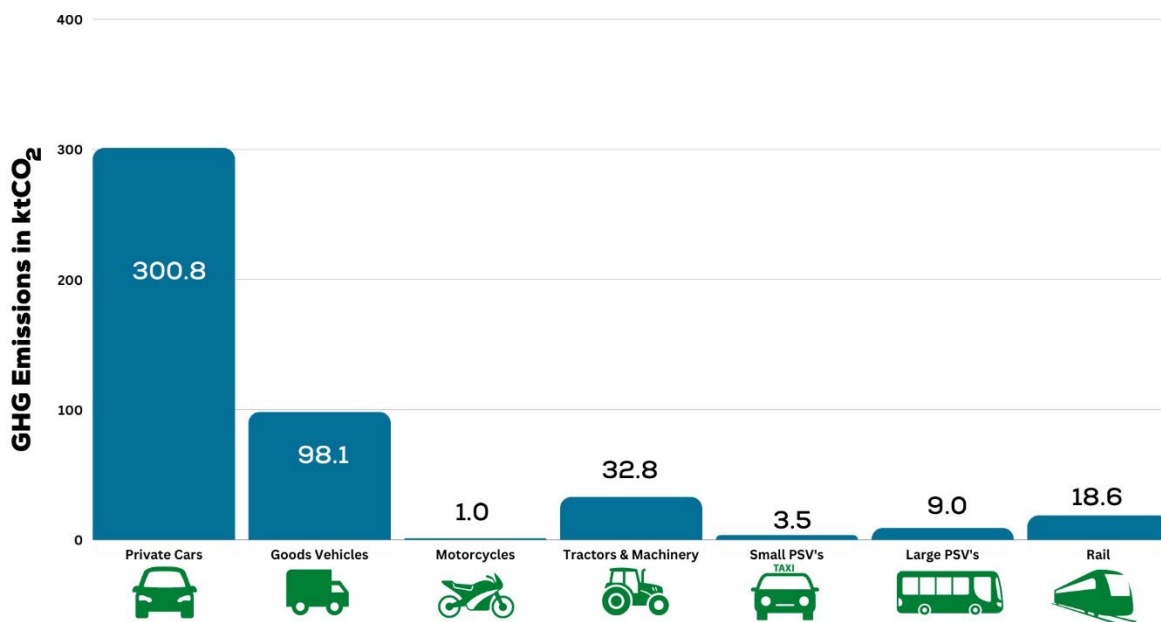- 18.6 $ktCO_2$ from railways.

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

The LA Transport emissions were removed from the total Transport emissions to give a value of 461.4 $ktCO_2$ direct CO_2 emissions.

The GHG emissions from methane (CH_4), and nitrous Oxide (N_2O) obtained from the MapEIre data equates to 27.2 $ktCO_2eq$.

This gives a total GHG emissions for the Transport Sector of **488.5 ktCO2eq.**

As seen in Figure 26, the split of emissions from the different areas is:

Fuel Type	ktCO$_2$eq	%
Petrol	88.2	18.1%
Road Diesel	370.8	75.9%
CNG	1.7	0.3%
Electricity	0.7	0.1%
CH4	2.4	0.5%
N2O	24.7	5.1%
TOTAL	488.5	

