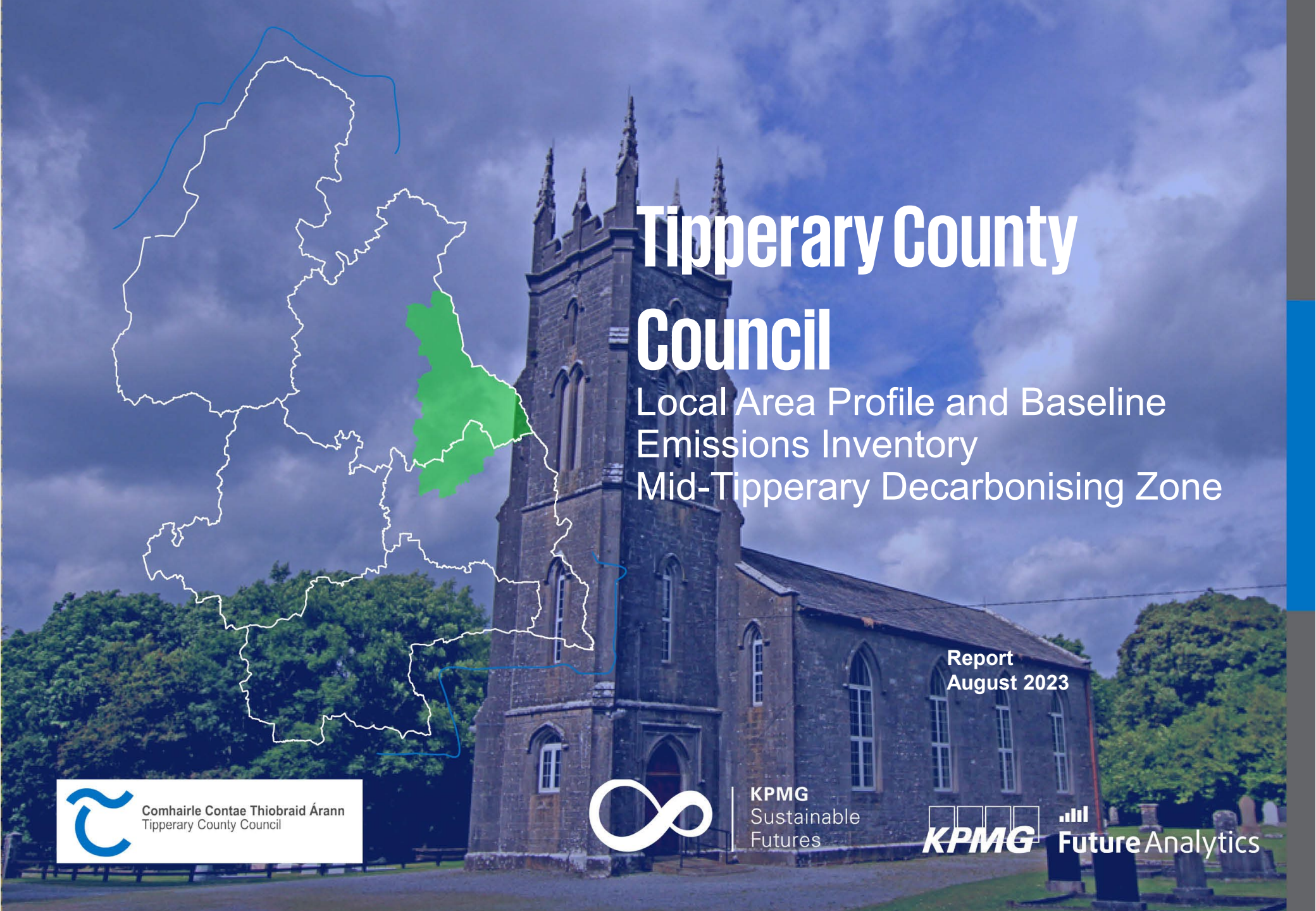


Tipperary County Council

Local Area Profile and Baseline Emissions Inventory Mid-Tipperary Decarbonising Zone

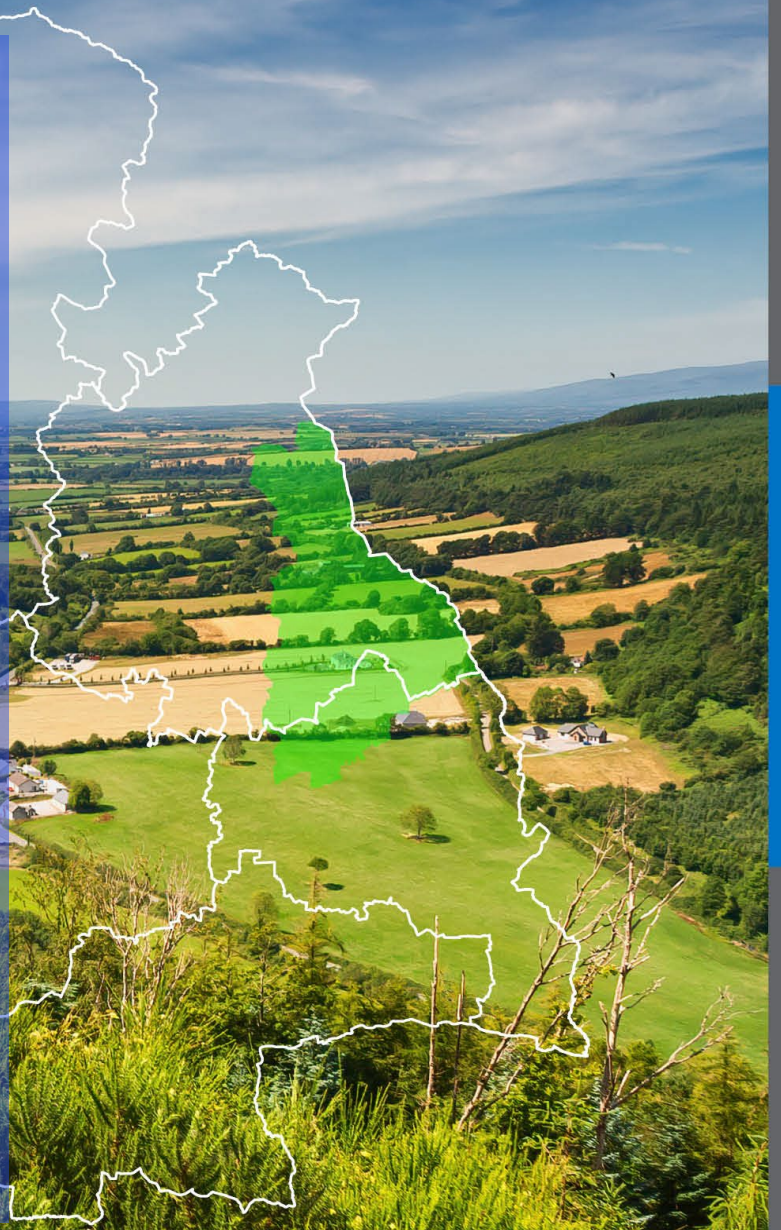
Report
August 2023

Comhairle Contae Thiobraid Árann
Tipperary County Council

KPMG Sustainable Futures

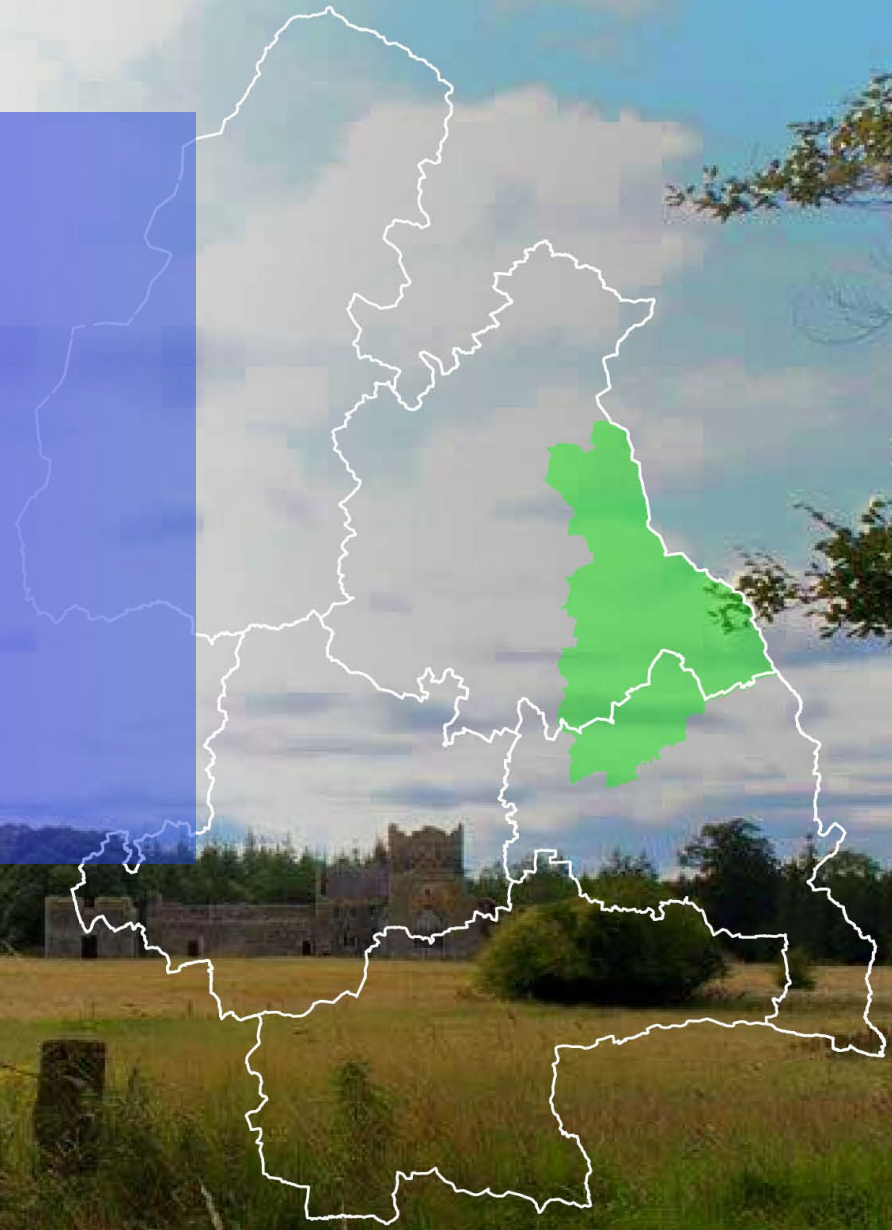
KPMG Future Analytics

Contents



01

Executive Summary



Executive Summary

The Mid-Tipperary Decarbonising Zone (DZ) is the first inland rural DZ to be designated in the country and will, in conjunction with funding sources, such as the EU 'Just Transition Fund' programme offer opportunities to the local community and businesses across a range of positive, sustainable and innovative areas, such as the bio-economy, sustainable tourism, village renewal, sustainable transport and land use diversification. This is a socio-economic profile of the area and a summary of emissions, or a Baseline Emissions Inventory (BEI), prepared to support the Tipperary County Council Climate Action Plan 2024 – 2029.

A Decarbonising Zone (DZ) is a spatial area, identified by each local authority in Ireland, in which a range of climate change mitigation measures are identified to contribute to meeting the national climate action targets. DZs are to be a demonstration and testbed of what is possible for decarbonisation and climate action at a local and community level. The DZ enables a flexible, incremental and community-driven approach to ensure that its objectives are delivered. In this respect, Tipperary County Council will seek to collaborate with stakeholders and help coordinate opportunities for low-emissions, progressive and sustainable development utilising the unique rural assets of the area.

The Mid-Tipperary DZ is designated as the DZ for Tipperary in the Tipperary County Development Plan 2022 – 2028 based on its socioeconomic, and physical and environmental characteristics which have been deemed an appropriate fit against a set of defined DZ criteria, which refer to the Local Authority Climate Action Plan Guidelines (DECC, 2023)). The Mid-Tipperary DZ area contains 14 Electoral Divisions, from Kilcooly in the east to Littleton in the west and from Templetouhy in the north and Graystown in the south. The villages within the DZ area include Ballinure, Ballynonty, Ballysloe, Castleleiny, Glengoole (New Birmingham), Gortnahoe, Grange, Horse & Jockey, Littleton, Moyne, Templetouhy, and Two-Mile-Borris.

This BEI is an overview of the area's total carbon emissions at a point in time. It is a key instrument to support and enable a local authority to measure the impact of planned actions relating to decarbonising, including climate mitigation and adaptation actions.

Decarbonising opportunities if developed, could allow the Mid-Tipperary DZ to become a safer and healthier place to live, improving the overall well-being of citizens and communities. The focus of this area is on the development of the bioeconomy, centred on the National Bioeconomy Campus at Lisheen. However, there are many other opportunity areas, as further addressed in the Local Authority Climate Action Plan. Opportunities such as support for active travel and improved public transport have the potential to allow people to make the modal shift from cars, improving the air quality in the area. The identification and investment in initiatives such as increased installation of Electric Vehicle (EV) charging infrastructure and the retrofitting of buildings will help make the area a cheaper place to live. New sustainable technologies will bring additional co-benefits of decarbonising including employment opportunities. In addition, sustainable land management and low-carbon farming practices could offer the potential for improved soil and water quality in the area, giving biodiversity spaces to thrive, and increasing the overall resilience of the area to climate change.

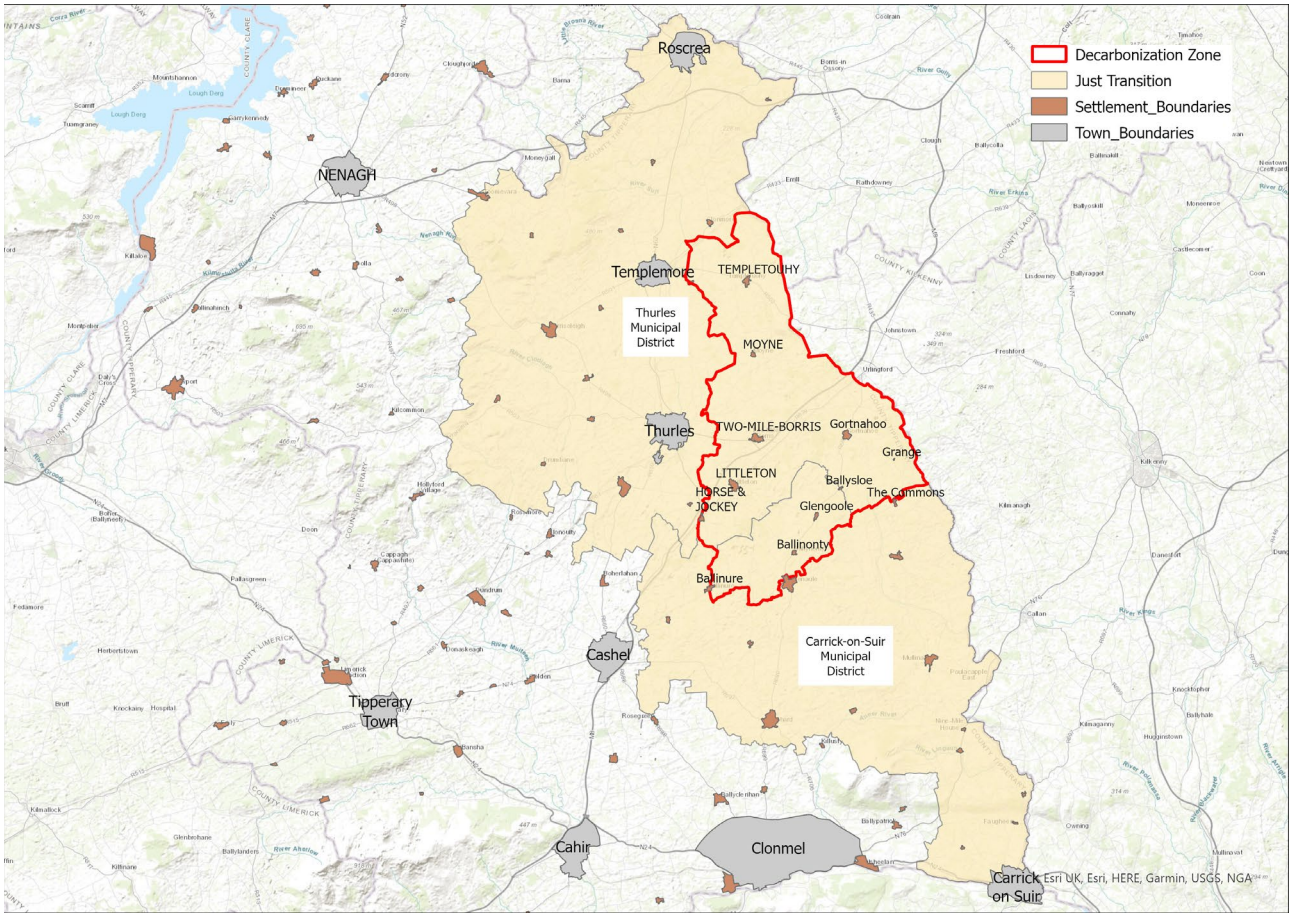
The development of this BEI for the DZ area is informed by the Local Authority Climate Action Plan Guidelines (DECC, 2023) Technical Annex C: Climate Mitigation Assessment and Technical Annex D Decarbonising Zones and follows a Tier 3 approach, i.e., a 'bottom-up, spatially led' approach.

2018 is used as the baseline year for the BEI assessment. This year has been purposefully chosen to align with Ireland's national targets which are set against a 2018 baseline year. Emissions associated with the following sectors are considered in this BEI assessment due to their relevance in the DZ area: Residential, Commercial & Public Sector, Transport, Waste, Agriculture and Land use, Land Use Change and Forestry and Energy and Electricity.

A summary of the results of the DZ area BEI assessment is provided on the pages that follow.

Executive Summary (cont..)

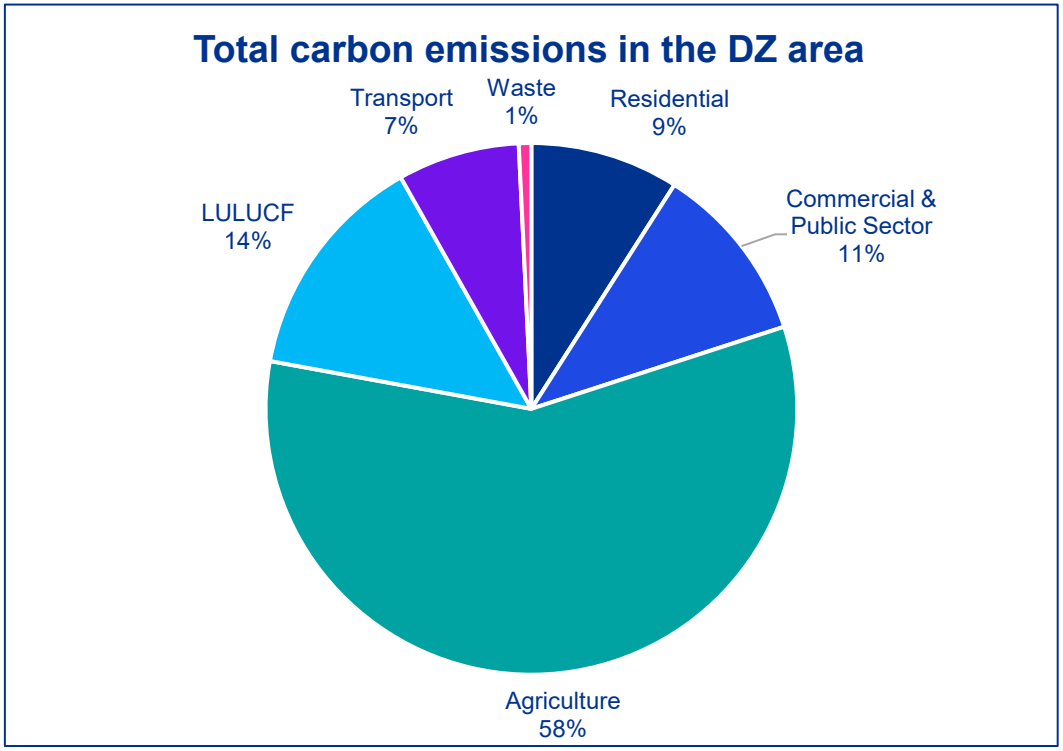
A map of the Mid-Tipperary DZ is shown below, also outlining Tipperary's Just Transition area. To facilitate a just transition towards a low-carbon economy across the Midlands, the EU and the Government of Ireland have established the Just Transition Fund. This will offer opportunities for funding in the area across a range of policy areas including: Economic Diversification, Local Economic Community Plan Schemes, Bioeconomy, Peatland Restoration, Carbon Capture, Networks of trails, Electric busses, Transport and EV Charge points.



Executive Summary (cont..)

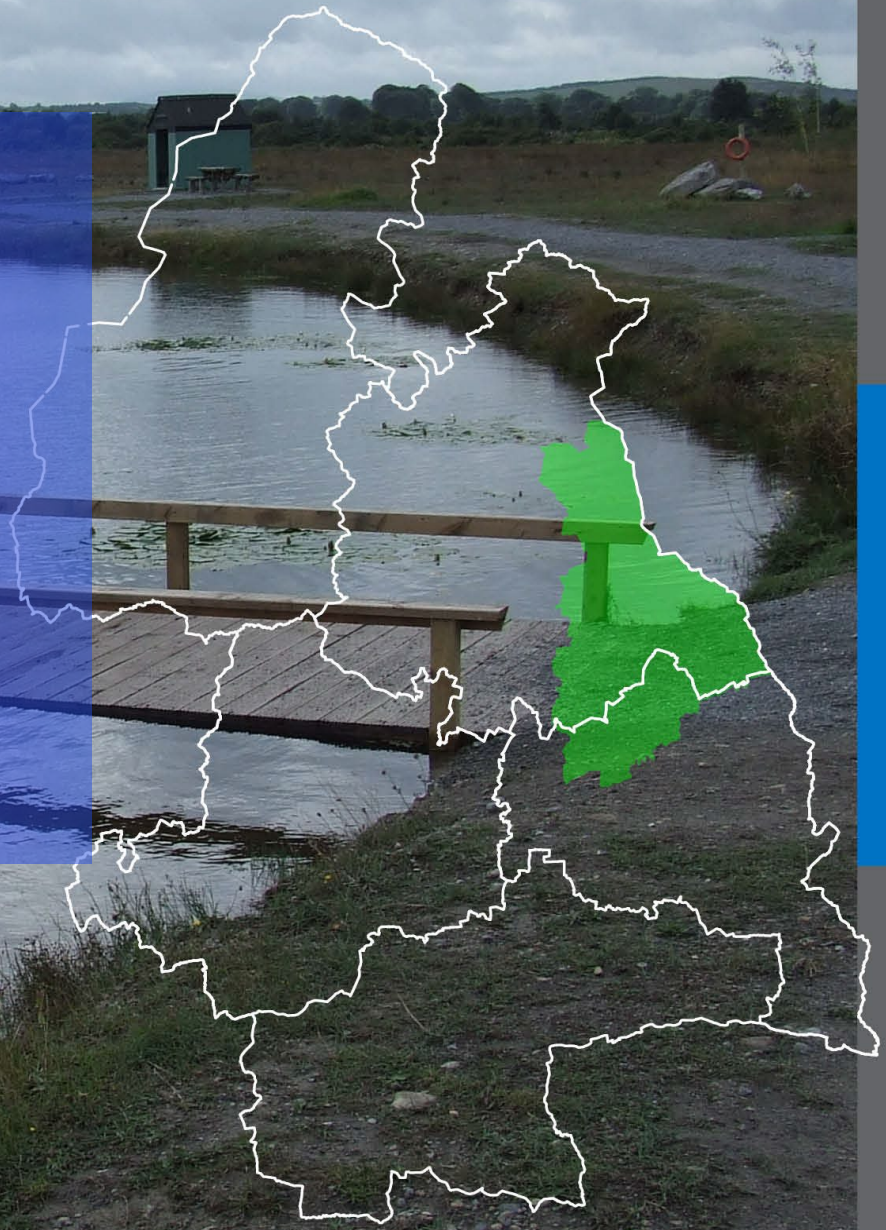
The results of the 'bottom-up' Tier 3 assessment are presented on the table and chart below. Total carbon emissions equate to approximately **229,862 tCO_2e**.

	Carbon emissions (tCO_2e)
Residential	20,820
Commercial & Public Sector	25,218
Transport	17,073
Waste	1,450
Agriculture	133,214
LULUCF	32,087
Total carbon emissions	**229,862**



02

Introduction



2.1 Global & National Response to Climate Change

Global responses to climate change are accelerating as exemplified by the signing of the COP21 Paris Agreement by 195 countries in 2015. Ireland's climate policies are evolving in line with national and international requirements and aims to "pursue and achieve, by no later than the end of 2050, the transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy."

Climate change has become one of the most pressing global public policy challenges facing governments today.

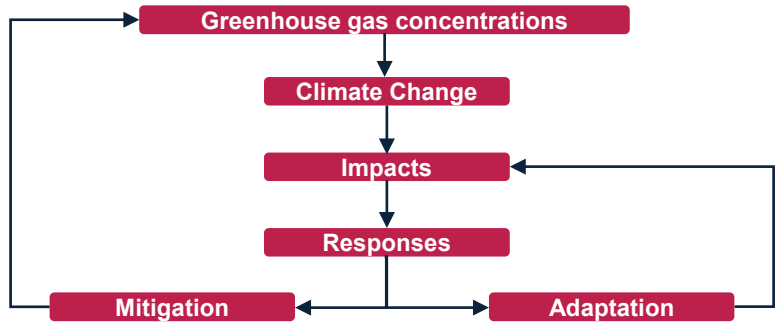
International organisations, national and local governments are increasingly compelled to take ambitious action through mitigation (decreasing emissions that cause climate change) and adaptation (enhancing resilience to climate change impacts and risks).

Ireland's Local Authorities are developing Local Authority Climate Action Plans (LACAPs) to play their part in meeting national emissions objectives and to transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy. These plans need to be underpinned by a robust evidence base detailing sources of emissions as well as the current and future climate-related risks faced by the Local Authority.

In response to the challenges posed by climate change, two complementary approaches are being adopted.

Mitigation: ensuring the impacts of climate change are less severe by preventing or reducing carbon emissions. Mitigation is achieved either by reducing the sources of these gases (e.g. by increasing the share of renewable energies, or establishing a cleaner mobility system), or by enhancing the storage of these gases (e.g. by increasing the size of forests).

Adaptation: anticipating the adverse effects of climate change and taking appropriate action to prevent or minimise the damage they can cause, or taking advantage of opportunities that may arise. Examples of adaptation measures include large-scale infrastructure changes, such as building defences to protect against sea-level rise, as well as behavioural shifts, such as individuals reducing their food waste.



2.1 Global & National Response to Climate Change (cont..)

Paris Agreement, 2015

The Paris Agreement, adopted in 2015 provides an internationally accepted and legally binding global framework to addressing climate change challenges. It has two clearly defined goals aimed at supporting progressive and ambitious climate action to avoid dangerous climate change:

I. holding global average temperature increase to well below 2°C and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels (i.e. **mitigation**);

II. increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience (i.e. **adaptation**).

European Climate Law, 2021

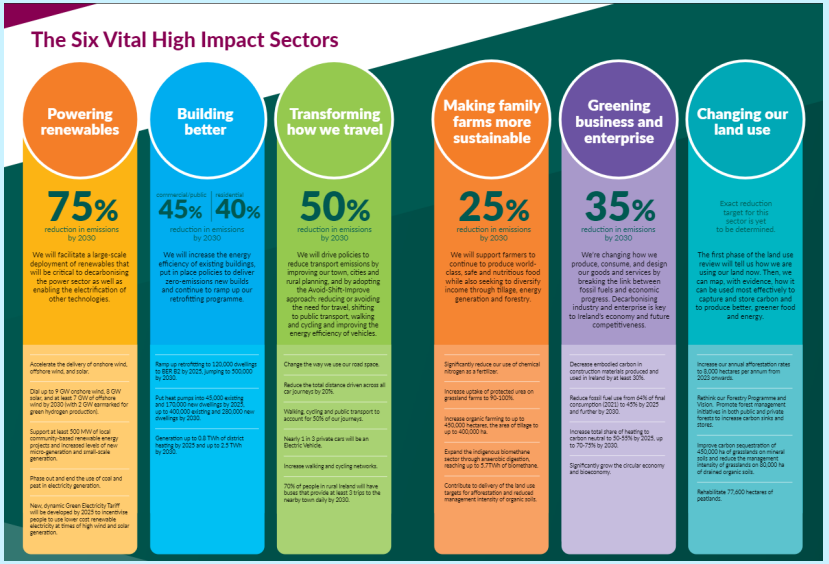
The EU adopted a legislative proposal for the European Climate Law in June 2021 to frame the climate neutrality objective by 2050 across the EU with an intermediate target of **reducing net greenhouse gas emissions by at least 55% by 2030**. The European Commission (EC) is clear in the commitment required by all Member States, and the use of all policy levers and instruments, to fight against the urgent challenge of climate change and to activate leadership efforts to reach climate neutrality by 2050.

Climate Action and Low Carbon Development (Amendment) Act, 2021

Climate policy in Ireland reflects the ambition of the EU and that required to confront the challenges of climate change. The Climate Action and Low Carbon Development (Amendment) Act, 2021 frames Ireland's legally binding climate ambition to delivering a **reduction in greenhouse gas emissions of 51% by 2030**, to achieve climate neutrality by the end of 2050.

Through progressive economy-wide carbon budgets, sectoral ceilings, a suite of strategies devised to promote a **combination of adaptation and mitigation measures**, and robust oversight and reporting arrangements, climate policy is working to scale up efforts across all of society and deliver a step change on ambitious and transformative climate action to 2030 and beyond to 2050.

Climate Action Plan 2023



Regional & Local Policies:

- Tipperary County Development Plan 2022- 2028
- Regional Spatial and Economic Strategy for Southern Region
- Local Economic Community Plan (LECP)

2.2 Identification of Decarbonising Zones

Local Authorities have a key role to play in addressing and driving forward climate change mitigation. In addition to meeting their 2030 and 2050 energy and emission targets, they are well placed to assess, exploit and support opportunities within their administrative areas, in cooperation with each other and with national bodies, and through the involvement and support of local communities.

Action 80 of the Government's Climate Action Plan 2019 states that they will support, monitor and assess Local Authority Climate Action.

Action 165 of the Government's Climate Action Plan 2019, requires Local Authorities to identify and develop plans for one Decarbonising Zone.

A **Decarbonising Zone (DZ)** is a spatial area, identified by each local authority in Ireland, in which a range of climate change mitigation measures are identified, whilst enhancing and embracing adaptation and biodiversity measures to contribute to reaching wider national climate action targets.

DZs are a demonstration and testbed of what is possible for decarbonisation and climate action at a local and community level. Through a feedback loop of experimentation and evaluation, the DZ enables a flexible, incremental and community-driven approach to ensure that its objectives are delivered.

The criteria for selecting a DZ are:

- Urban areas and agglomerations with a population not less than 5000 persons, **or**
- Rural areas with an area of not less than 4 km^2
- Other location/areas that can demonstrate decarbonisation at a replicable scale.

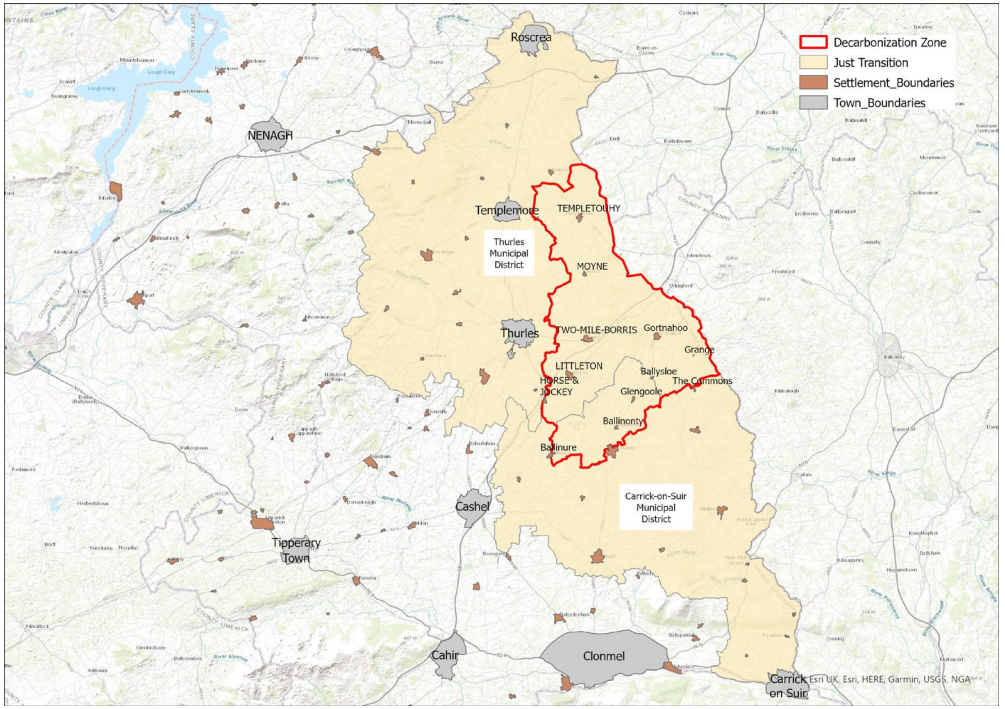
Once a DZ area is identified and the associated overarching vision and objectives are set, each local authority must kickstart the next stages of the DZ, as illustrated on the right.

2.2 Identification of Decarbonising Zones (cont..)

Tipperary County Council has also set an overarching vison for their DZ area:

"The Mid-Tipperary Decarbonising Zone designation recognises the importance of the bio-economy in Tipperary and the potential for synergies with other areas including wind energy and tourism and amenity."*

The Mid-Tipperary DZ has been designated as the spatial area in which a range of climate mitigation, adaptation and biodiversity measures and actions are identified to address local low carbon energy, greenhouse gas emissions and climate needs to contribute to national climate action targets. Its socioeconomic and physical environmental characteristics have been reviewed and identified as an appropriate fit for the defined DZ criteria.



Source: Text from Tipperary County Development Plan 2022 - 2028

Zoning

The Mid-Tipperary DZ includes 27 small areas under 14 Electoral Divisions (EDs) (as shown within the red line boundary on the left)

Population

The total population of the Mid-Tipperary DZ area was estimated at 7,142 people (2016 Central Statistics Office (CSO) data of small areas within the DZ).

Land Area

The Mid-Tipperary DZ has a total land area of approximately 314 km^2.

Scalability

The Mid-Tipperary DZ is considered to be an appropriate demonstration area and testbed for rural decarbonisation measures to be adopted in other rural areas as well as scaled up across Tipperary County and wider.

Just Transition

The entirety of the Mid-Tipperary DZ is located within an area eligible for EU Just Transition funding.

2.3 Establishment of the Baseline Emissions Inventory

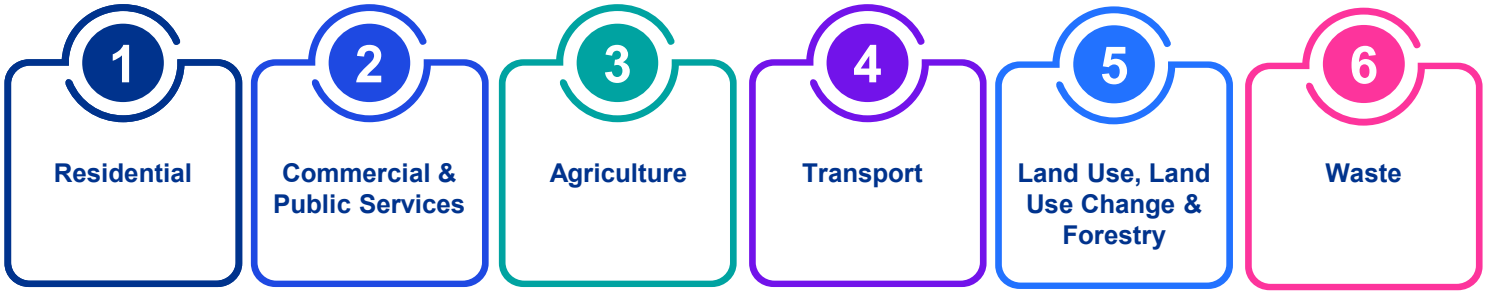
The baseline emissions inventory (BEI) provides an overview of an area's or region's total carbon emissions at a point in time. The BEI is a key instrument that enables a local authority to measure the impact of planned actions related to emission reductions across its own operations as well as relevant sectors of society. The BEI represents an evidence-based approach to not only inform appropriate emission reduction actions but also measure progress over time.

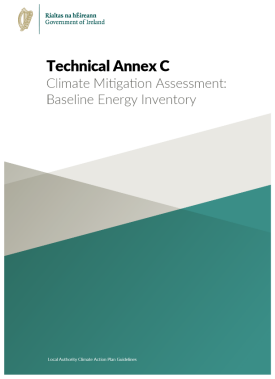
The BEI is required to be undertaken for the purpose of informing climate change action planning. Local authorities are encouraged to update their emissions baseline where and/or when more up to date versions of relevant datasets become available (for example, when new census data is released) or upon any review or update of the national climate action plan. The BEI should be treated as a live inventory and regularly updated to assess progress against actions as well as to improve accuracy with the inclusion of new and better datasets as they evolve.

Tipperary County Council's BEI for the Mid-Tipperary DZ area is informed by the guidance document Technical Annex C: Climate Mitigation Assessment and Technical Annex D Decarbonising Zones. These guidance documents support a robust approach to the assessment and reporting of baseline energy and carbon emissions for all local authorities. 3 approaches to the development of a BEI are outlined – Tier 1, Tier 2 and Tier 3 – each of which allow for local authorities at varying levels of experience and maturity to produce a BEI. This BEI assessment for Tipperary County Council DZ follows a Tier 3 approach, i.e. a 'bottom-up, spatially led' approach to BEI development.

2018 is used as the baseline year for the BEI assessment. This year has been purposefully chosen to align with Ireland's national targets which are set against a 2018 baseline year. This BEI assessment provides a snapshot in time of the carbon emissions across all identified sectors of the economy within the boundaries of a specific local authority. The baseline assessment covers both direct and indirect emission sources within the administrative area, as well as the level of control and influence a local authority has over these emissions.

Emissions associated with the following sectors are considered in this BEI assessment, aligning with Ireland's National Emissions Inventory. Note that 'Industrial Processes' are excluded from the assessment given the negligible activities in the DZ area.





03

Local Area Profile

3.1 Characteristics of Mid-Tipperary DZ

The Mid-Tipperary DZ covers an area of 314 km², ~7.3% of the total county area. The DZ is bordered by the district towns of Templemore and Thurles. According to the Census 2016, the Mid-Tipperary DZ has a population of 7,142).

Physical & Environmental Characteristics

Grassland (or pastures) and peat bogs account for approximately 84% of the land area within the Mid-Tipperary DZ area. A number of rivers flow through the DZ including the Black River, River Goul, River Breagagh, and the River Drish.

The Mid-Tipperary DZ has a rich and diverse archaeological heritage, ranging from castle ruins and monuments to churches and abbeys. The ruins of the Derrynaflan Church are located to the south-east of the DZ. Here the Derrynaflan Chalice was found in 1980, a 9th-century AD chalice, now on display in the National Museum of Ireland. The Slieveardagh Hills lie in the south-east of the DZ, where the Wellington Monument can be found atop the hills. The Kilcooly Estate, an 18th-century country house and Cistercian Abbey, is located just west of the hills.

The DZ also contains a wide-ranging natural landscape. Lough Doire Bhile is located in the foothills of the Slieveardagh hills. The 70 acres of land previously used for Bord na Mona milled peat production, now consists of a lake and two wetland areas and is home to many species of bird including lapwing.

Socioeconomic Characteristics

The average population density of the study area was approximately 23 people per km², while the average population per Small Area is approximately 265 persons. There are 3,262 occupied dwellings in the area, with an additional 377 vacant dwellings. There are ten primary schools located within the area.

In terms of social and economic characteristics, most of the study area is defined as being 'Marginally below average', with some areas to the south, north and east noted as 'Disadvantaged'. The most affluent areas lie towards the northern half of the DZ but are still considered 'Marginally above average'.

The DZ has had a varied industrial past. Coal was historically mined in the Slieveardagh Hills for approximately 200 years up until the mid-1980s. Over the past decade, the DZ area has undergone significant changes. The Lisheen lead and zinc mine closed in 2015 following over 15 years of operation, employing approximately 400 people. Then in 2017, the Bord na Mona stopped production at the Littleton briquette factory, following almost 80 years of operation.

The National Bioeconomy Campus

The former mining site was repurposed to become the National Bioeconomy Campus. The first National Policy Statement on the Bioeconomy was published in 2018, and subsequently during 2018 the first Bioeconomy Day in Ireland was held at the National Bioeconomy Campus, where the IBF as well as the Campus were officially launched that day

The National Bioeconomy Campus located at Lisheen is a critical piece of infrastructure that will enable diversification of business activities in the agri-food and marine sectors in the rural economy, attracting and retaining workers and businesses in the region which in turn will drive innovation and investment.

Tipperary County Council are currently working on a masterplan to guide the development of the Lisheen National Bioeconomy Campus and associated investment priorities. The initial plan for the Campus in 2017 included:

- Development of a solar farm. In 2022, conditional planning permission was granted Expansion of the existing 18 turbine (36 MW) wind farm.
- A €22 million funded research project led by Glanbia called AgriChemWhey.

3.1 Characteristics of Mid-Tipperary DZ (cont..)

The Mid-Tipperary DZ is well connected by transport infrastructure and has an increasingly diverse range of planned tourist activities, including cycling routes and camping facilities.

Tourism

The tourism sector in the DZ is currently underdeveloped. The TCC Development Plan 2022-2028 recognises the potential for tourism within the DZ, with particular reference to the proposed Littleton Labyrinth Greenway and the Tipperary Bushcraft Survival and Activity Park.

Planning permission was granted in 2022 for the Little Labyrinth Greenway. The project consists of a 7km cycleway on the disused rail track on Bord na Móna lands and will link the existing walking loop at Lough Dhoire Bhile with the existing Derrynaflan Loop cycle trail. The greenway is an example of the co-benefits the DZ will bring. The greenway will bring tourism to the area and its footfall will benefit the local economy. In addition, the greenways will also play a crucial role in encouraging people to walk or cycle.

The proposed Tipperary Bushcraft Survival and Activity Park in Littleton will include adventure activities and camping facilities. This ecotourism hub will conserve and protect the surrounding natural habitats, and boost the local economy, whilst also raising environmental awareness.

Transport

In terms of transport infrastructure, the DZ is intersected by the M8. The 149km motorway, commences in County Laois, and runs through the counties of Kilkenny, Tipperary, and Limerick, before terminating near Cork City. The N75 is also located within the DZ, connecting Two-Mile-Borris to Thurles. The remainder of the roads within the DZ are rural.

There are bus stops at 10 locations within the DZ boundary. The expansion of the TFI Local Link network recently has increased the accessibility of the DZ's population. The Irish Rail stations of Templemore and Thurles also border the DZ boundary to the north and east, respectively.

The private car is the most common mode of transport for commuting within the DZ, according to the 2016 Census, with 67% of the total population aged 5 and over travelling to work, school or college by car. Further expansion and interconnectivity of the DZ's public transport network is essential to facilitate the modal shift away from the private car in the coming years.

3.1 Characteristics of Mid-Tipperary DZ (cont..)

Agriculture and associated industries represent a core economic pillar in the Mid-Tipperary DZ, providing significant employment for its inhabitants. The area is currently heavily dependent on fossil fuels, however a shift towards renewable energy is currently underway, with significant wind energy infrastructure currently being proposed.

Renewable energy

The Mid Tipperary Decarbonising Zone is playing its part in decarbonising the electricity sector through the deployment of renewable energy technologies. There are approximately 30 wind turbines operating in the area. Most of these concentrated around the National Bioeconomy Campus based at Lisheen. The Tipperary Renewable Energy Strategy 2016 identifies that a significant part of the area is 'open for consideration' for wind energy development with good wind speed resources in parts.

There is also planning permission for three solar farms in the area. The proposed solar energy development for Lisheen has a potential to generate122 Mega Watts of electricity.

There is currently no electric vehicle (EV) changing infrastructure in the area. The nearest charging points are located in Thurles and Urlingford. There are a number of funding streams, for example the Just Transition Fund) to support the role out of EV charging infrastructure.