Table 20: Split of Transportation Emissions from different fuel types, County Tipperary 2018
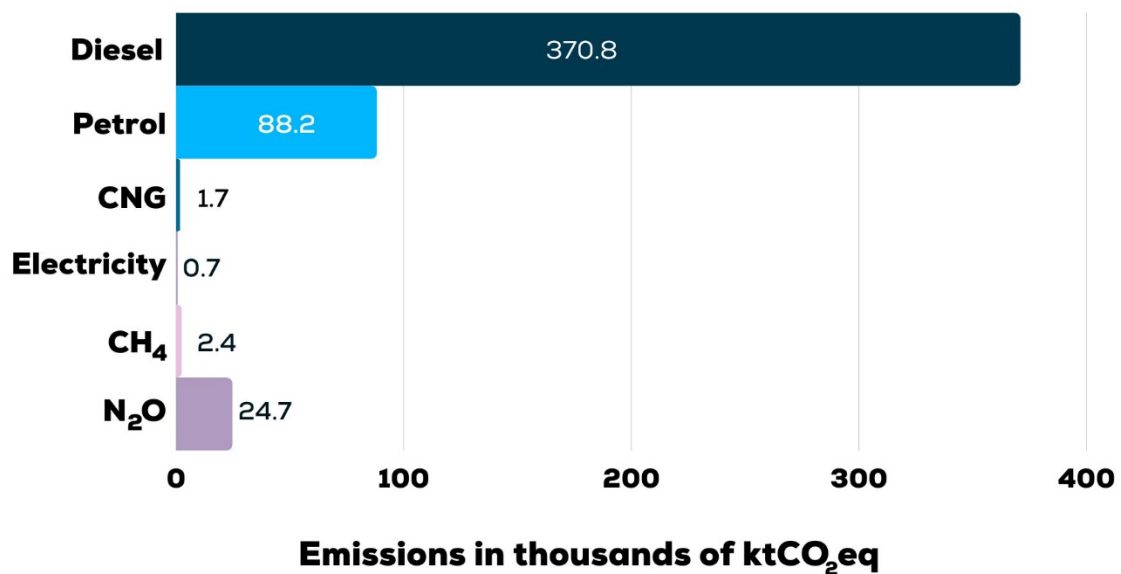

Figure 2623: ktCO$_2$eq Emissions from Transportation, County Tipperary, 2018

9.3   KEY FINDINGS

- Total energy use in transport was 1,765.2 GWh.
- Total final emissions from transport were 488.5 ktCO$_2$eq.
- Transport emissions came primarily from diesel (80.4%) and Petrol (19.1%).

Transport Sector	Electricity	Fossil Fuels		Other Emissions			Total
		CNG	Road Diesel	Petrol	CH$_4$	N$_2$O	
Total Emissions (ktCO$_2$eq)	0.7	1.7	370.8	88.2	2.4	24.7	488.5

Table 21: County Tipperary Transport Inventory, Energy and CO$_2$eq Emissions, 2018

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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_2eq 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).

All emissions in this sector are non-energy related emissions.

10.1 METHODOLOGY

As per the methodology provided on page 29 of the Technical Annex C: Climate Mitigation Assessment (EPA, 2023). MapEIre provides data on the level of emissions and carbon sinks on a local authority level including forest land, cropland, wetlands, settlements as well as for harvested wood products (EPA, 2022).

The non-energy related GHG emissions include Carbon Dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O).

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_2 emissions from LULUCF sector is 264.0kt. CH_4 and N_2O emissions from LULUCF sector is 53.2kt CO_2eq. This is equivalent to total emissions from LULUCF sector of **317.2 ktCO$_2$eq**.

See Figure 27, emissions from different sectors in LULUCF account for the following:

Emissions from different sectors in LULUCF accounts for:
- Grassland accounts for 595.4 ktCO$_2$eq.
- Wetlands accounts for 67.7 ktCO$_2$eq.
- Settlements accounts for 7.3 ktCO$_2$eq.
- Cropland accounts for -4.5 ktCO$_2$eq.
- Harvested wood products accounts for -21.7 ktCO$_2$eq.
- Forest land accounts for -327.1 ktCO$_2$eq.
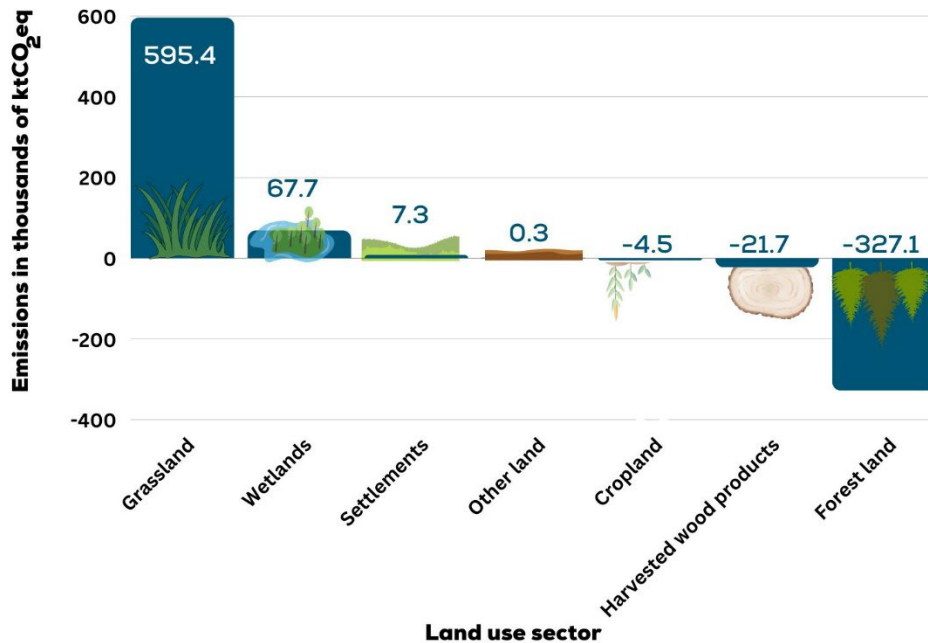- Other Lands accounts for 0.3 ktCO$_2$eq.