There is an opportunity to improve the electrical grid in the area to support the development of green electricity and the role out of electric vehicle changing infrastructure to maximise the potential emission reductions in the area.

Agri-Land Use, Land Use Change & Forestry (LULUCF)

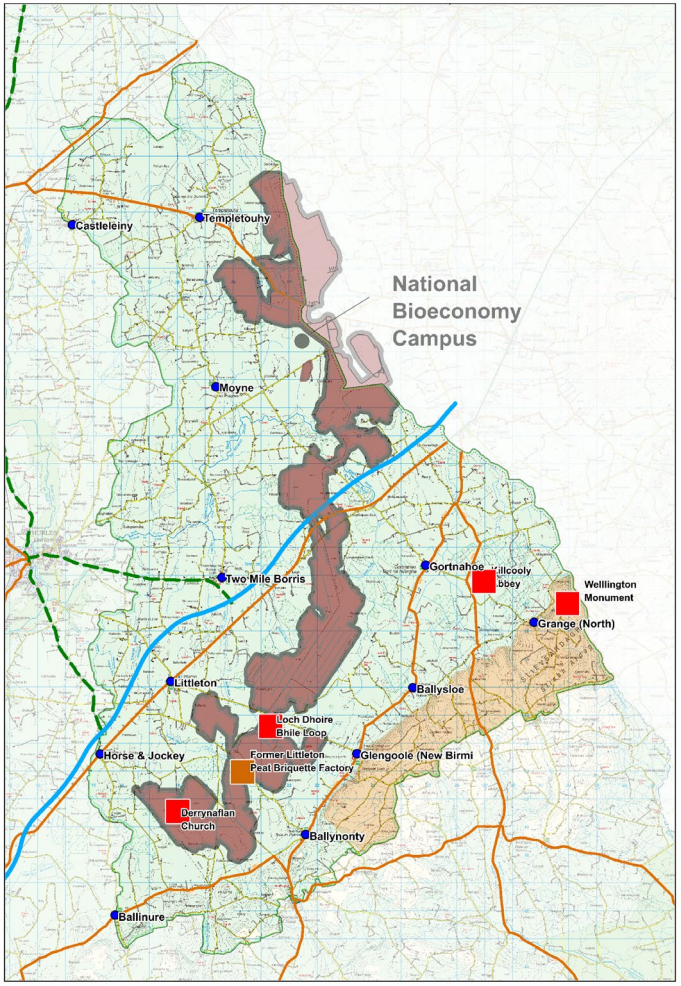
Grassland (or pastures) and peat bogs account for approximately 84% of the land area within the Mid-Tipperary DZ area. The figure is representative of the DZ's industrial past and current agricultural presence.

For Tipperary, nearly 11% of the workforce is employed in agriculture, forestry and fishing. This is more than double the national average and illustrates the importance of this sector to the county. Within the DZ, beef and dairy farming are the most common activities. Livestock farming is concentrated in the northern region of the DZ which has the highest numbers of livestock when compared to the surrounding Eds.

The LULUCF and agricultural sectors will play a vital role in transitioning the area from being a carbon source to a carbon sink. Tipperary County Council could explore opportunities to support farmers and the agriculture sector to better manage agricultural land to optimise carbon storage.

3.1 Characteristics of Mid-Tipperary DZ (cont..)

A visual representation of the key characteristics of the Mid-Tipperary DZ is shown below, outlining the areas villages and transport infrastructure. The map shows the location of the former peat briquette factory at Littleton, along with the extent of the Bord na Móna peatlands (Approx. 50 km^2). In addition, the National Bioeconomy and several points of cultural significance are also shown below.



3.2 Socio-Economic Context

Socio-economic development and decarbonisation are intricately linked, with social and economic activities impacting on carbon emissions

01

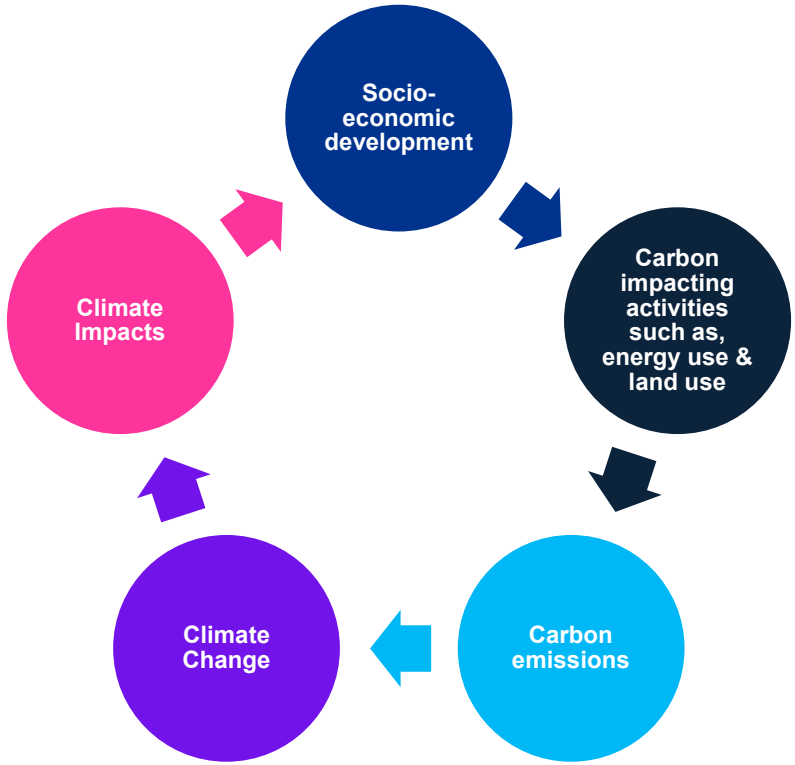
Socio-economic development and decarbonisation are intricately linked, with social and economic activities impacting on carbon emissions, for example, through energy use and land use. Carbon emissions contribute and influence the severity of climate change – climate change has a direct effect on socio-economic development, often contributing to and/or heightening various social issues.

02

Socio-economic factors including income, wealth, and industrialisation can contribute significantly to carbon emissions. Addressing these socio-economic factors as part of a holistic approach to decarbonisation and climate change action planning and decision making will result in effective solutions, supporting the shift to a more sustainable and just society.

03

The following pages focus on socio-economic factors including population and zoning associated with the DZ area. This overview is based on data from the 2016 CSO which is considered to be an appropriate proxy for activities in the baseline year of 2018.



3.3 Socio-Economic Overview

Socio-Economic Snapshot of the DZ area

The population of the Mid-Tipperary DZ area is 7,142. A 50% male: 50% female split in gender is seen in the demographics of the region.

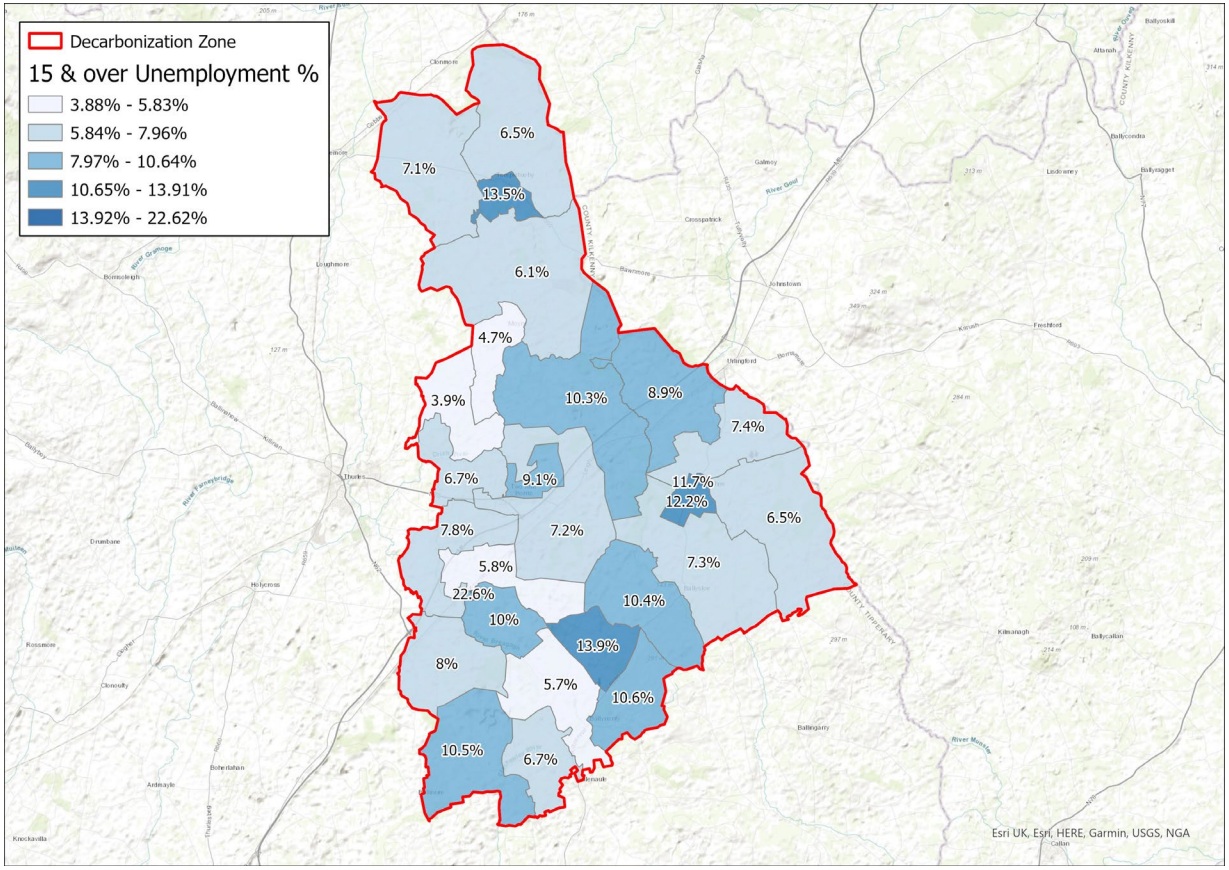
The largest age cohort was the 10-19 years age bracket, representing 15.7% of the population. The smallest cohort being 80+ years bracket, which accounted for 3.9%.

The nationality breakdown of the DZ area showed that 3.7% of the population was non-Irish. This was lower than the state average (c.13%). UK nationals formed the largest non-Irish cohort (c.2.4%).

The average household income within the study area was €41,651 which is 7% lower than the state average of €44,477. Employment rates in the study area (c.49.1%) were below the national average (c.53.4%).

The average unemployment rate within the study area was 8.9%, slightly higher than the state figure of 7.9%. Retired persons comprise 15.2% of the DZ area population.

The 2016 POBAL data points to most of the study area being 'Marginally below average', with some areas to the south, north and east noted as 'Disadvantaged'. The most affluent areas lie towards the northern half of the DZ but are still considered 'Marginally above average'.



Please note, depending on the data sources available, some information beyond the DZ boundary is included in the maps contained within this report.

3.4 Population

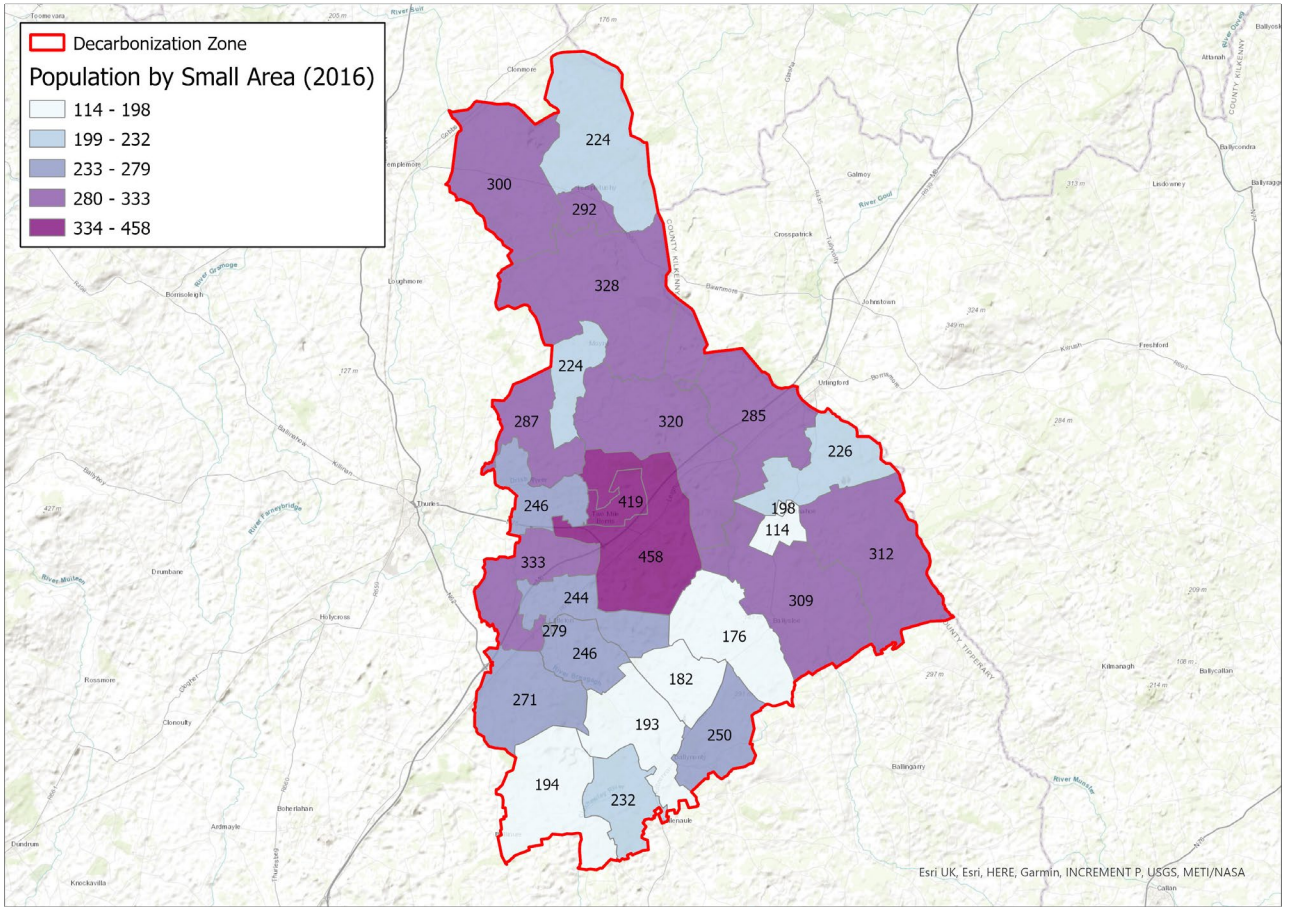
Population Density

- The highest population density within the Mid-Tipperary DZ is seen in the Central and North East sections.

- Central Statistics Office (CSO) data indicated that the average household size was 2.86 in 2016. This was slightly higher than the State average of 2.75. The proportion of single person households is very similar in the study area (c.23%) compared to the national average (c.24%).

- The average population density of the study area was c.23 people per km^2, while the average population per Small Area is c.265 persons.

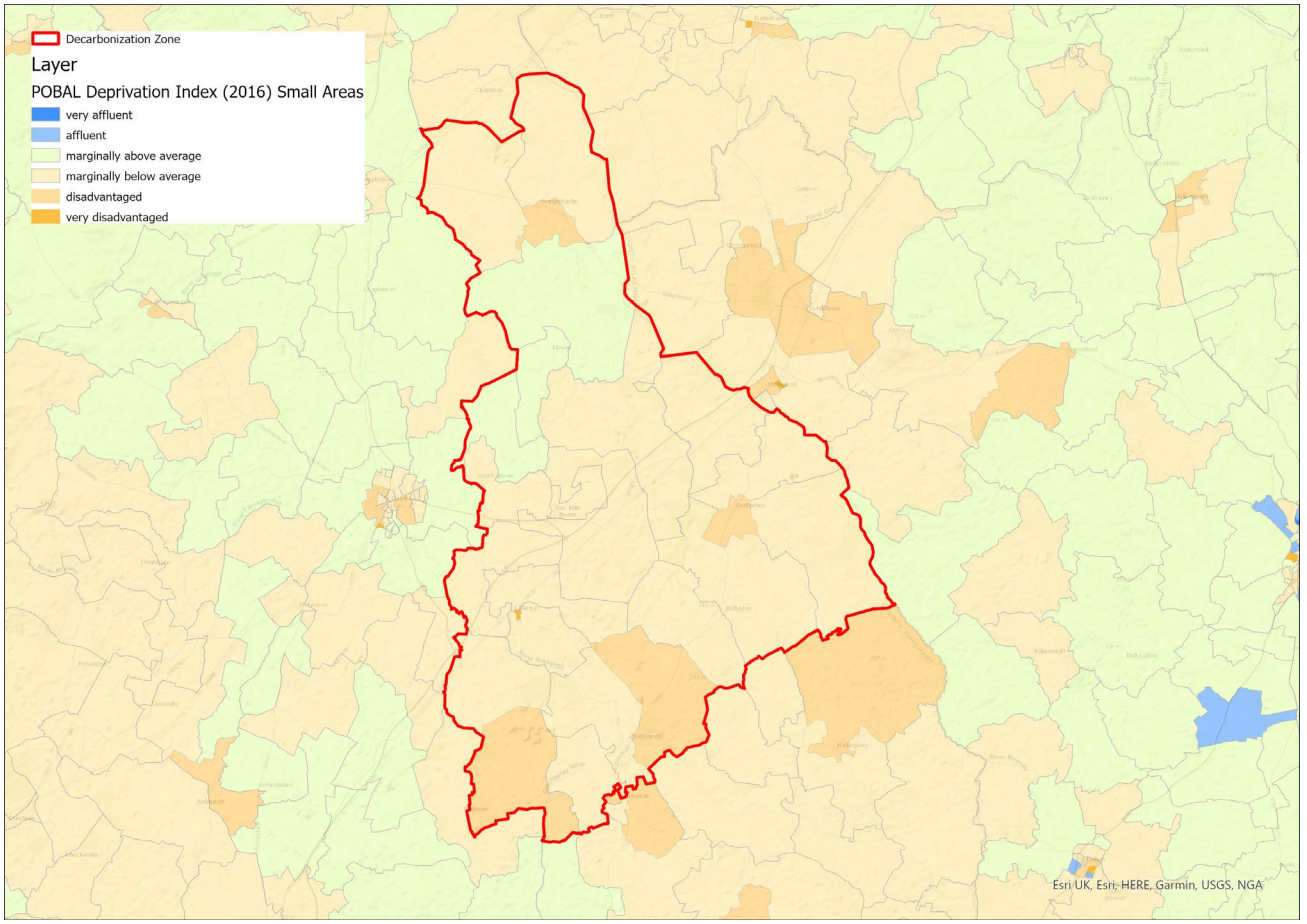
- Population density is a key decision-making consideration in decarbonisation and climate change action. For example, areas with higher population densities are more suited to certain renewable energy infrastructure projects such as district heating.



3.5 Deprivation

Socio- Economic Snapshot of the DZ area

- The Pobal Deprivation Index provides a measurement of the affluence or deprivation of a given area relative to the national mean at a specific point in time. By comparing the 'Deprivation Index' scores for a particular area at two different points in time, Pobal can assess whether an area has moved up or down in its position relative to the rest of the country.
- Knowledge and understanding of these areas of unemployment and deprivation is vital when planning for climate change action. Some socio-economic groups will need assistance and encouragement to adopt climate change and decarbonisation measures to combat influencing factors such as affordability, social isolation, and housing types.
- For example, while higher socio-economic groups may be able to afford home energy saving and efficiency initiatives such as smart technology, solar panels, these initiatives are likely unaffordable for some socio-economic groups.



3.6 Dwellings

Municipal Area Extent

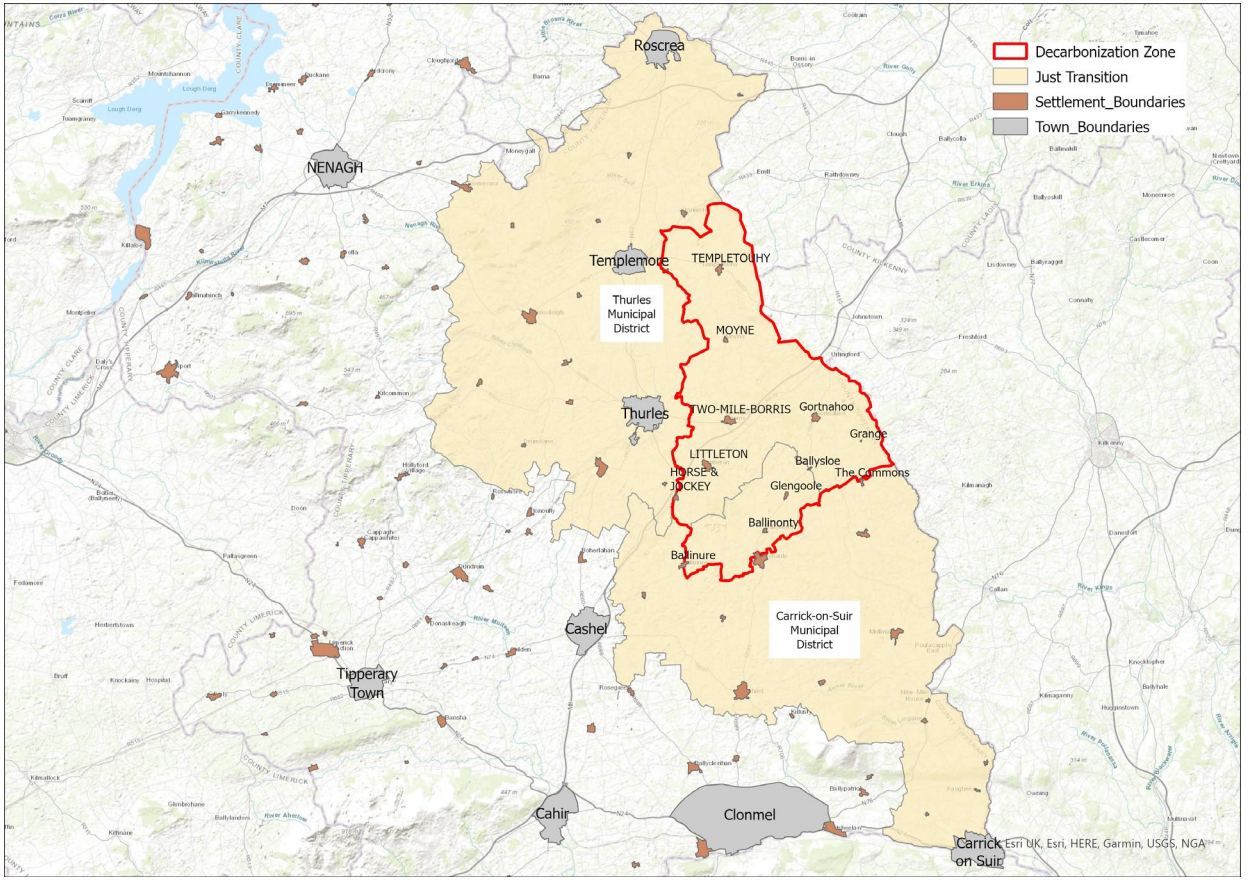
- The Tipperary DZ lies on the North-East side of County Tipperary, spread across the municipal districts of Thurles and Carrick-on-Suir. Templemore and Thurles lie just outside the DZ boundary on the west, while Carrick-on-Suir and the larger town of Clonmel lie further away towards the south.

- According to the CSO (2016) data, there are 3,262 occupied dwellings in the Mid-Tipperary DZ, with an additional 377 vacant dwellings.

- The average year of construction is 1970, with most of the houses (c.58%) having been built after 1970 of which c.22% were built in the 2000s. Around c.39% of the houses that were built prior to 1970 are likely to encounter issues with energy efficiency upgrades/retrofitting.

- The area also contains 347 social housing units which the local authority will have responsibility for retrofitting. These units could be used as a pilot scheme to show the medium to long term benefits of energy efficiency.

Average Year of Housing Stock*	
2000+	21.7%
1971-2000	36.6%
1919-1970	23.9%
Pre-1919	15%



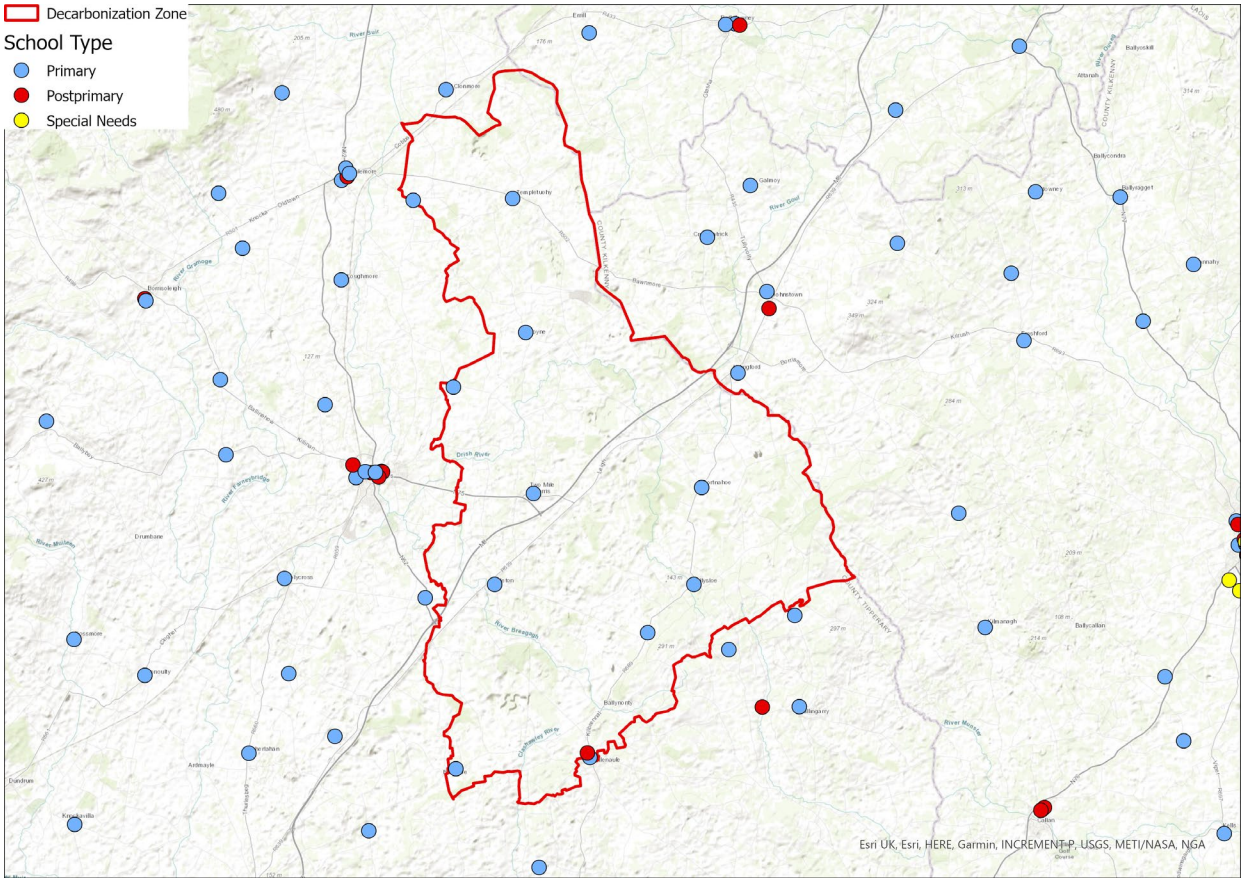
3.7 Education

Education snapshot of the DZ

- There are ten primary schools located within the DZ. There are no post-primary schools located within the DZ.

- According to the CSO (2016) data, ~57.9% of the DZ population have completed education up to leaving cert level.

- The CSO (2016) data also indicates that ~29.8% of the DZ's population aged 15 and over have completed a third-level degree (NFQ Level 6+).



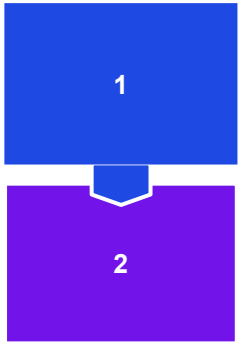
04

DZ BEI Tier 3 Assessment

4.1 BEI Assessment: Approach and Summary Results

4.1.1 Approach to BEI Assessment

This section of the report sets out the analysis of energy and carbon emissions associated with the main activities, and emissions sources, presented by sector, within the DZ area. Two steps have been undertaken to inform a robust understanding of the energy and carbon emissions within the DZ area, as summarised below:



A ‘top-down’ overview of carbon emissions within the DZ area, informed by data gathered from the Environmental Protection Agency’s (EPA) MapEire database, has been undertaken. This assessment allows for a ‘helicopter’ overview of the magnitude of emissions within the area and the sectoral hotspots. The purpose of this ‘top-down’ assessment is not to override the ‘bottom-up’ assessment outcomes, but rather to provide an additional layer of context to inform decision making. The results of this assessment are contained within **Appendix 5.9.**

This ‘top-down’ overview is followed by the **Tier 3** ‘Bottom-Up’ assessment approach, informed predominantly by spatial data and the use of geographical information systems (GIS) software and processes. This allows for the mapping of data and information within the DZ area, supporting effective communication and engagement with key internal and external stakeholders. The assessment also includes non-spatial data to support the analysis and future action planning.

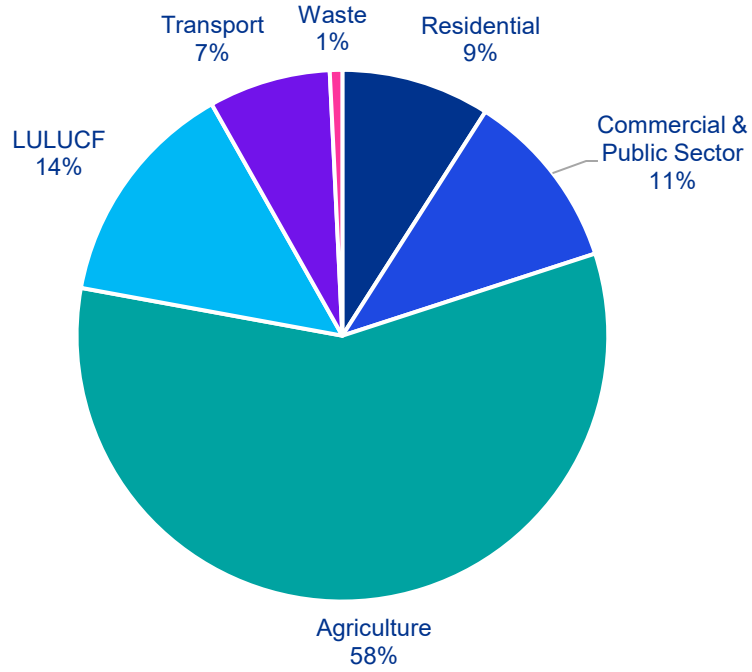
Although the Tier 3 approach can provide a more robust evidence base on which to inform the action planning, it relies heavily on the quantity, quality, and variety of the data available for analysis. As more datasets and methodologies are made available, BEIs will improve further and better equip local authorities in their decision making and action planning supporting decarbonisation and climate action.

A full list of data sources, assumptions & limitations are included within **Appendices 5.1 - 5.8**.

4.1.2 Summary Results

The results of the 'bottom-up' Tier 3 assessment are presented on the table and chart below. Total carbon emissions equate to approximately **229,862 tCO_2e (tonnes of carbon dioxide equivalent)*.** This translates to **32.18 tCO_2e per capita** based on 2016 census population data. In 2018, Ireland's national carbon emissions equated to approximately 12.6 tCO_2e per capita. While the DZ's carbon emissions per capita is higher than the national equivalent, Ireland is higher than the EU average of 8.2 tCO_2e per capita*. While the per capital emissions for the Mid-Tipperary DZ are higher than the national average, this can be attributed to the rural nature of the DZ, with sparse population for the land area and prominence of the agricultural activities in the region.

	Carbon emissions (tCO_2e)
Residential	20,820
Commercial & Public Sector	25,218
Transport	17,073
Waste	1,450
Agriculture	133,214
LULUCF	32,087
Total carbon emissions	**229,862**
Total carbon emissions per capita (tCO_2e/capita)	**32.18**



CO_2e is a unit of measurement that is used to standardise the climate effects of various greenhouse gases on the basis of their global-warming potential (GWP)

***Source: https://www.cso.ie/en/releasesandpublications/ep/p-eii/environmentalindicatorsireland2020/greenhousegasesandclimatechange/#:~:text=In%202018%2C%20Ireland%20had%20the,EU28%20average%20of%208.2%20tonnes.*

4.2 BEI Assessment: Detailed Results

4.2.1 Residential sector

4.2.1.1 Residential Sector Overview

Overview of the Residential Sector

Ireland's domestic properties face a significant decarbonisation challenge. Our housing stock is one of the least energy efficient within the EU while our heating systems have a particularly low level of renewables in the energy mix – the SEAI have indicated that fossil fuels are used as the heat source in 73% of dwellings. The ongoing cost of the energy crisis has highlighted Ireland's dependence on imported fossil fuels (these provide approximately 75% of our home heating), leaving Irish households highly vulnerable to global energy prices.

The residential sector accounted for approximately 10% of Ireland's carbon emissions in the baseline year of 2018 with similar levels seen in the latest reported figures. To achieve Ireland's climate goals, the sector is required to reduce its emissions by 40% by 2030 (compared to a 2018 baseline).

CAP 2023 sets out a number of actions and targets for the residential sector to meet its overarching goal, including:

- All new dwellings designed and constructed to Nearly Zero Energy Building (NZEB) standard by 2025 and Zero Emission Building (ZEB) standard by 2030;
- Equivalent of 120,000 dwellings retrofitted to BER B2 or cost optimal equivalent by 2025, and 500,000 dwellings by 2030;
- Up to 0.8 TWh of district heating installed capacity by 2025, and up to 2.5 TWh by 2030;
- 170,000 new dwellings using heat pumps by 2025, and 280,000 by 2030;
- 45,000 existing dwellings using heat pumps by 2025, and 400,000 by 2030;
- Up to 0.4 TWh of heating provided by renewable gas by 2025, and up to 0.7 TWh by 2030.

To achieve theses highly ambitious targets, the DZ area must significantly reduce its use of fossil fuels, including, coal, peat and oil, and increase dependence on renewables and electricity, to heat existing residential buildings while also optimising and enabling energy efficiency. Retrofit activity must be supported to underpin this reduction, with resulting benefits for homeowners in terms of efficiency, comfort, and health and wellbeing.

The Tipperary County Development Plan 2022-2028 sets out a myriad of guidelines to assist the DZ on its journey to significantly reduce the fossil fuels within the residential sector. The most notable for the residential sector is the Rural Housing Design Guide, where the objective of these guidelines is to produce high-quality sustainable developments using a spatial planning framework.

The following sections present an overview of the residential sector related activities, energy and emissions within the DZ area. Further detail on data sources, assumptions and limitations is included within **Appendix 5.2.**

4.2.1.2 Residential Summary Results

The results of the residential sector assessment are presented in the table and chart below. Note that, for the purposes of this assessment, 'occupied' residential homes have been focussed on. These account for the majority of residential homes in the DZ area.

Total energy consumption of the sector equates to **72,989 MWh**. The associated carbon emissions of the sector equate to approximately **20,820 tCO_2e**. The 464 dwellings built during the period 'Pre 1919' within the DZ account for ~32% of both the sector's total energy consumption and carbon emissions. Whereas, the 396 dwellings built during the '2001-2005' built period within the DZ account for ~14% of total residential and carbon emissions.

	Energy Consumption (MWh/ year)	Carbon emissions (tCO_2e)
Pre 1919	23,387	6,699
1919-1970	11,257	3,204
1971-1990	8,970	2,556
1991-2000	6,154	1,751
2001-2005	10,313	2,941
2006-2011	7,131	2,036
2012 onwards	5,777	1,633
Total	**72,989**	**20,820**

Further supporting information on the residential sector can be found in Appendix 5.2.

4.2.1.3 Residential Sector Analysis

Residential Sector: Age of Housing Stock

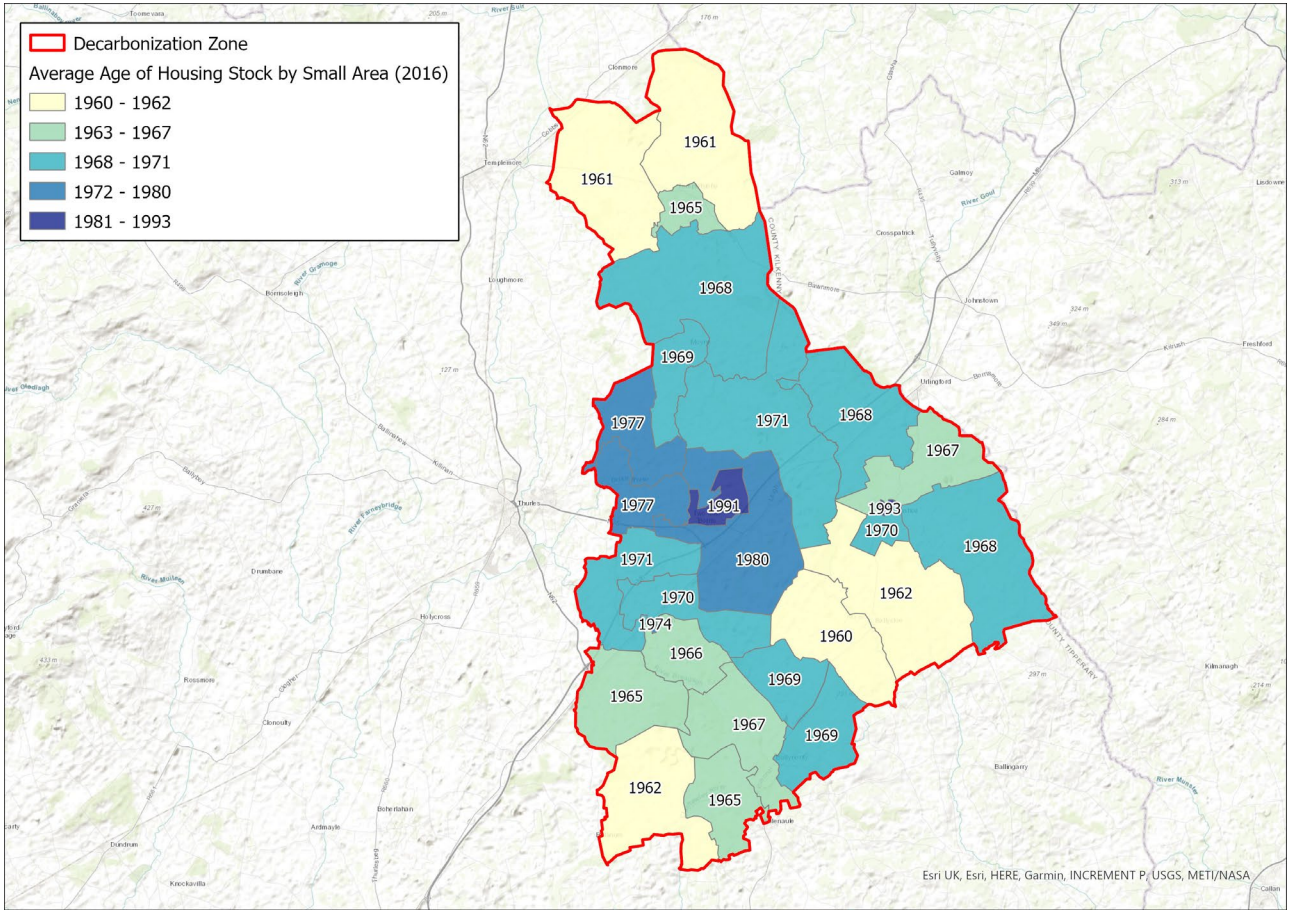
- The age of housing stock in an area has a strong correlation with energy efficiency, consumption and demand, including this DZ area. Energy use is a proxy for carbon emissions and therefore, in general, older housing stock may mean higher carbon emissions.

- Age of construction of residential housing stock ranges from pre-1919 to 2018. The average year of construction is 1970, with approximately 58% of the housing stock being built since 1970. Approximately 39% of the residential units have been built pre-1970s. This is summarised on the table below.

- The map on the right provides an overview of the average year of construction of residential housing stock within each SA. This is based on the average year of construction of the housing stock combined with the frequency of each residential housing stock to estimate average construction year by SA.

- Focussing on the more populated village of Two-Mile-Borris in the centre, there is a similar trend – the average housing stock for the small areas is dated at the older end of the stock (~1960-70s), whereas the younger housing stock is in the immediate perimeter of the village centre (particularly the west and south) before aging again into more rural areas.

- As the DZ area includes relatively older housing including in the most populated area of Two-Mile-Borris village, it is likely that energy efficiency is low and energy demand and consumption is high, leading to higher carbon emissions.



Note: *The figures in the map included above have been derived from CSO SA data. This data has been broken out into various bands e.g., 1948-1956. The average of these bands and their frequency within each SA are used to find the average year of the residential housing stock in the SA.*

Average Year of Housing Stock*	
2000+	21.7%
1971-2000	36.6%
1919-1970	23.9%
Pre 1919	15%

Further supporting information on the residential sector can be found in Appendix 5.2.

4.2.1.3 Residential Sector Analysis (cont..)

Residential Sector: Energy Efficiency & BER rating

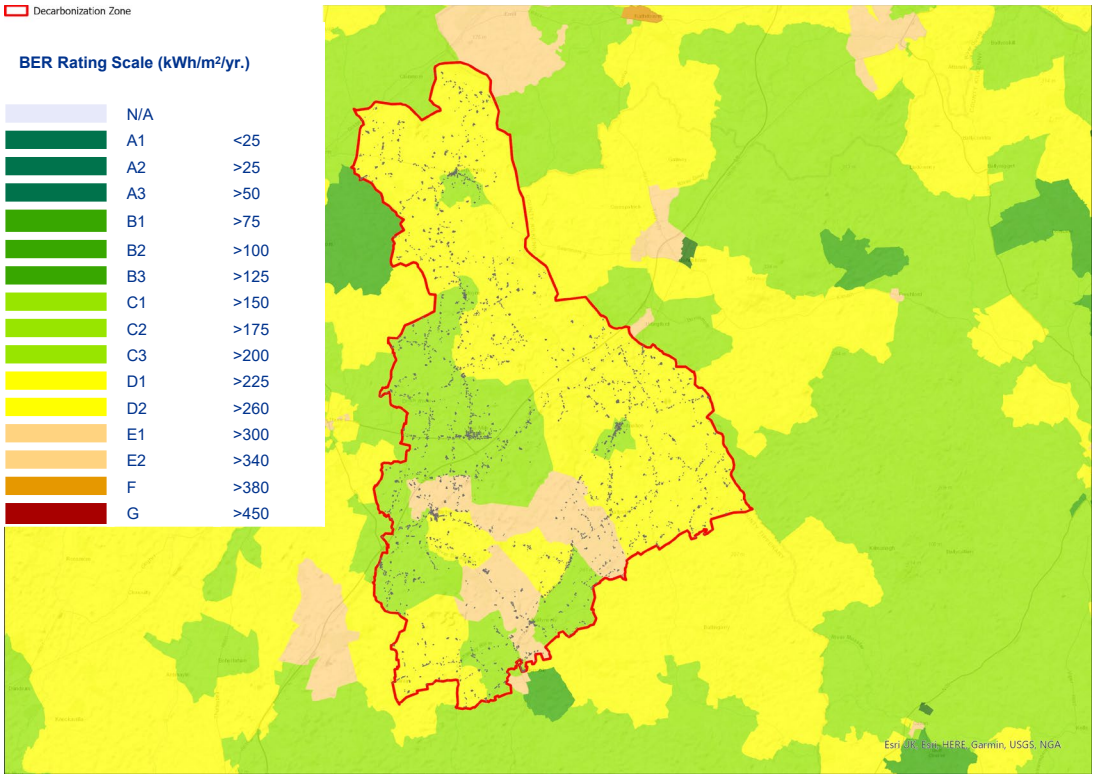
- A Building Energy Rating (BER) Certificate supports the understanding of the energy efficiency of a home. It is a helpful indicator for the likely energy consumption of a home and its associated carbon emissions. It uses a scale of A to G, with A-rated homes being the most energy-efficient and comfortable and G-rated homes the least energy efficient.