Figure 27. Breakdown of GHG Emissions from LULUCF, County Tipperary, 2018

Negative emissions accounts for the amount for CO$_2$ absorbed by the forests, crops and harvested woods.

10.3 KEY FINDINGS

- Total emissions from LULUCF sector accounts for 317.2 ktCO$_2$eq.

LULUCF Sector	Grasslands	Wetlands	Settlements	Croplands	Harvested Wood Products	Forest land	Other land	Total
Total Emissions (ktCO$_2$eq)	595.4	67.7	7.3	-4.5	-21.7	-327.1	0.3	317.2

Table 152: County Tipperary LULUCF sector CO$_2$eq emission, 2018

11.0 WASTE

This sector is responsible from handling of waste, burning of waste, composting, and wastewater handling [18]. 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

MapEIre provides data on the emission levels within this sector [14]. For County Tipperary 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 Pollutant Release and Transfer (PRTR)[32] shows that in 2018 there were 4 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 **34.4 kt CO_2eq**, of which 90% of the emissions by methane (CH_4) which converted to CO_2eq.

- 22.9 ktCO_2eq from solid waste disposal on land
- 6.5 ktCO_2eq from domestic waste water handling
- 4.7 ktCO_2eq from composting
- 0.3 ktCO_2eq from open burning of waste.