- BER ratings in the Mid-Tipperary DZ area range from C1 rated buildings to E2.. The map on the right presents the range of BER ratings across the DZ area; with the west of the DZ rating better than the north and east. The south presented the most varied BER ratings. Note that these BER ratings are average ratings.

- The table below sets out the average BER rating by residential type.

- Note that residential BER ratings are only available for a limited number of residential dwellings.

- Energy efficiency opportunities should be explored, including the use of heat pumps and other renewable energy sources to support the decarbonisation of the DZ area as well as to contribute to wider national energy and climate targets.



Average BER rating by residential building type

	Residential building type			
Unit: kWh/m2/year	Apartment	Terraced	Semi detached	Detached
Average BER	368	233	224	279

Further supporting information on the residential sector can be found in Appendix 5.2.

4.2.1.3 Residential Sector Analysis (cont..)

Residential Sector: Energy Consumption & Heat Demand

- Heat demand maps allow users to explore Ireland's heating and cooling demands. Heat mapping describes the spatial disaggregation of national heat demand into smaller geographic areas. This disaggregation is based on the characteristics of the buildings within each area and include:

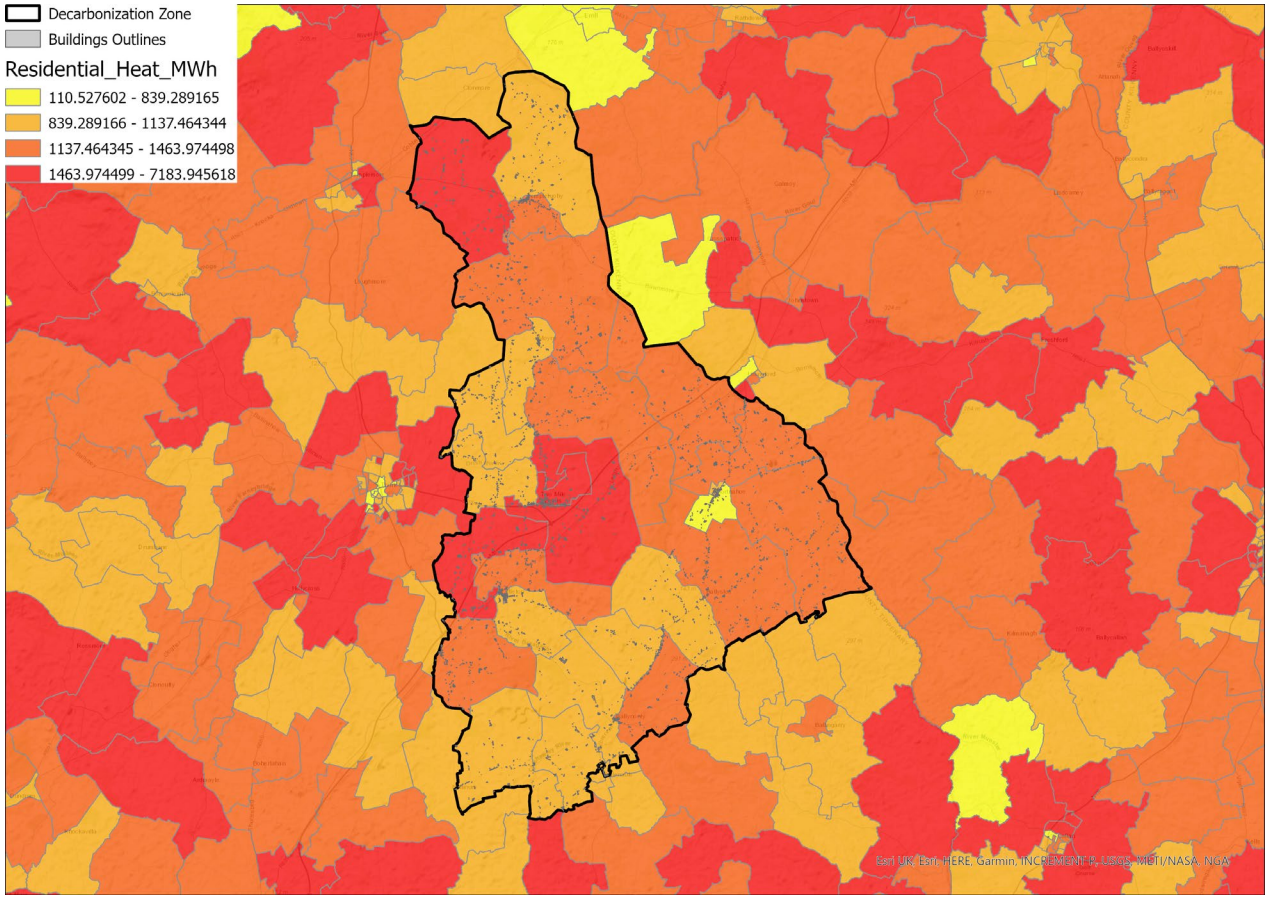
Building type (a residential dwelling, a commercial or public sector building or an industrial site)

Type of fuel used to generate the heat

Other metrics such as the area of buildings, and current and planned energy efficiency measures

- Heat demand in the Mid-Tipperary DZ follows a similar pattern across the EDs, with relatively high heat demand observed in the majority of the DZ area. Areas of high heat demand should be prioritised with targeted actions implemented to reduce this demand. The map on the right provides a visual representation of heat demand per m^2 of the DZ area.

- Heat demand is further explored in the Energy & Electricity Sector section.



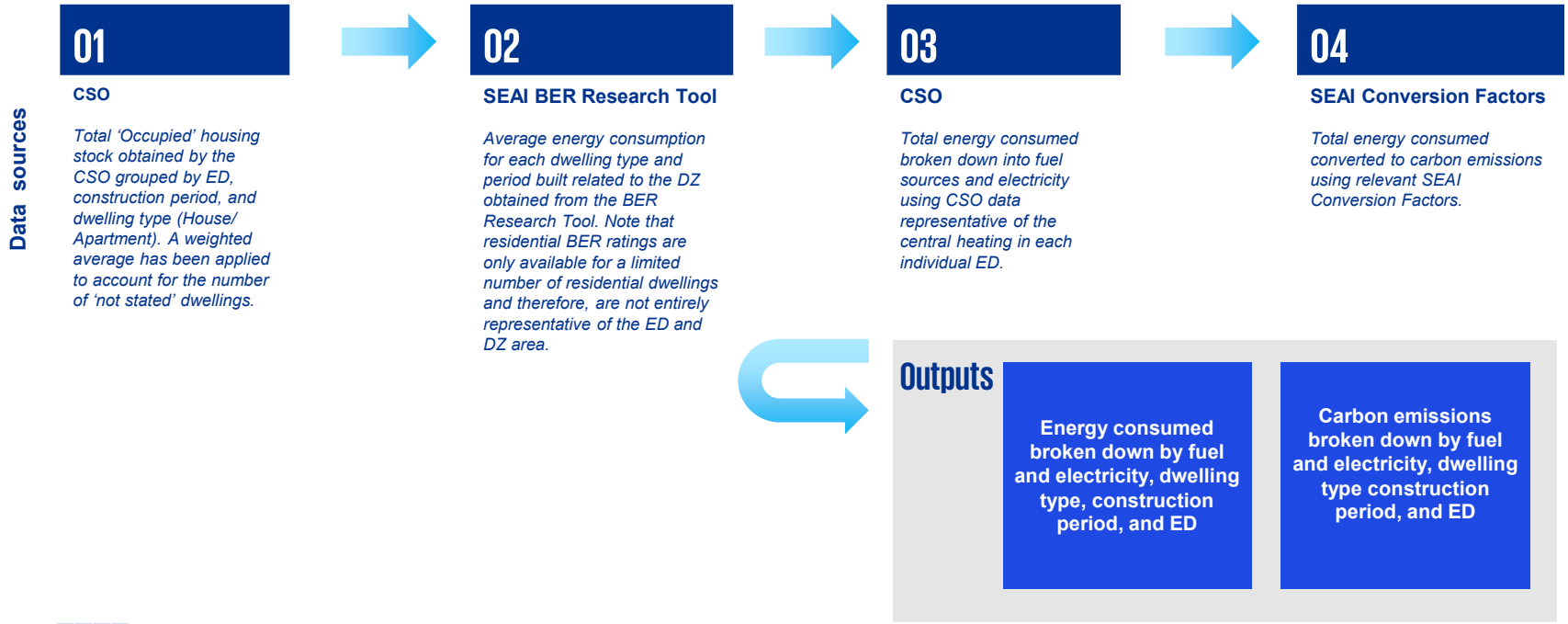
Further supporting information on the residential sector can be found in Appendix 5.2.

4.2.1.3 Residential Sector Analysis (cont..)

Residential Sector: Energy & Carbon Emissions

To estimate residential sector energy consumption and associated carbon emissions within the DZ area, a number of non-spatial data points have been used. 'Occupied' homes, as defined by the 2016 CSO database, account for the majority of residential homes in the DZ area, at 85.7%. These 'Occupied' homes are included in the assessment. 'Other vacant dwellings' (9.9%), 'temporarily absent' (1.6%), and 'unoccupied holiday homes' (1.0%) account for the remaining ~15% of residential stock – these are excluded from the assessment. An overview of the approach used is outlined below with results of the assessment on the following pages.

Further information on data sources, assumptions and limitations is included within **Appendices 5.2.1 - 5.2.2**



4.2.1.3 Residential Sector Analysis (cont..)

Residential Sector: Occupied Dwellings: Energy & Carbon Emissions

Total residential sector energy consumption and associated carbon emissions of 'Occupied' homes within the DZ area is presented by energy split below. Note that as a result of the no available BER total delivered energy data for 'apartments' within the DZ, residential energy consumption and carbon emissions have been presented as 'all dwellings' have been not been split out into 'houses' and 'apartments'. The individual energy split of each ED has been applied to the total energy consumption across all households within each of the EDs.

Further information on the ED's energy spits is included within **Appendix.5.2.4.**

	Energy Source	Coal	Peat	Oil	LPG	Natural Gas	Renewables	Electricity	Wood	Total
Energy consumption (MWh)	All dwellings	6,284	14,994	46,467	220	131	582	1,354	2,957	72,989
Carbon emissions (tCO_2e)	All dwellings	2,140	5,336	12,713	50	27	-	508	545	20,820

4.2.1.3 Residential Sector Analysis (cont..)

Residential Sector: Occupied Dwellings: Energy & Carbon Emissions

Total residential sector energy consumption and associated carbon emissions within the Mid-Tipperary DZ is presented by ED below. A visual representation of energy and emissions across the DZ area is presented on the following page.

ED	Energy Consumption (MWh)
BALLYMURREEN	2,850
BUOLICK	6,831
FENNOR	5,850
GRAYSTOWN	4,405
KILCOOLY	3,243
KILLENAULE	10,180
LITTLETON	9,228
LONGFORDPASS	2,166
MOYNE	4,429
NEW BIRMINGHAM	3,799
POYNTSTOWN	1,973
RAHELTY	5,235
TEMPLETOUHY	8,028
TWO-MILE-BORRIS	4,774
Total	**72,989**

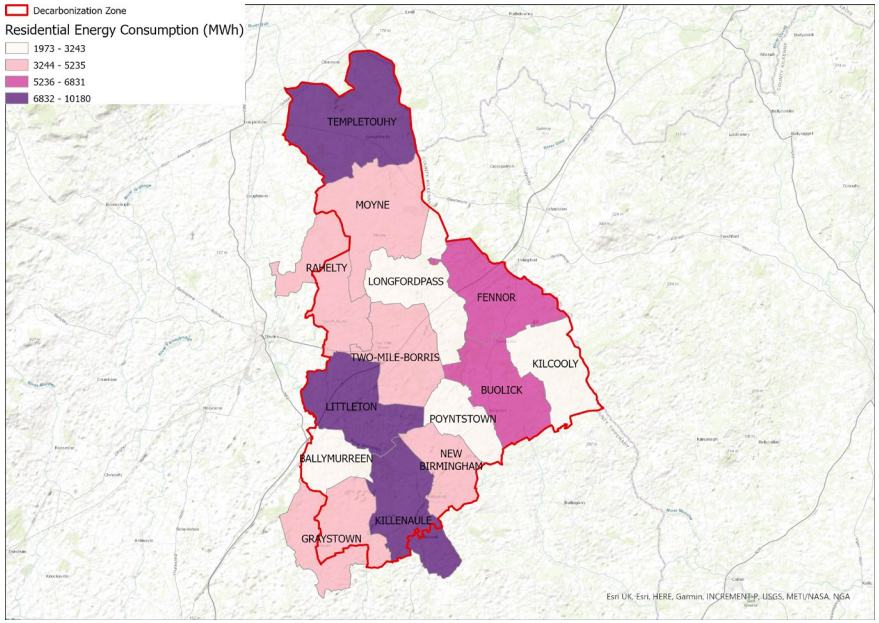
ED	Carbon emissions (tCO_2e)
BALLYMURREEN	792
BUOLICK	1,949
FENNOR	1,669
GRAYSTOWN	1,231
KILCOOLY	859
KILLENAULE	2,889
LITTLETON	2,643
LONGFORDPASS	631
MOYNE	1,270
NEW BIRMINGHAM	1,082
POYNTSTOWN	580
RAHELTY	1,443
TEMPLETOUHY	2,428
TWO-MILE-BORRIS	1,354
Total	**20,820**

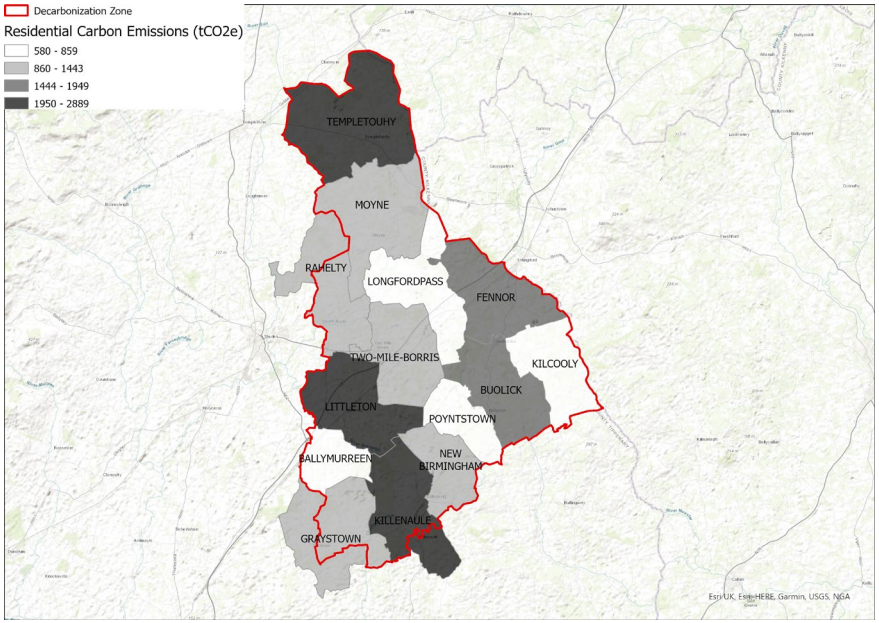
Further supporting information on the residential sector can be found in Appendix 5.2.

4.2.1.3 Residential Sector Analysis (cont..)

Residential Sector: Occupied Dwellings: Energy & Carbon Emissions

A visual representation of total residential sector energy consumption and associated carbon emissions within the Mid-Tipperary DZ is presented by ED below.



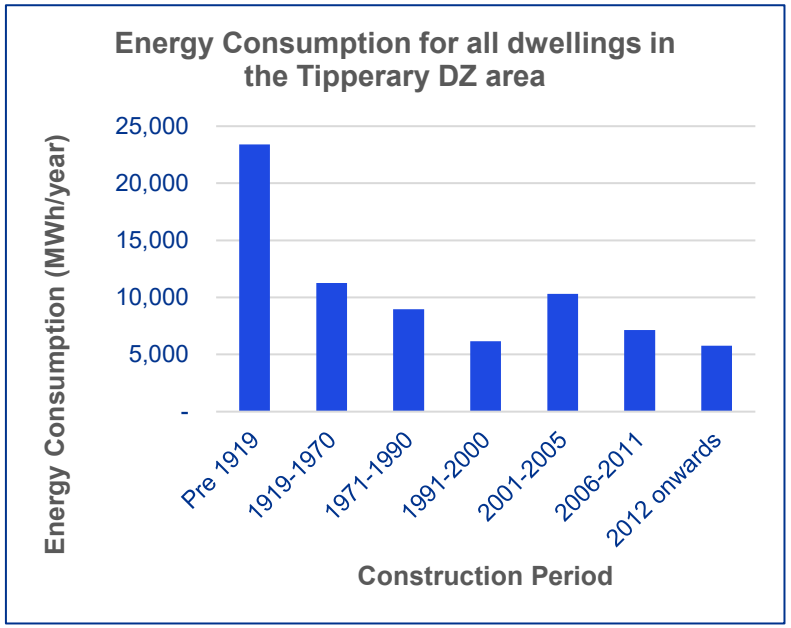


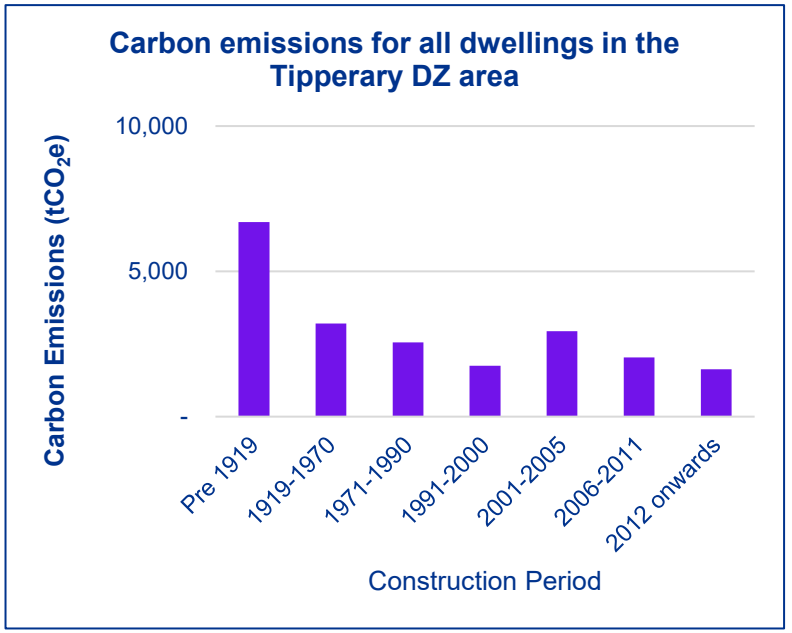
Further supporting information on the residential sector can be found in Appendix 5.2.

4.2.1.3 Residential Sector Analysis (cont..)

Residential Sector: Occupied Dwellings: Energy & Carbon Emissions

Total residential sector energy consumption and associated carbon emissions within the Mid-Tipperary DZ area is presented by construction period for all dwellings below. Although only approximately ~15.8% of all dwellings were constructed during the 'Pre 1919' construction period, these dwellings account for 32% of total energy consumption and ~32% of total carbon emissions. The older building fabric of these dwelling leading to lower energy efficiency likely result in their high energy consumption and carbon emissions.





Further supporting information on the residential sector can be found in Appendix 5.2.

4.2.1.3 Residential Sector Analysis (cont..)

Residential Sector: Social Housing: Energy & Carbon Emissions

Social housing (within the residential sector) energy consumption and associated carbon emissions within the DZ area has also been included in our analysis using a number of non-spatial data points to inform the assessment. Total number of social housing units has been provided by Tipperary County Council to understand energy consumption and carbon emissions associated with social housing units, Step 2-4 outlined in Section 4.2.3.6 has been applied. Further information on data sources and methodology is included within **Appendix 5.2.**

The table below sets out the average BER rating for social housing units by dwelling type. Note that BER ratings are only available for a limited number of social housing units and therefore, are not entirely representative of social housing in the ED and DZ area.

	Energy consumption (MWh)
Energy source	Social Housing units
Coal	525
Peat	1,478
Oil	4,577
LPG	23
Natural Gas	16
Renewables	53
Electricity	134
Wood	298
Total	**7,042**

	Carbon emissions (tCO_2e)
Energy source	Social Housing units
Coal	179
Peat	526
Oil	1,252
LPG	5
Natural Gas	3
Renewables	-
Electricity	50
Wood	4
Total	**2,021**

Average BER rating by residential building type

	Average BER
Residential building type	Unit: kWh/m2/year
Apartment	-
Terraced	210
Semi-detached	249
Detached	279

The social housing units in the DZ area account for approximately 11.8% of the total residential stock. When compared to the entire DZ area, the social housing units account for approximately 9.6% of total residential energy consumption and 9.7% of total residential carbon emissions. These findings suggest that the number of social housing units is proportional to its energy consumption and carbon emissions.

4.2.2 Commercial & Public Sector

4.2.2.1 Commercial & Public Sector Overview

Overview of the commercial & public sector

- The built environment comprises the residential, commercial and public sectors, of which the commercial and public sector account for approximately 2% of Ireland's carbon emissions in the baseline year of 2018. The emissions from commercial and public sectors are typically from fuel combustion for space and hot water heating in commercial and public/institutional buildings in Ireland. Emissions from commercial services and public services decreased by 3.0% and 3.8% respectively in 2021 compared to 2020 emissions due to a decrease in natural gas use.

- The sector is required to reduce its emissions by 45% by 2030, compared to the 2018 baseline. Actions and targets to support the achievement of this target are set out in the CAP 2023 and include:
  - decarbonising heating in commercial and public buildings;
  - determining optimum management of property portfolios for decarbonisation;
  - installing rooftop solar PV (e.g. in schools);
  - retrofitting buildings owned by public bodies;
  - promoting and supporting building automation and control optimisation and smart building technologies to increase energy efficiency and monitoring;
  - upgrading existing building energy management systems to high-efficiency and zero-carbon equivalents.

- To achieve this ambitious target, the use of all fossil fuels (coal, natural gas, oil, and peat) to heat our buildings must be reduced and the support for a major expansion in retrofit activity must be realised. The challenge facing the commercial and public sector is that its existing buildings will require the most effort to decarbonise. Technologies such as heat pumps in the residential sector are also suitable for commercial buildings and the scaling-up in deployment of solutions such as district heating and renewable gases will also benefit commercial and public buildings – these will be important levers for the DZ area to consider. This chapter explores the various factors impacting the decarbonisation of commercial and public sector buildings, whilst also considering the constraints associated with protected buildings.