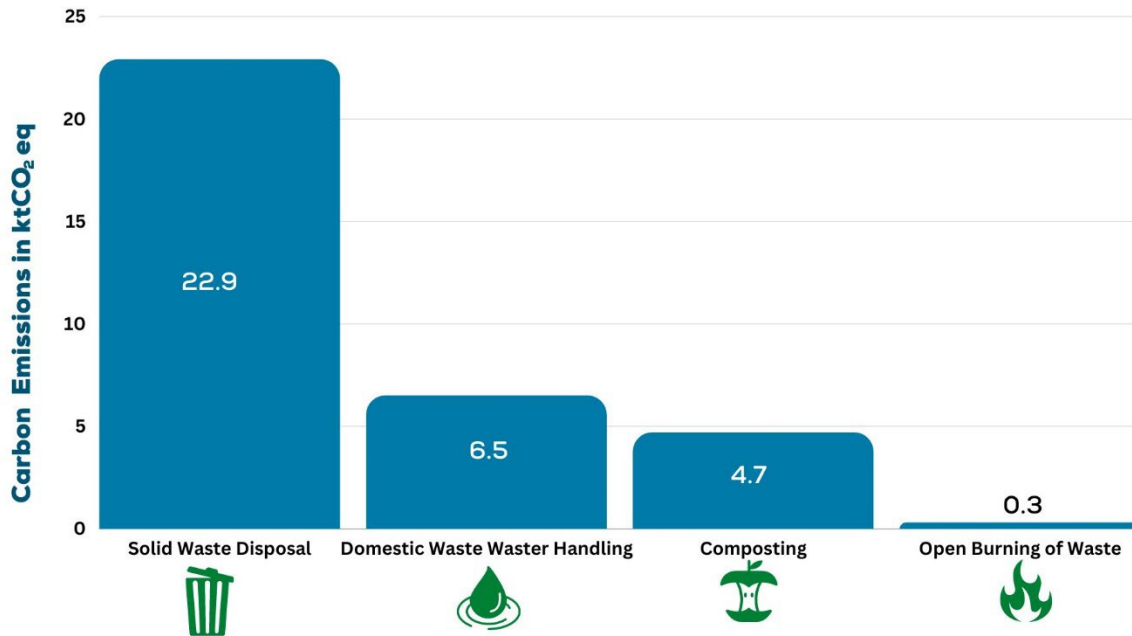
[32] https://gis.epa.ie/EPAMaps/PRTR

Figure 2824. Waste GHG emissions by category, County Tipperary, 2018

11.3 KEY FINDINGS

- Total emissions from waste sector accounts for 34.4 ktCO$_2$eq.

Waste Sector	Solid Waste Disposal	Domestic Wastewater Handling	Composting	Open Burning of Waste	Total
Total Emissions (ktCO$_2$eq)	22.9	6.5	4.7	0.3	34.4

Table 163: County Tipperary Waste sector CO$_2$eq emission, 2018

12.0 F-GASES

These gases comprise of HFCs (Hydrofluorocarbons), PFCs (Perfluorocarbons), SF6 (Sulphur Hexafluoride) and NF3 (Nitrogen Trifluoride). They are much more potent than the naturally occurring greenhouse gas emissions. These were extracted from MapEIre dataset for the local authority area and is presented as CO_2 eq (EPA, 2022).

For County Tipperary there is no emissions from these gases. In Ireland, only Limerick City and County and County Kildare produce these emissions.

13.0 RESULTS SUMMARY

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

The total baseline GHG emission for 2018 for County Tipperary is **3,703.4 ktCO$_2$eq**.

At 49.9%, the Agriculture Sector accounted for the greatest percentage of total emissions in the county. This was followed by the Residential (13.7%) and Transport (13.2%) Sectors. Figure 29 below illustrates the total emissions by Sector.
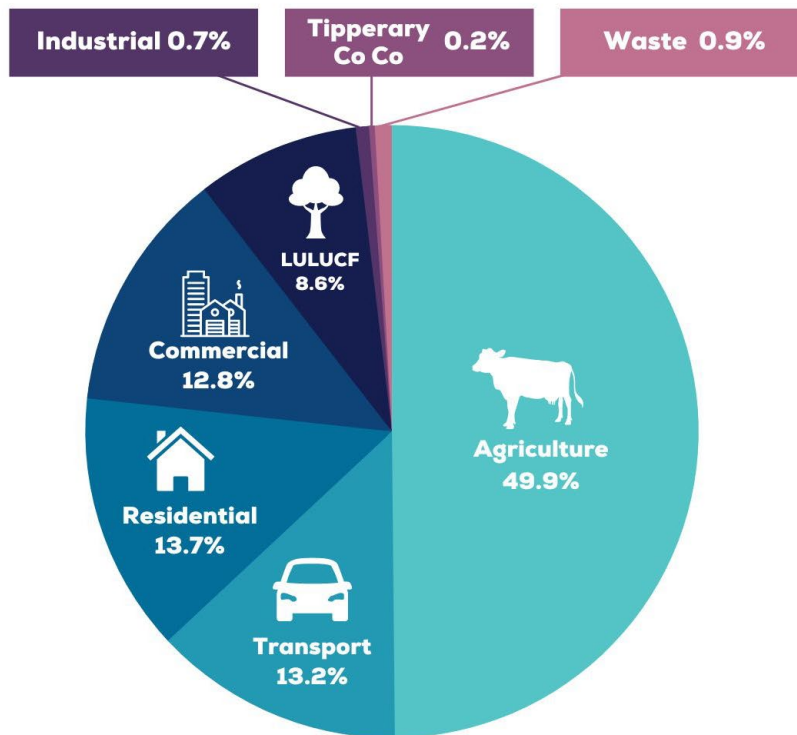
County Tipperary Total Emissions 2018