- As outlined in the Tipperary County Development Plan 2022-2028, several towns and villages throughout Tipperary have vacant properties in their central areas, which present opportunities for reuse and redevelopment as new homes and businesses. The Council aims to encourage, through collaboration and support, for example, through the Commercial Vacancy Incentive Scheme, and through legal mechanisms, where appropriate, the maintenance and active use of town/village centre buildings, and the reduction in the number of properties registered as derelict or dangerous. This reduces the level of inefficient building use throughout the county. Furthermore, the Development plan can support the DZ by introducing green spaces and buildings, alongside the investment into natural and indigenous planting and landscaping in urban areas, as per the recommendations of the All Ireland Pollinator Plan

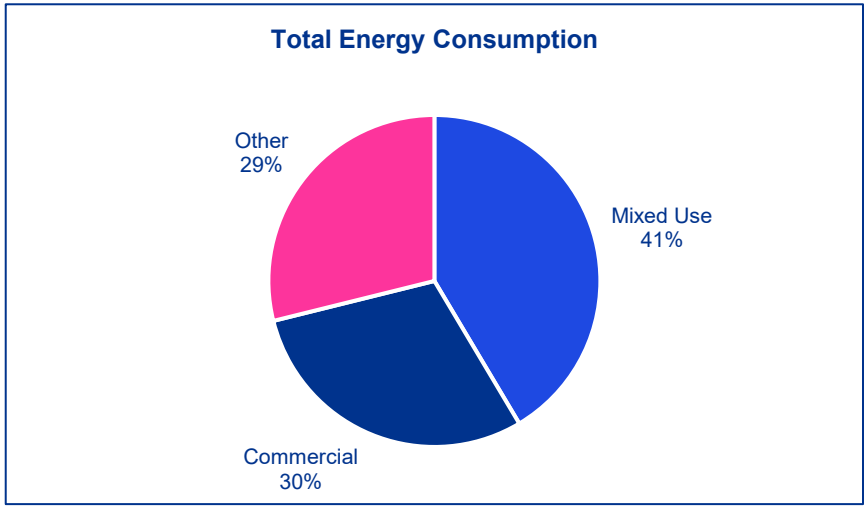
4.2.2.2 Commercial & Public Sector Summary Results

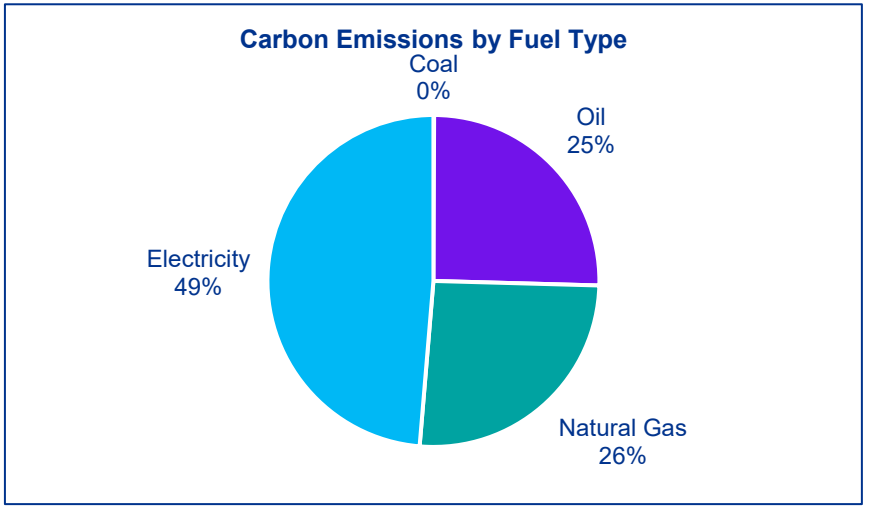
The results of the commercial and public sector assessment are presented in the table and chart below. Note that, for the purposes of this assessment, commercial and public sector buildings have been sub-categorised into 'mixed use', 'commercial' and 'other', as per the OSI dataset from which they are derived from. Further detail on the types of buildings contained within these categories are provided in the pages that follow. These account for the majority of commercial and public sector buildings in the DZ area.

Total energy consumption of the sector equates to **91,792 MWh**. The associated carbon emissions of the sector equate to approximately **25,196 tCO_2e**. The 791 commercial buildings within the DZ primarily rely upon electricity as their primary fuel source. Electricity is used to power 49% of commercial buildings in the DZ.

Building type	Total energy use (MWh)	Total carbon emissions (tCO_2e)
Mixed Use	38,097	10,611
Commercial	27,242	7,328
Other	26,532	7,279
Total	**91,870**	**25,218**

Energy source	Carbon emissions (tCO_2e)
Coal	17
Oil	6,397
Natural Gas	6,530
Electricity	12,274
Total	**25,218**





4.2.2.3 Commercial & Public Sector Analysis

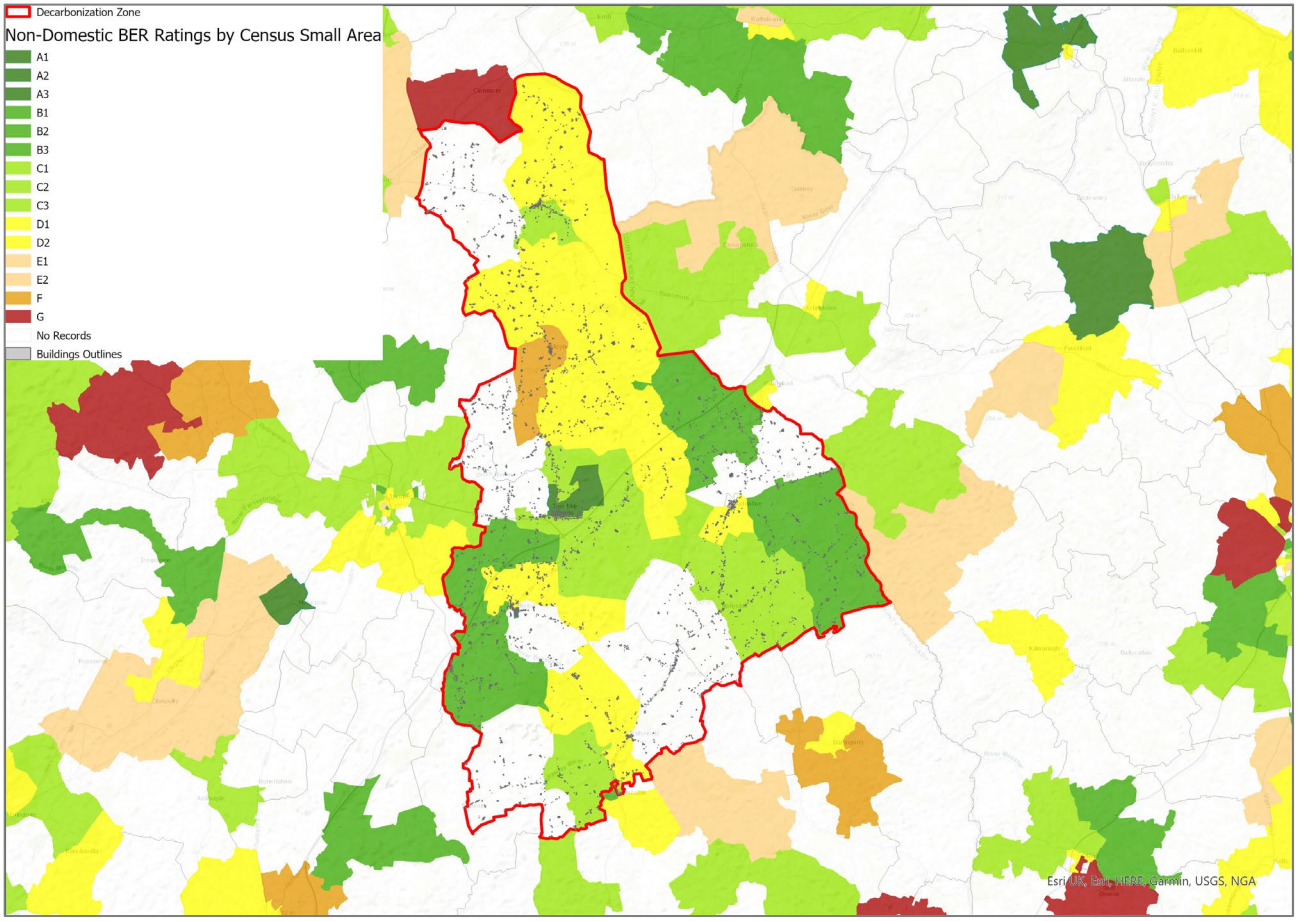
Commercial & Public Sector: Energy Efficiency & BER Rating

- A Building Energy Rating (BER) Certificate supports the understanding of the energy efficiency of buildings. It is a helpful indicator for the likely energy consumption and its associated carbon emissions in commercial and public settings. Similar to the residential sector, it uses a scale of A to G, with A-rated homes being the most energy-efficient and comfortable and G-rated homes the least energy efficient.

- Average BER ratings in the Mid-Tipperary DZ area range from A1 rated buildings to G. The map on the right presents the range of BER ratings across the DZ area. Buildings in the west, middle and east rank best with a range from A1 to D2. with the very north of the DZ ranking poorly with a range of D1 to G. Note that these BER ratings are average ratings.

- Note that BER ratings are only available for a limited number of commercial & public sector buildings.

- Energy efficiency opportunities should be explored, including the use of heat pumps and other renewable energy sources to support the decarbonisation of the DZ area as well as to contribute to wider national energy and climate targets.



4.2.2.3 Commercial & Public Sector Analysis (cont..)

Commercial & Public Sector: Energy Consumption & Heat Demand

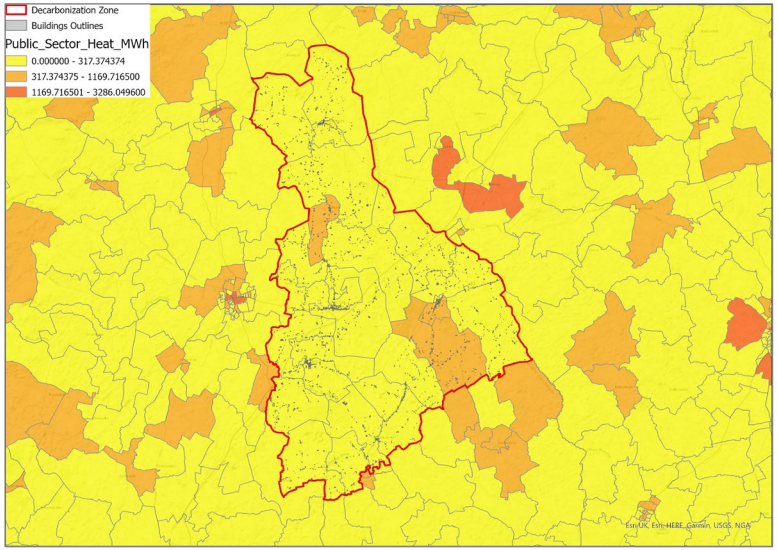
Heat demand maps allow users to explore Ireland's heating and cooling demands. Heat mapping describes the spatial disaggregation of national heat demand into smaller geographic areas. This disaggregation is based on the characteristics of the buildings within each area and include:

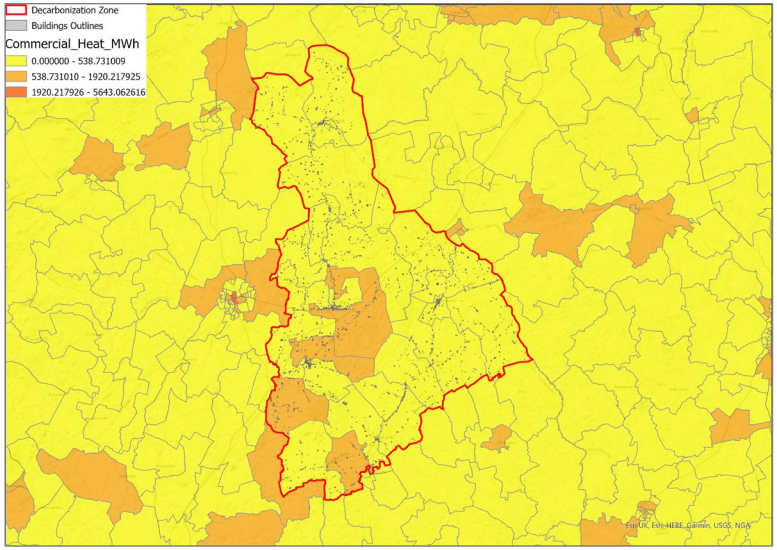
- Building type (a residential dwelling, a commercial or public sector building or industrial site),
- The type of fuel used to generate the heat,
- Other metrics such as the area of the buildings, and current planned energy efficiency measures

- Heat demand in the DZ area follow a similar pattern across the EDs, with higher heat demand observed in two Eds (Buolick and Rahelty) within the Mid-Tipperary DZ for public sector heat demand. Commercial heat demand followed similar trends; with three EDs (Two-Mile-Borris, Killenuale, and Ballymureen) having been observed to produce more heat demand – these areas should be considered and prioritised with targeted actions to reduce this demand.

- The maps provided here provide a visualisation of heat demand across the DZ area.

- Heat demand is further explored in the Energy & Electricity Sector section.

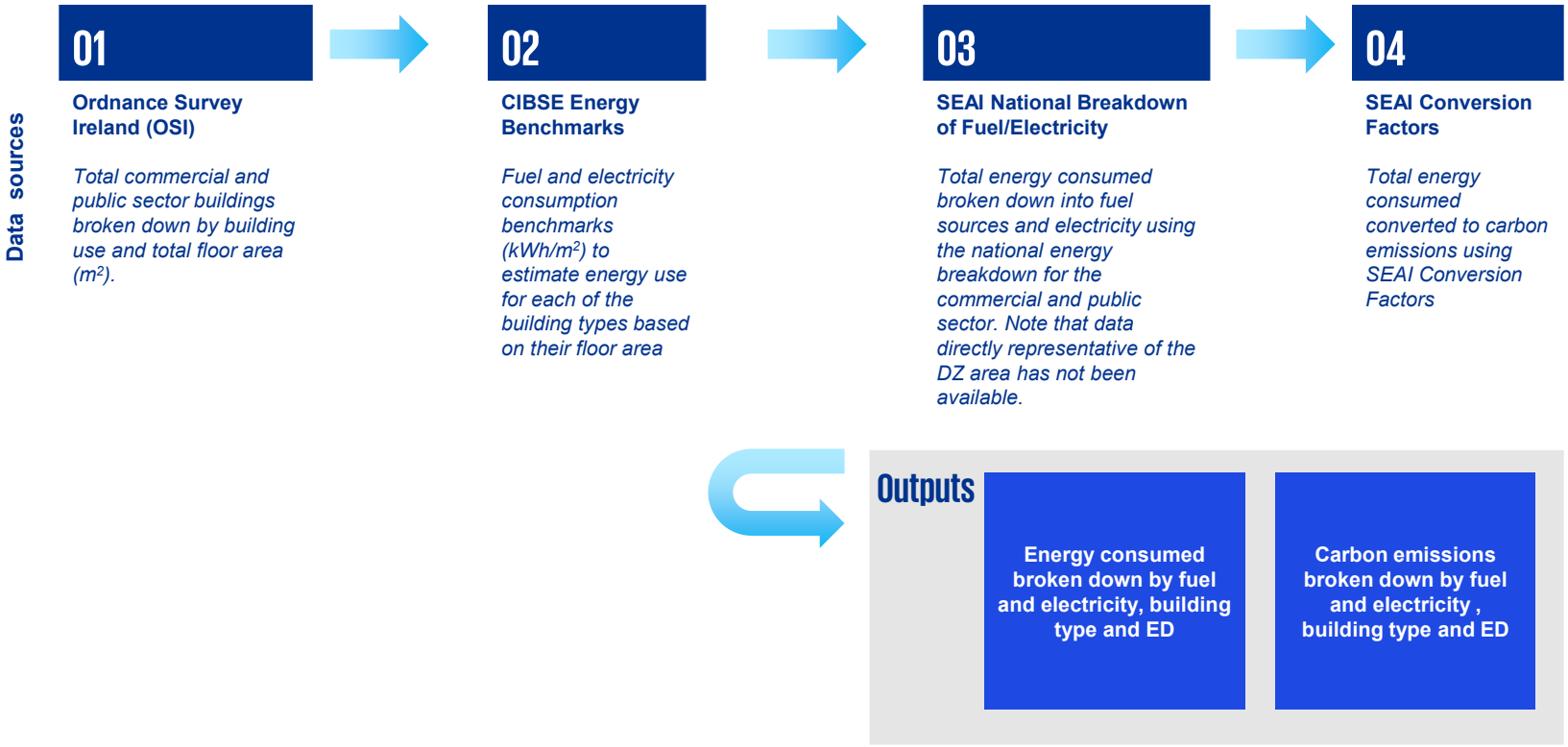




4.2.2.3 Commercial & Public Sector Analysis (cont..)

Commercial & Public Sector: Energy & Carbon Emissions

To estimate commercial and public sector energy consumption and associated carbon emissions within the DZ area, a number of non-spatial data points have been used. An overview of the approach used is outlined below. Further information on data sources, assumptions and limitations is included within **Appendices 5.3.1 - 5.3.2**.



4.2.2.3 Commercial & Public Sector Analysis (cont..)

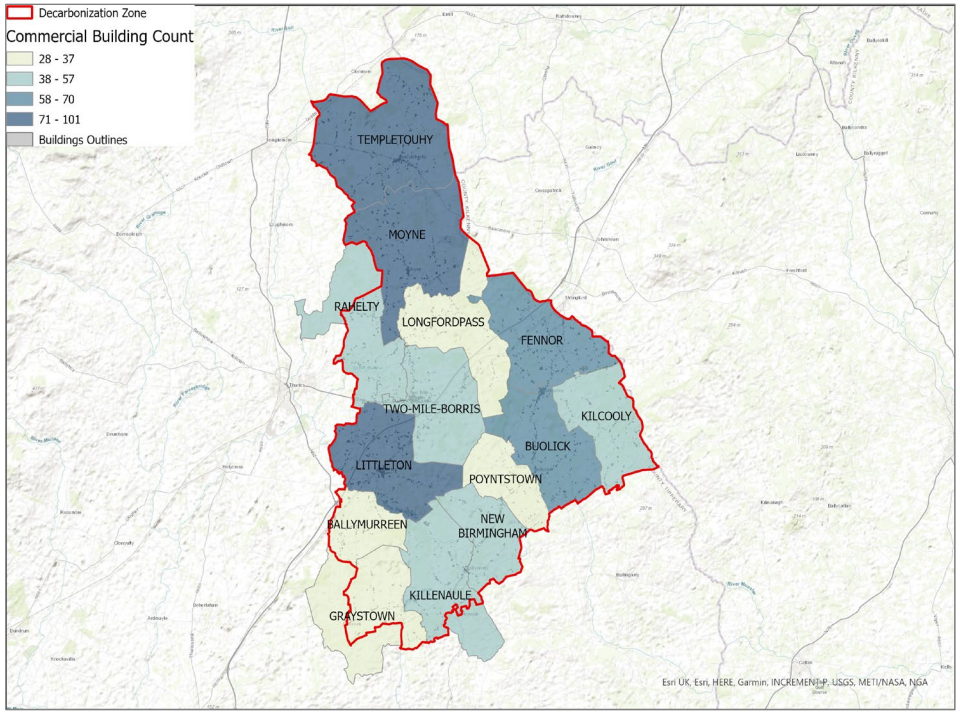
Commercial & Public Sector: Buildings Number & Locations

Commercial and public sector building types are shown in the table and map below. Both the table and map provide a breakdown of building types by ED. The largest number of commercial and public sector buildings are located in the Littleton, Templetouhy and Moyne EDs.

The table below breaks commercial and public sector building types into three categories: 'Mixed Use', 'Commercial' and 'Other'. The 'Mixed Use' category refers to building types including public houses, post offices, and mixed use. The 'Commercial' category refers to building types including factories, garages and industrial facilities. The 'Other' category refers to building types including churches, garda stations and stables.

Further information on data sources, assumptions and limitations is included within **Appendices 5.3.3 – 5.3.5**.

	Building Type			
ED	**Other**	**Mixed Use**	**Commercial**	**Total**
Ballymurreen	10	12	10	**32**
Buolick	15	36	18	**69**
Fennor	26	39	5	**70**
Graystown	13	15	2	**30**
Kilcooly	15	24	7	**46**
Killenaule	15	30	8	**53**
Littleton	24	53	24	**101**
Longfordpass	7	25	5	**37**
Loughmore	-	1	-	**1**
Moyne	25	48	10	**83**
New Birmingham	13	21	9	**43**
Poyntstown	12	14	2	**28**
Rahelty	16	30	5	**51**
Templetouhy	22	57	11	**90**
Two-Mile-Borris	15	24	18	**57**
Total	**228**	**429**	**134**	**791**



4.2.2.3 Commercial & Public Sector Analysis (cont..)

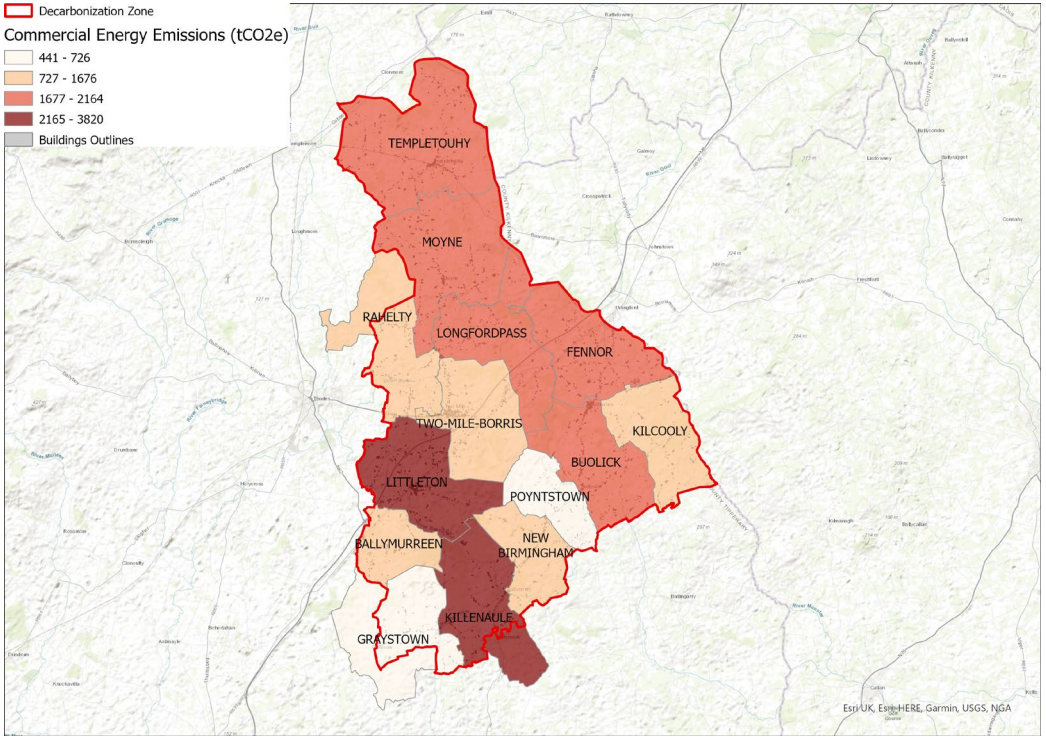
Commercial & Public Sector: Energy & Carbon Emissions

Total commercial and public sector energy consumption and associated carbon emissions within the Mid-Tipperary DZ area is presented by building type and energy split below. As noted, energy split assumed for this analysis is representative of the national energy split for the commercial and public sector and may not reflect the actual energy split within the DZ area. The highest commercial and public sector related emissions are observed in the Littleton and Killenuale EDs.

In addition, the map displays carbon emissions by ED, further supported by the information can be found within **Appendices 5.3.3 – 5.3.5.**

Building type	Fuel use (MWh)	Electricity use (MWh)	Fuel related carbon emissions (tCO_2e)	Electricity related carbon emissions (tCO_2e)
Mixed Use	23,554	14,543	5,154	5,457
Commercial	18,496	8,746	4,047	3,281
Other	17,108	9,424	3,743	3,536
Subtotal	**59,158**	**32,713**	**12,944**	**12,274**
Total	**91,871**		**25,218**	

Energy source	Energy consumption (MWh)	Carbon emissions (tCO_2e)
Coal	50	17
Oil	23,381	6,397
Natural Gas	31,899	6,530
Renewables	3,828	-
Electricity	32,713	12,274
Total	**91,871**	**25,218**



4.2.3 Transport Sector

4.2.3.1 Transport Sector Overview

Overview of the transport sector

- Despite the growing focus on achieving Ireland's climate ambitions, Ireland's road transport emissions are increasing. In 2018, the transport sector accounted for approximately 17% of Ireland's total carbon emissions. Although the impact of COVID-19 supported the decrease in transport related emissions, 2021 saw a 6.1% increase in emissions over 2020 levels, largely driven by the cessation of public health restrictions that had artificially reduced transport demand.

- Ireland's transport sector must reduce its emissions by 50% by 2030. The actions and targets outlined in CAP 23 are pivotal in encouraging a shift to 'active travel' and overcoming the challenges deeply embedded through our settlement patterns, policies, and mindsets which favour private car usage over more sustainable transport modes. These targets will require a transformational shift in how we travel, as well as investment and innovation efforts into electric vehicles (EVs), increased charging facilities, and alternative fuels. Achieving a shift to transport modes with zero- or low-carbon emissions, such as active travel (walking and cycling) and public transport, will require unprecedented levels of public buy-in and engagement.

- The following pages present an overview of the transport sector related activities and associated energy and carbon emissions within the DZ area.

- As outlined in the Tipperary County Development Plan 2022-2028, Tipperary has the second highest vehicle ownership rate per capita in the country, highlighting an obvious reliance on the private car for transportation. With the majority of commuters using private vehicles for journeys to work, school or college, there are opportunities for a shift to more sustainable modes of transport supported by policy, infrastructure investment and behavioural change measures. The Tipperary County Development Plan 2022-2028 shows a desire to support regional growth through strengthening of rail line as well as investment in infrastructure to support the transition to alternative and renewable fuels in transport.

Further supporting information on transport sector can be found in Appendix 5.4

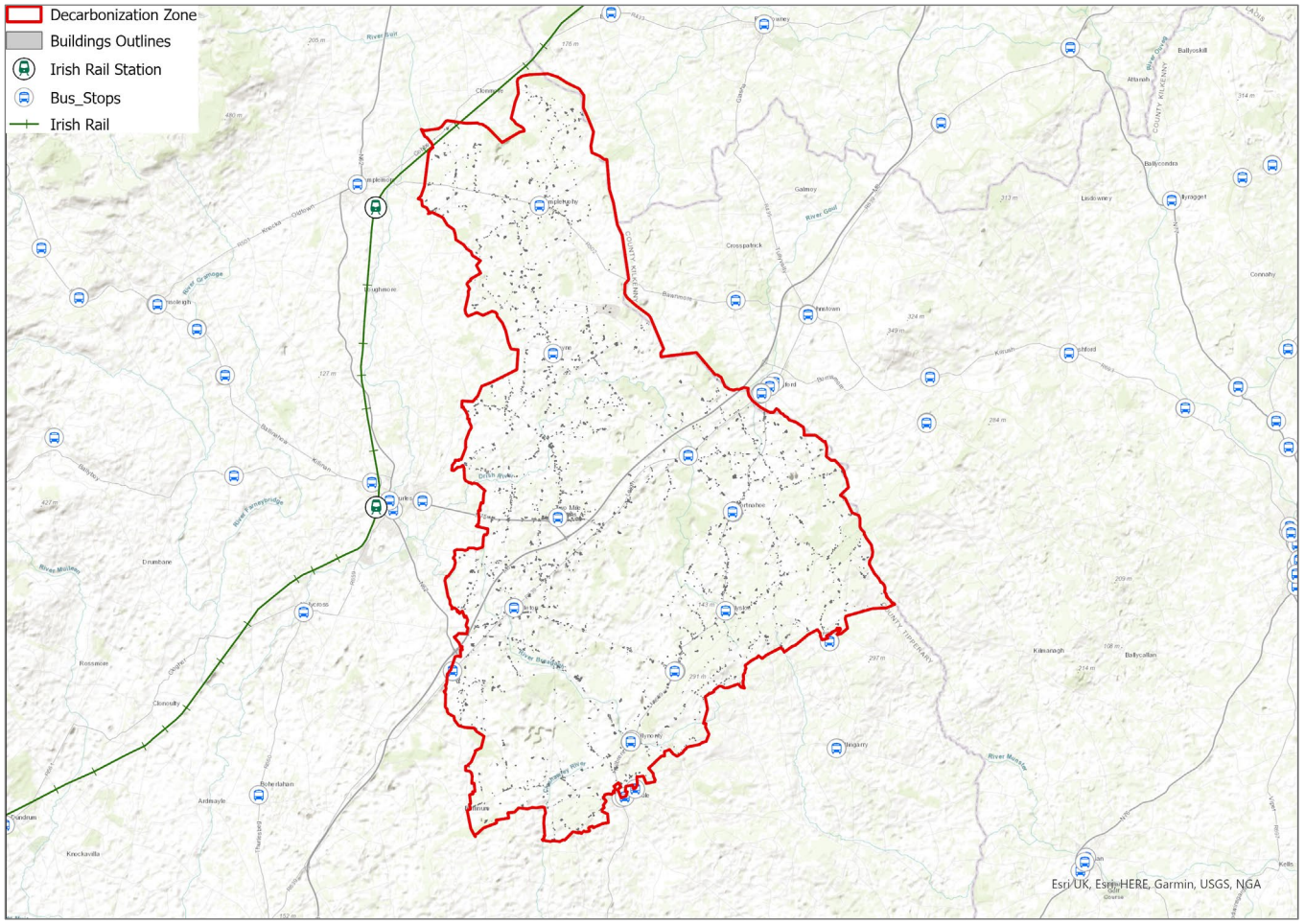
4.2.3.2 Transport Sector Analysis

Transport Sector: Public Transport

- Buses are the key public transport within the study area with several public and private operators. Bus stops at 10 locations are noted in the DZ area.

- The map shown here provides a visual of the locations of bus stops within the DZ area.

- The uptake of ‘Green’ transport methods such as buses, trains, electric vehicles and walking are vital in the reduction of Irelands overall emissions and an increase in the general health of a population through reduced air pollutants.



Further supporting information on transport sector can be found in Appendix 5.4

4.2.3.2 Transport Sector Analysis (cont..)

Transport Sector: Energy & Carbon Emissions

To estimate transport sector energy consumption and associated carbon emissions within the DZ area, a number of non-spatial data points have been used. An overview of the approach used is outlined below. Note that this approach reflects vehicles owned and licenced within the area and does not reflect all transport movements within the DZ area. Further information on data sources, assumptions and limitations is included within **Appendices 5.4.1 – 5.4.2.**

Data sources

01

Transport Omnibus

Number of vehicles licenced by end of 2018 in Tipperary. These numbers have been proportioned down to the DZ area based on population.

02

SEAI National Energy Balance

Total energy consumed per transport mode broken down into fuel sources and electricity, supported by the SEAI National Energy Balance.

03

SEAI Conversion Factors

Total energy consumed per transport mode converted to carbon emissions using SEAI Conversion Factors.

Outputs

Energy consumed broken down by fuel and electricity source, and transport mode

Carbon emissions broken down by fuel and electricity source, and transport mode

4.2.3.2 Transport Sector Analysis (cont..)

Transport Sector: Energy & Carbon Emissions

Total transport sector related energy consumption and associated carbon emissions within the DZ area, broken down by transport mode and energy type are shown below. As mentioned on the previous page, energy consumption and carbon emissions presented below reflect vehicles owned and licenced within the DZ area based on the entire DZ area, factored down by population in the DZ area. Although this approach does not provide total energy consumption and associated carbon emissions of all transport movements in the DZ area in the baseline year, it provides a useful overview of vehicle ownership in the DZ area and impact of their usage. Further information and supporting data can be found in **Appendices 5.4.3.**

Private cars are the transport mode that accounts for the highest carbon emissions. Petrol and diesel are the most common sources of fuel with just a small proportion relying on electricity.

Transport mode	Total energy consumption by transport mode in the DZ area (MWh)				
	Oil	Natural Gas	Renewables	Electricity	Total
Road Freight	18,063	0.2	774	-	**18,839**
Road Light Goods Vehicle	7,501	-	322	-	**7,822**
Road Private Car	38,444	-	1,519	21	**39,984**
Public Passenger Services	1,256	-	53	-	**1,309**
Total	**65,264**	**0.2**	**2,668**	**21**	**67,954**

Transport mode	Total carbon emissions by transport mode in the DZ area (tCO_2e)				
	Oil	Natural Gas	Renewables	Electricity	Total
Road Freight	4,767	0.2	-	-	**4,767**
Road Light Goods Vehicle	1,979	-	-	-	**1,979**
Road Private Car	9,988	-	-	8	**9,995**
Public Passenger Services	331	-	-	-	**331**
Total	**17,065**	**0.2**	**-**	**8**	**17,073**

Further supporting information on transport sector can be found in Appendix 5.4.

4.2.3.2 Transport Sector Analysis (cont..)

Transport Sector: Commuting & Carbon Emissions

Using POWSCAR data, commuters to the DZ area and from the DZ area to attend work, college or school on a daily basis from within the DZ area and from surrounding areas has been explored. Carbon emissions associated with these commuting patterns are estimated using distances taken from POWSCAR and assumptions on transport modes used in the DZ area – this results of which are shown on the next pages.

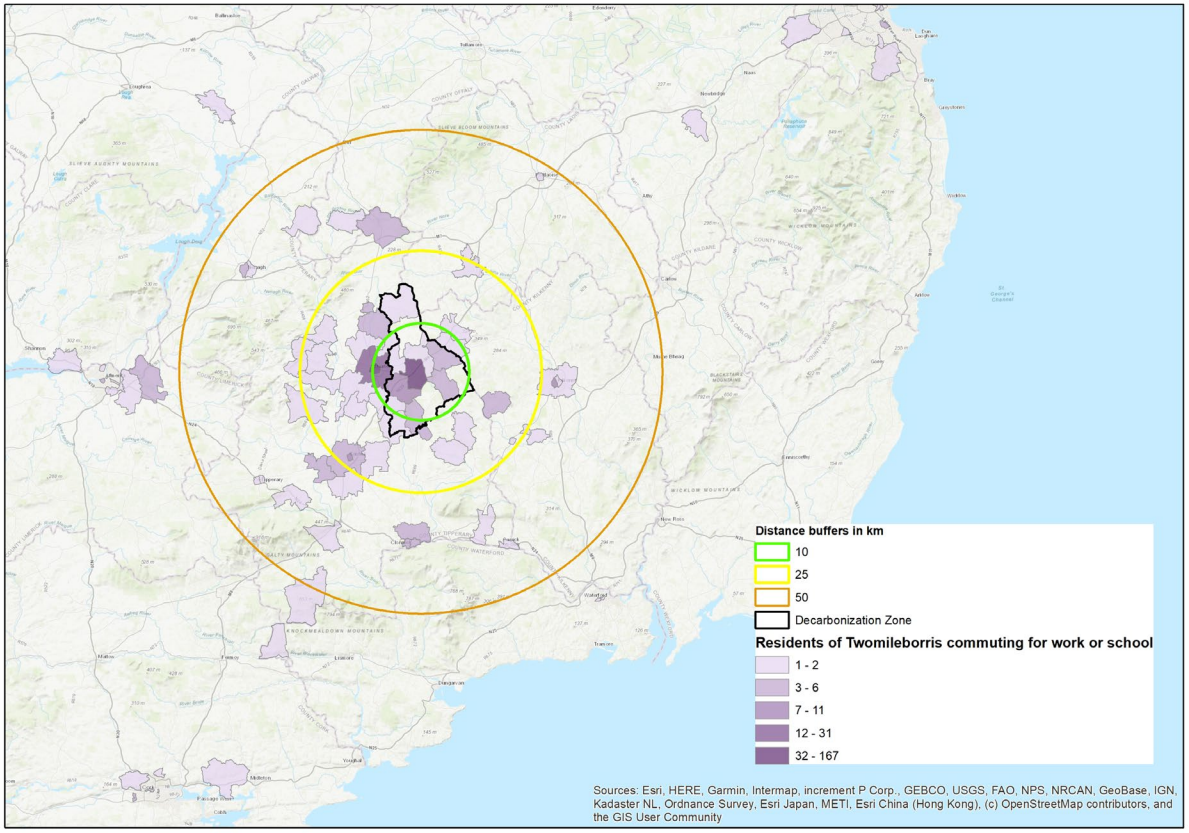
71% of these commutes are made in a car, while 22% are made using public transport, bicycle or on foot. The remaining commuters take a van or motorcycle with some 'telecommuting' (i.e. work from home). In addition, within the DZ area, approximately 46% of households own a car, approximately 27% own two cars and approximately 20% of households do not own a car.

Note that although these commuting patterns focus on commuters travelling in and out of the DZ area, the impact of which are not entirely associated with the DZ area boundary itself, it is important to understand opportunities for decarbonisation through both control and influencing mechanisms available to the Council.

Further supporting information on transport sector can be found in Appendix 5.4.

4.2.3.2 Transport Sector Analysis (cont..)

Transport Sector: Commuting & Carbon Emissions



- The map on the left provides an illustration of commuters leaving the DZ area and travelling to surrounding EDs on a daily basis.

- For the purposes of this assessment, the starting point for all commuters is assumed to be Two-Mile-Borris ED. To provide for a proportional assessment, commuters travelling to the top 90% of EDs are included in the carbon emissions estimate. An uplift is then applied to the resulting carbon emissions to represent 100% of commuters.

- It is estimated that these daily commuter trips leaving the DZ area, and assumed to then return, contribute approximately **1,472 tCO_2e** on an annual basis.

- Further information on data sources, assumptions and limitations is included within **Appendix 5.4.4**.

Emissions source	Total per year (return journey)
Total carbon emissions (tCO_2e) associated with commuter travel out of the DZ area to surrounding EDs	**1,472**

4.2.3.2 Transport Sector Analysis (cont..)

Transport Sector: Commuting & Carbon Emissions

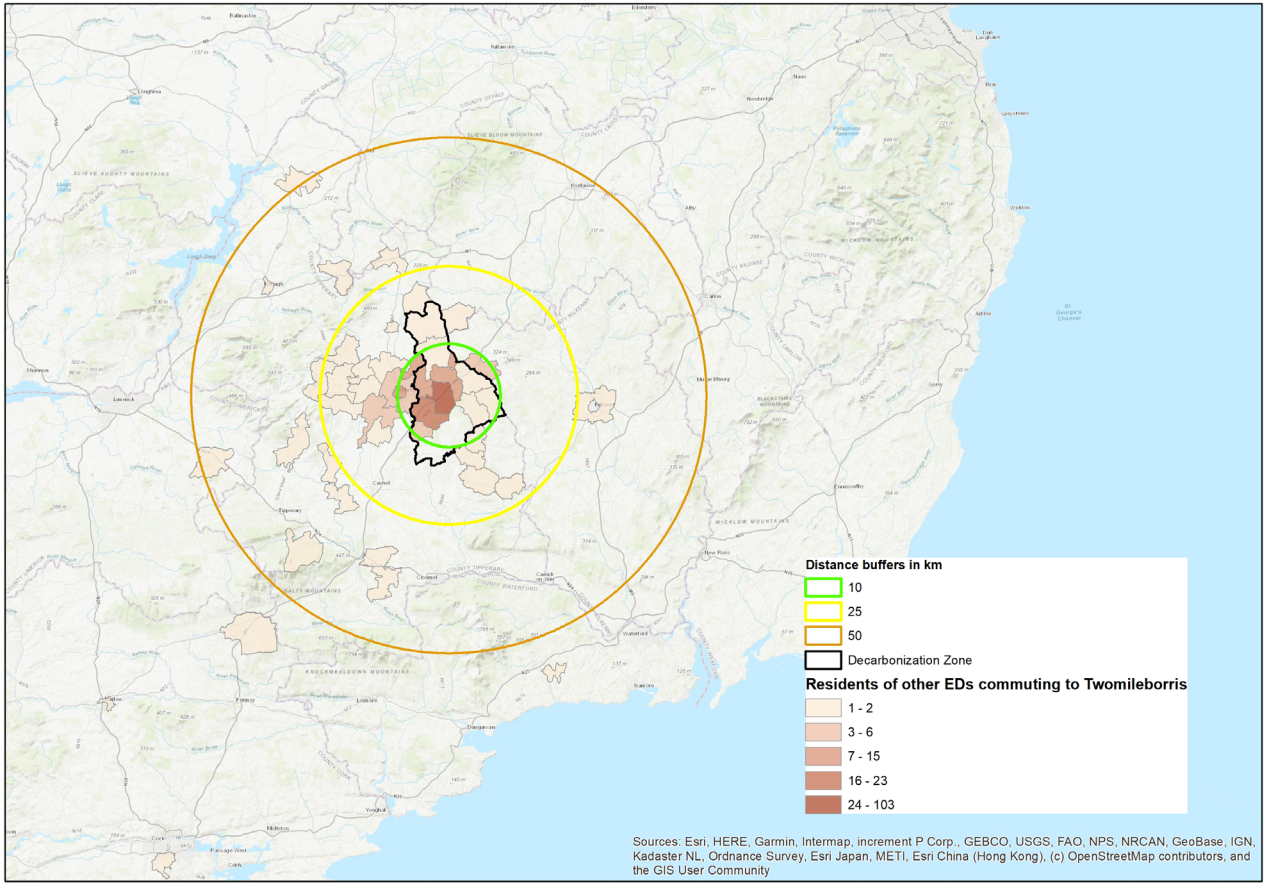
- The map on the right provides an illustration of commuters travelling into the DZ area from surrounding EDs on a daily basis.

- For the purposes of this assessment, the end point for all commuters is assumed to be Two-Mile-Borris ED. To provide for a proportional assessment, commuters travelling to the top 90% of EDs are included in the carbon emissions estimate. An uplift is then applied to the resulting carbon emissions to represent 100% of commuters.

- It is estimated that these daily commuter trips travelling into the DZ area, and assumed to then return, contribute approximately **3,699 tCO_2e** on an annual basis.

- Further information on data sources, assumptions and limitations is included within **Appendix 5.4.4**.

Emissions source	Total per year (return journey)
Total carbon emissions (tCO_2e) associated with commuter travel into the DZ area from surrounding EDs	**3,699**



4.2.4 Waste Sector

4.2.4.1 Waste Sector Overview

Overview of the waste sector

- Waste emissions are predominantly associated with methane emissions arising from disposal to landfill. The waste sector accounts for approximately 1% of Ireland's annual carbon emissions. Waste emissions per head of population are lower in Ireland compared to the EU average and carbon emissions have decreased since 2005. Minimising waste generation, and improving segregation, reuse and recycling will lead to a continued reduction in carbon emissions.

- A number of targets and goals have been set in Ireland to meet both its climate and circular economy objective – for example, Ireland has set a plastic recycling target of 55% by 2030, with a 90% collection target for beverage containers.
- Ireland has made significant progress in managing waste streams, particularly in improving recycling rates and diversion from landfill but substantial change is needed to pivot towards a more circular economy in Ireland. Businesses and households play a vital role in enabling this change by influencing and facilitating sustainable consumer behaviour.

- A number of initiatives outlined in CAP 2023 will be beneficial to DZ area as areas to focus on, including:
    - Deposit and return schemes for plastic and aluminium beverage containers;
    - Promotion of trials for better public recycling opportunities on street and at Bring Centres;
    - Improvement of segregation and collection performance to increase recycling and reduce contamination.

- As outlined in the Tipperary County Development Plan 2022-2028, it is a key objective of the Council to support the sustainable management of waste in line with the National Waste Management Plan for a Circular Economy (Government of Ireland, 2022) and associated guidance across the delivery of its services and in the management of new development. Circular opportunities exist within the DZ that can potentially reduce overall emissions, such as anaerobic digestion and the area around Lisheen Mine and Lisheen Bog area, centred on the National Bioeconomy Campus, which recognises the importance of the Bioeconomy in Tipperary and the potential for synergies with other areas including renewable energy, tourism and amenities.