Figure 25. 2018 Baseline Share of Total Emissions in County Tipperary, 2018

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County Tipperary	Electricity	Fossil Fuels							CH$_4$	N$_2$O	CO2	SF6	Total
		Natural Gas	Heating Oil	Diesel	Petrol	LPG	Coal	Peat					
Tipperary County Council (ktCO$_2$eq)	4.9	0.7	0.4	2.3	0.0	0.1							8.5
Residential (ktCO$_2$eq)	153.4	18.2	216.2			8.3	44.7	61.2	6.3	0.7			509.0
Manufacturing and Commercial (ktCO$_2$eq)	176.4	99.0	133.9			23.6	38.2	0.4	0.5	0.5			472.4
Industrial Processes (ktCO$_2$eq)									-	1.5	8.7	14.2	24.5
Agriculture (ktCO$_2$eq)	109.0		0.1						1,260.0	479.8			1,848.9
Transport (ktCO$_2$eq)	0.7	1.7		370.8	88.2				2.4	24.7			488.5
LULUCF (ktCO$_2$eq)									29.7	23.5	264.0		317.2
Waste (ktCO$_2$eq)									28.3	5.8	0.2		34.4
Total Emissions (ktCO$_2$)	**444.3**	**119.7**	**350.6**	**373.1**	**88.3**	**32.0**	**82.9**	**61.5**	**1,327.3**	**536.6**	**273.0**	**14.2**	**3,703.4**

Table 24: BEI Table for County Tipperary

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 Tipperary is **3,703.4 ktCO$_2$eq.**

Therefore, the combined allowable GHG emissions in 2030 by the various Sectors within County Tipperary is **1,814.7 ktCO$_2$eq.**

GHG emissions for Tipperary County Council in 2016-2018 was **8.47ktCO$_2$eq.**
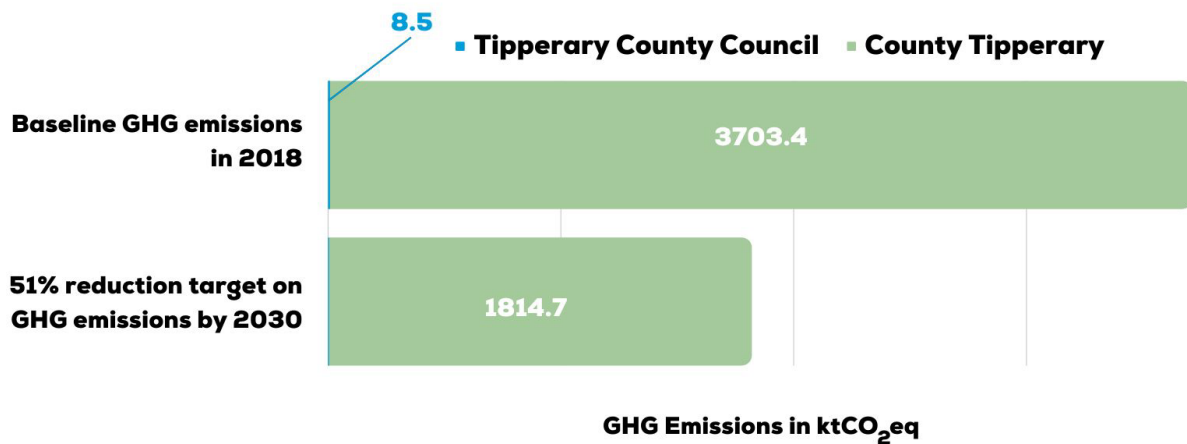

Figure 3026. Baseline Emissions and Allowable GHG emissions, County Tipperary

The resulting Climate Action Plan for County Tipperary must define and outline a clear pathway to achieve this reduction. As part of the Climate Action Plan, Tipperary County Council 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.

Tipperary 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.**

15.0 APPENDIX A – ASSUMPTIONS

Sector	Data source	Data source link	Data assumption
Tipperary County Council	SEAI Monitoring & Reporting (M&R)	https://psmr.seai.ie/Account/LogOn?ReturnUrl=%2f	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	https://data.cso.ie/	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	https://ndber.seai.ie/BERRese archTool/ber/search.aspx	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	https://www.seai.ie/publications/Energy-in-the-Residential-Sector-2018-Final.pdf	This data was used to give an average breakdown between electricity, space hearting & 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	https://www.seai.ie/publications/2018-National-Energy-Balance-Final.pdf	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	https://www.cso.ie/en/statistics/energy/meteredelectricity consumption/	The total metered electrical data for residential sector for county Tipperary was downloaded from CSO
	CSO metered natural gas data	https://www.cso.ie/en/statistics/energy/networkedgascon sumption/	The total metered natural gas data for residential sector for county Tipperary was downloaded from CSO
	SEAI Conversion Factors	https://www.seai.ie/data-and- insights/seai-statistics/conversion-factors/	The fuel type was used to ascertain GHG emissions using the conversion factors per fuel type from the SEAI

	Map Eire	https://projects.au.dk/mapeire/spatial-results/download	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 form the localised data sets.
	US EPA GHG Conversion Factors	https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#results	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	https://projects.au.dk/mapeire/spatial-results/download	This data set includes Local Authority data. As such the total Tipperary 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	https://www.cso.ie/en/statistics/energy/meteredelectricity consumption/	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	https://www.cso.ie/en/statistics/energy/networkedgascon sumption/	assume that all data provided in this data set was associated with M&C sector, minus the LA specific data
	CSO Energy Balance	https://data.cso.ie/table/SEI01	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	https://maps.valoff.ie/maps/VO.html	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	https://projects.au.dk/mapeire/spatial-results/download	No localised data sets available for this sector so a full breakdown was taken from MapEIre
Agriculture	Map Eire	https://projects.au.dk/mapeire/spatial-results/download	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	https://www.cso.ie/en/releasesandpublications/ep/p-coa/censusofagriculture2020-preliminaryresults/kf/	Provides the number of livestock (sheep, Pigs, cows and poultry).

	Teagasc	https://www.teagasc.ie/media/website/rural-economy/rural-development/diversification/Energy-12_Poultry-Energy-Efficiency-in-Poultry-Units.pdf	Provides the average energy consumption per poultry.
	Teagasc	https://www.teagasc.ie/media/website/rural-economy/rural-development/diversification/Energy-14-Energy-Use-on-Pig-Farms.pdf	Provides the average energy consumption per pig
	Teagasc	https://www.teagasc.ie/rural-economy/rural-development/diversification/energy-auditing-in-agriculture/	Provides the average energy consumption per cow
Transport	CSO Transport Omnibus 2018	https://www.cso.ie/en/statistics/transport/transportomnibus/	Tipperary 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 Tipperary. 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 Tipperary. The national dataset shows that an average of 1% of transport fuel is related to Compressed Natural Gas (CNG). Without data specific to County Tipperary, 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 Tipperary.
	Map Eire	https://projects.au.dk/mapeire/spatial-results/download	Provides rail data for County Tipperary
	SEAI Energy in Transport 2014	https://www.seai.ie/publications/Energy-in-Transport-2014-report.pdf	gCO2/km travelled for the different vehicle types - factors used to calculate the overall GHG emissions from the road vehicle in County Tipperary
LULUCF	Map Eire	https://projects.au.dk/mapeire/spatial-results/download	
Waste	Map Eire	https://projects.au.dk/mapeire/spatial-results/download	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	https://www.nwcpo.ie/permitsearch.aspx	Provided the number of waste collection licences in the County. No other data was provided

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

16.0 APPENDIX B – TIPPERARY COUNTY COUNCILS 2016-2018 DATA

The National Climate Action Plan 2023, Section 10 requires all public sector bodies including local authorities to calculate their baseline GHG's using an average of years 2016-2018. The Local Authorities 51% target is set against this baseline, and calculated by SEAI on the Monitoring and Reporting System. The LACAP will outline the pathway for Tipperary 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.

ENERGY RESULTS

From the results obtained from the M&R system, Tipperary County Council's average energy use in 2016-2018 was **30.7 GWh.**

- Tipperary County Council building & facilities were the highest energy consumer, accounting for 13.3 GWh (43%) of the total energy consumption.
- Transport fuels accounted for 8.8 GWh of energy (28%).
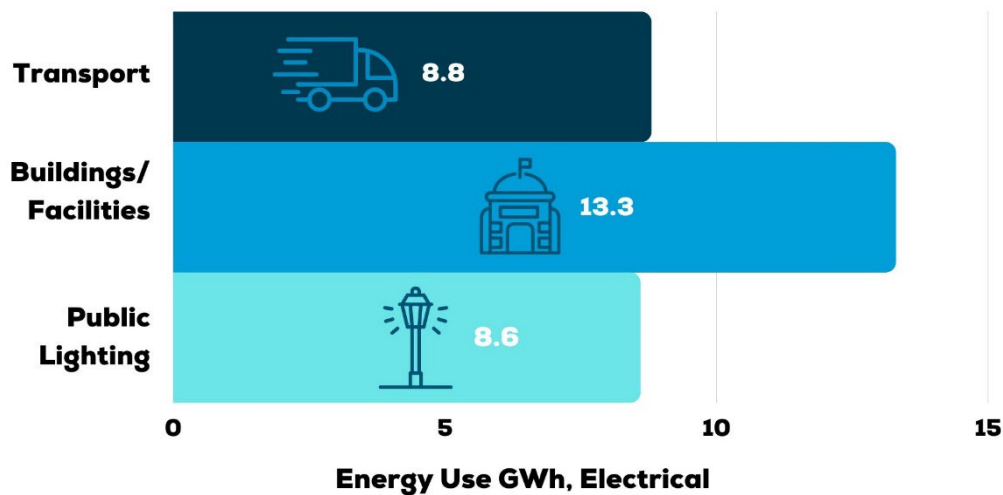- Public lighting accounted for 8.6 GWh of energy (28%).

Figure 27: Breakdown of 2016-2018 energy consumption, in GWh, by Tipperary County Council - split by SEU Category

GHG Emission Results

When energy use was converted into GHG emissions, the council's total emissions amounted to **9.1ktCO$_2$eq.**

- Public lighting accounted for 3.7 ktCO$_2$eq (40%) of Tipperary County Council total GHG emissions.
- This was followed by buildings/facilities with 3.2 ktCO$_2$eq (35%).
- Transport accounted for 2.3 ktCO$_2$eq (25%).
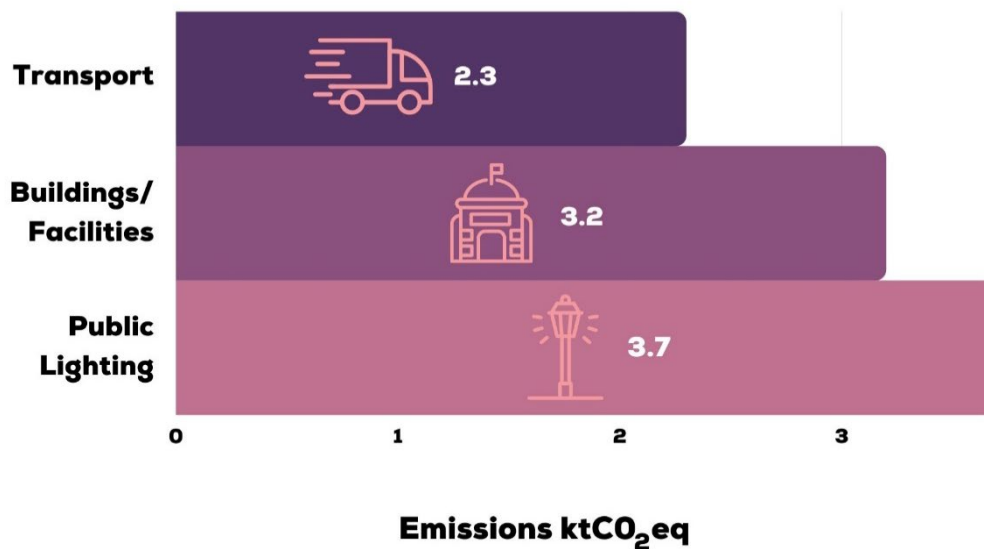

Emissions ktCO$_2$eq

Figure 28: Breakdown of 2016-2018 GHG emissions in ktCO$_2$eq, by Tipperary County Council - split by SEU Category

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SOUTH EAST
ENERGY AGENCY

South East Energy Agency
Kilkenny Research & Innovation Centre
Burrell's Hall, St Kieran's College Kilkenny,
R95 TP64
Ireland

Tel: +353 (0)56 7790856
Email: contact@southeastenergy.ie