- The following sections present an overview of the waste sector related activities and emissions within the DZ area.

4.2.4.2 Waste Sector Analysis

Waste Sector: Locations & Carbon Emissions

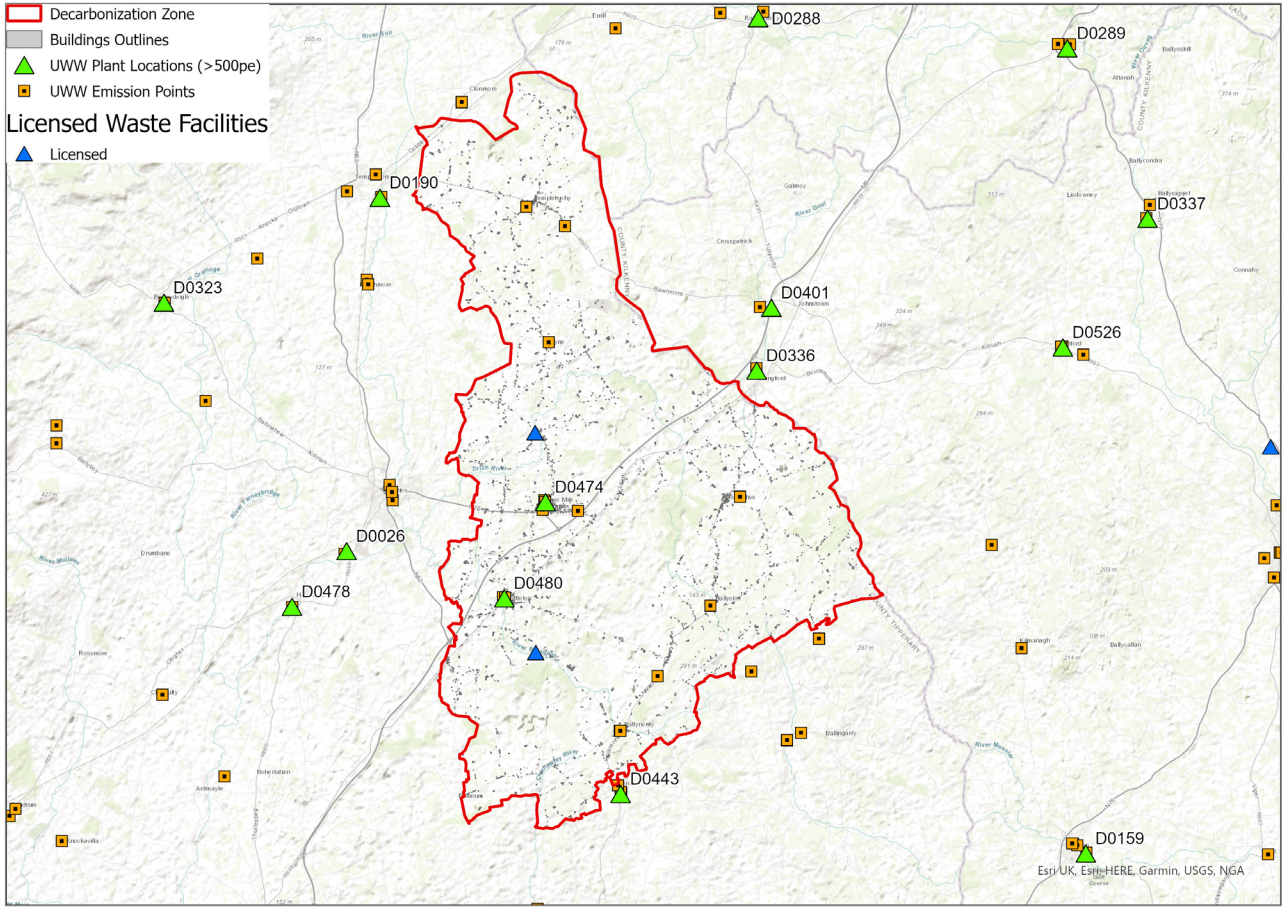
- Two waste facilities (Two-Mile-Borris and Littleton) and a Urban Wastewater Treatment plant lies within the DZ area.

- The EPA's Pollutant Release & Transfer Register (PRTR) has been reviewed to understand carbon emissions associated with the waste facilities. No emissions data has been included on this register for either facility.

- Similarly, emissions associated with activities at the wastewater treatment plant have not been made available.

- Using a benchmark for waste related carbon emissions of 0.21 tCO_2e/head of population*, it can be estimated that waste related carbon emissions within the boundary of DZ area is approximately **1,450 tCO_2e**.

* Benchmark is estimated using 2018 national waste sector emissions divided by national population (2016 CSO data). This benchmark is then multiplied by total population of the DZ area (7,142).



Further supporting information on Waste sector can be found in Appendix 5.8.

4.2.5 Agriculture Sector

4.2.5.1 Agriculture Sector Overview

Overview of the agriculture sector

- As Ireland's largest contributor to national carbon emissions, agriculture is a key sector to decarbonise whilst maintaining food availability and affordability. Over the last decade emissions in the sector have increased by 19% - largely related to the expansion of the dairy sector.

- Agricultural carbon emissions come from a variety of activities and are responsible for a proportion of national carbon emissions each year:
  - Enteric fermentation, i.e. methane emissions from the digestive systems of ruminant livestock such as cattle and sheep, contributed approximately 61% of total agriculture related carbon emissions in 2018 at a national level;
  - Agricultural soils, including nitrogen fertiliser use, contributed approximately 22% of total agriculture related carbon emissions in 2018 at a national level;
  - Manure management contributed approximately 12% of total agriculture related carbon emissions in 2018 at a national level;
  - Fuel combustion and electricity use associated with agricultural machinery and buildings contributed approximately 2.6% of total agriculture related carbon emissions in 2018 at a national level;
  - Liming and urea application contributed approximately 2.4% of total agriculture related carbon emissions in 2018 at a national level.

- Agricultural activities in the DZ area account for a large proportion of the DZ area's total carbon emissions, as well as a large part of economic activities.
- As part of Ireland's response to climate change, the agriculture sector is required to reduce its emissions by 25% by 2030 with key measures to achieve this target set out in the CAP 23. These measures include: a reduction in nitrogen fertiliser use to a maximum of 300,000 tonnes, earlier finishing of beef cattle and improved animal breeding focusing on low methane traits. The CAP 23 also sets out a target to support land use diversification options for livestock farmers, such as anaerobic digestion, forestry and tillage to incentivise voluntary livestock reductions - whilst not a direct cap, it signals the ambition to reduce herd numbers.
- Measures set out at a national level can be considered by the DZ area.

- Although agriculture sector emissions encompass the emissions sources outlined above, there are close synergies with other sectors, including LULUCF sector which is explored further in the next section. Decarbonisation measures must consider these synergies to ensure an effective plan is developed.

- For Tipperary, nearly 11% of the workforce are employed in agriculture, forestry and fishing. This is more than double the national average and illustrates the importance of this sector to the county. The Rural Development Programme (DAFM, 2014) supports agriculture, sustainable management of natural resources and climate action, and balanced development of rural economies and communities.

- The following sections present an overview of agriculture related activities, energy and emissions within the DZ area.

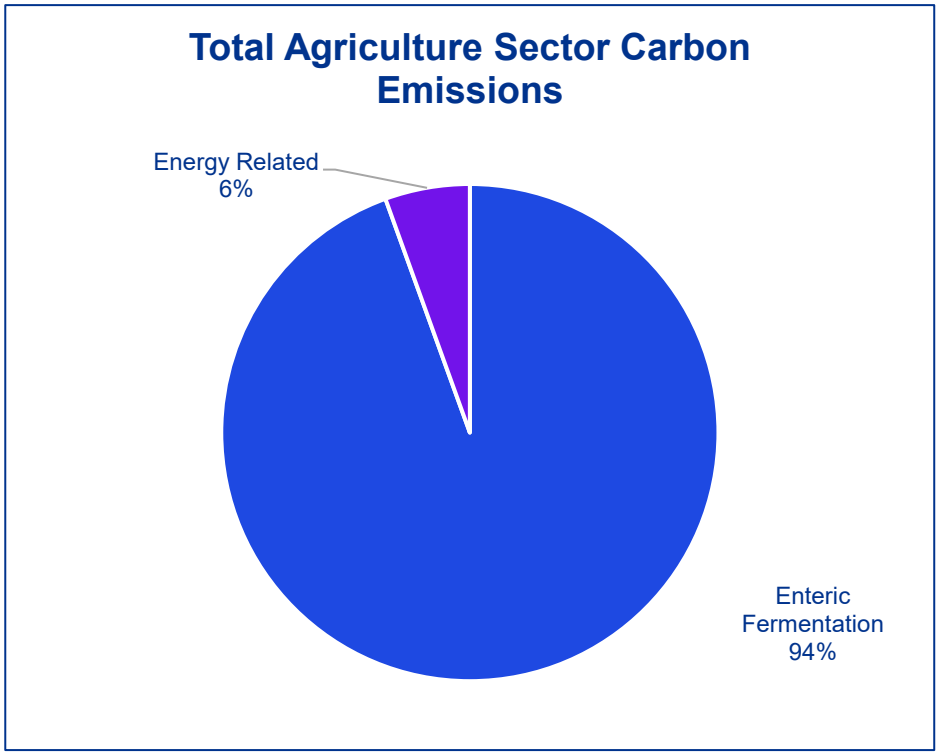
Further supporting information on agriculture sector can be found in Appendix 5.5

4.2.5.2 Agriculture Sector Summary Results

Agriculture Sector: Summary

The results of the agriculture sector assessment are presented in the table and chart below. A number of activities contribute to the agriculture sector's carbon emissions, including enteric fermentation and fuel combustion associated with agricultural machinery. Total carbon emissions of the sector equates to approximately **133,214 tCO_2e**. Note that a mix of benchmarks and robust assumptions have been used to understand the impact of the agriculture sector within the DZ area.

Agricultural sector emissions sources	Carbon emissions (tCO_2e)
Enteric fermentation	125,865
Agriculture energy related	7,349
Total	**133,214**



Further supporting information on agriculture sector can be found in Appendix 5.5

4.2.5.3 Agriculture Sector Analysis

Agriculture sector: Carbon Emissions

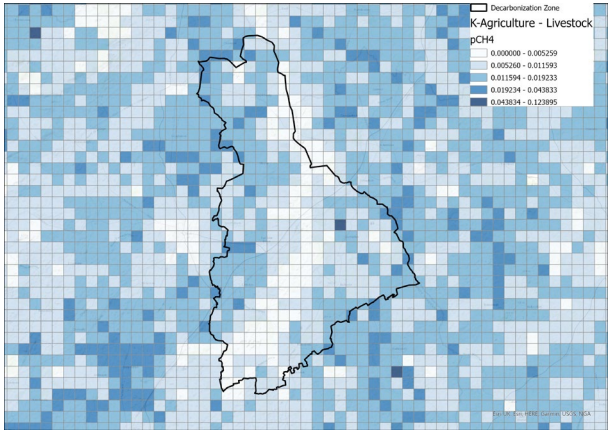
According to the EPA's MapEire database, in the baseline year of 2018, the agricultural sector accounts for 48% of DZ area's total carbon emissions. *Note that this is based on the MapEire database which adopts a 'top-down' assessment approach.*

The majority of the DZ area's agriculture carbon emissions are attributed predominantly to ruminant livestock related emissions (methane emissions resulting from enteric fermentation and manure management and nitrous oxide emissions associated with manure management).

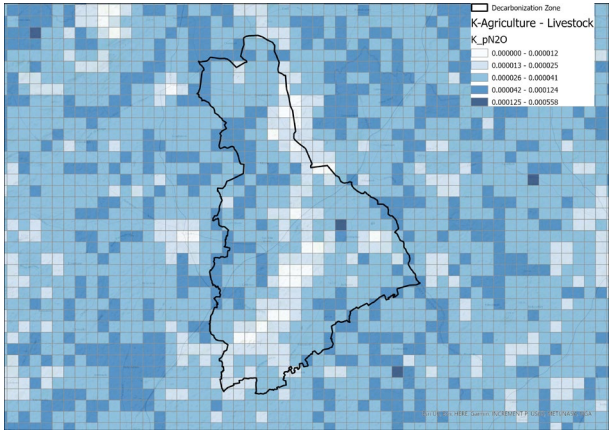
The remaining proportion of emissions are attributed to the category 'Other', largely associated with nitrous oxide associated with nitrogen fertiliser use and carbon dioxide emissions associated with on-farm fuel combustion and electricity use, liming and urea application.

As such, the agriculture sector is one of the main carbon hotspots in the DZ area and hence should be targeted in terms of carbon reduction measures.

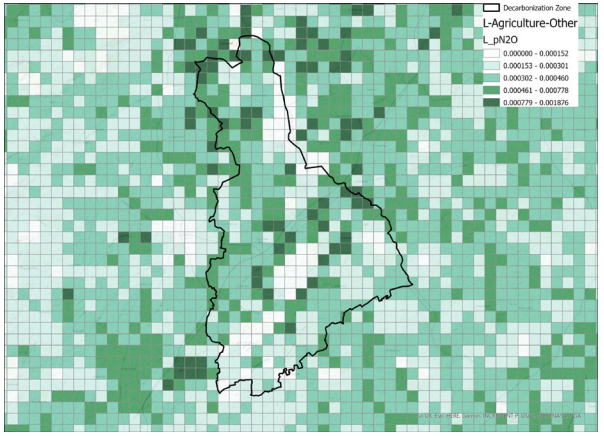
The maps to the right provide an overview of agriculture related activities, presented by 'livestock' related methane (CH_4) and nitrous oxide (N_2O) emissions and 'other' related carbon dioxide (CO_2) and nitrous Oxide (N_2O).



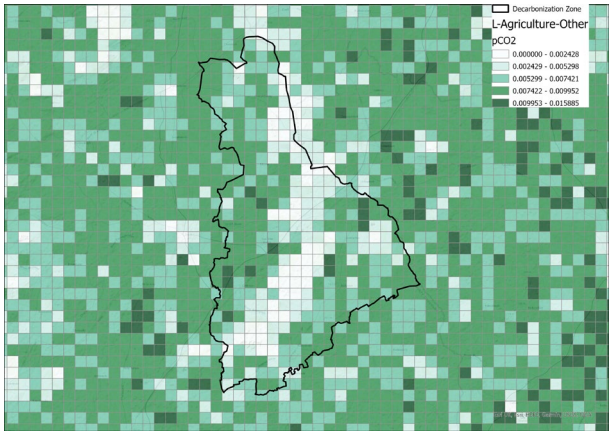
Methane emissions predominantly associated with livestock in the DZ area



Nitrous oxide emissions associated with livestock in the DZ area



Nitrous oxide emissions associated with agriculture activities, excluding livestock, in the DZ area



Carbon dioxide emissions associated with agriculture activities, excluding livestock, in the DZ area

Further supporting information on agriculture sector can be found in Appendix 5.5

4.2.5.3 Agriculture Sector Analysis (cont..)

Agriculture Sector: Energy & Carbon Emissions

To estimate the agriculture sector's energy consumption and associated carbon emissions within the DZ area, a number of non-spatial data points have been used. As discussed previously, there are a number of emissions sources within the agriculture sector, including enteric fermentation, agricultural soils, including nitrogen fertiliser use, manure management and fuel combustion associated with agricultural machinery. These have been explored as far as possible using the approach outlined below.

Data sources

01

CSO & Department for Agriculture, Food and the Marine (DAFM)

Livestock numbers in the DZ area, split by livestock type

02

Various sources

Benchmarks to measure the impact of enteric fermentation and on-farm energy use:

- *Methane emissions per dairy cow;*
- *Methane emissions per beef cattle;*
- *On-farm diesel consumption per dairy cow;*
- *On-farm diesel consumption per beef cattle;*
- *On-farm electricity consumption per dairy cow.*

03

SEAI Conversion Factors

Total on-farm energy consumed per livestock converted to carbon emissions using SEAI Conversion Factors

Outputs

On-farm energy consumed broken down by diesel and electricity and livestock

Energy related carbon emissions presented by livestock

Enteric fermentation related carbon emissions presented by livestock

Note that the quantification of the impact of agricultural soils, manure management, liming and urea application on carbon emissions is complex and requires an understanding of the various elements included as part of these activities. For example, to understand the impact of fertiliser use on carbon emissions, annual amount of synthetic fertiliser applied to soils and annual amount of animal manure applied to soils, amongst a number of other data points. For the purposes of this baseline assessment, an estimate of these emissions sources have been excluded.

Further supporting information on agriculture sector can be found in Appendix 5.5

4.2.5.3 Agriculture Sector Analysis (cont..)

Agriculture sector: Livestock Numbers

- Beef, dairy and sheep farming are the most common activities within the DZ area.

- Beef cattle, dairy cows and sheep account for approximately 59%, 29% and 12%, respectively, of total livestock reviewed.

- Farming activities are present in all Eds of the DZ, with Templetouhy, Moyne and Buolick having the highest livestock numbers

	Number of Livestock			
ED	**Beef cattle**	**Dairy cows**	**Sheep**	**Total**
Ballymurreen	353	1,155	-	1,508
Buolick	1,851	1,434	2,773	6,058
Fennor	2,051	1,574	-	3,625
Graystown	2,283	-	-	2,283
Kilcooly	1,444	1,035	-	2,479
Killenaule	2,670	805	633	4,108
Littleton	1,499	513	-	2,012
Longfordpass	1,062	484	-	1,546
Moyne	3,982	2,990	-	6,972
New Birmingham	1,814	515	1,741	4,070
Poyntstown	1,241	-	-	1,241
Rahelty	1,792	948	-	2,740
Templetouhy	4,787	2,095	661	7,543
Two-Mile-Borris	2,093	915	-	3,008
Total	**28,920**	**14,463**	**5,808**	**49,191**

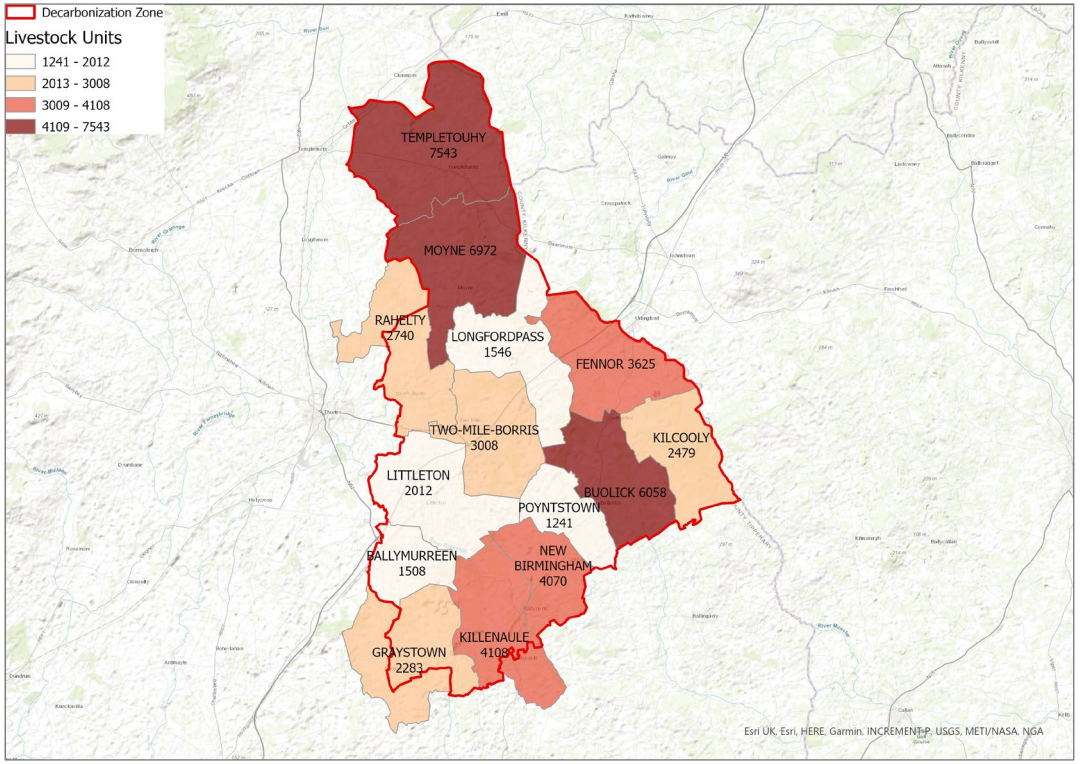
Further supporting information on agriculture sector can be found in Appendix 5.5

4.2.5.3 Agriculture Sector Analysis (cont..)

Agriculture sector: Livestock Numbers

- Sheep farming occurs in 4 EDs, with largest numbers in Buolick, followed by New Birmingham, Templetouhy, and Killenuale.

- The northern region of Mid-Tipperary DZ has highest numbers of livestock units; a significant increase from surrounding Eds, the majority of which have below 3,008 units of livestock (7/14 EDs)



Further supporting information on agriculture sector can be found in Appendix 5.5

4.2.5.3 Agriculture Sector Analysis (cont..)

Agriculture sector: Beef Cattle, Dairy Cows & Sheep enteric fermentation

- As previously discussed, methane emissions produced by livestock enteric fermentation is one of the main contributors to agriculture's total carbon emissions.
- As the majority of livestock in the DZ area are beef cattle, dairy cows and sheep, to provide for a meaningful and proportionate assessment, these livestock have been focussed on.
- To estimate carbon emissions associated with beef cattle, dairy cows and sheep within the DZ area, benchmarks (gCH_4/livestock/day) have been used and are presented below.
- Estimated carbon emissions related to enteric fermentation in beef cattle, dairy cows and sheep are shown on the tables to the right.

	tCH_4/year for all beef cattle	tCO_2e/year for all beef cattle****
Total	2,428	67,736

	tCH_4/year for all dairy cows	tCO_2e/year for all dairy cows****
Total	1,742	48,604

	tCH_4/year for all sheep	tCO_2e/year for all sheep****
Total	341	9,526

**** Note that methane emissions (CH_4) have been converted to carbon dioxide equivalent (CO_2e) using IPCC conversion factors contained within **Appendix 5.5.2**.

Benchmarks

	gCH_4/livestock/day
Beef cattle*	6,651,543
Dairy cow**	4,772,790
Sheep***	935,410

Summary

	Beef cattle (tCO_2e)	Dairy cows (tCO_2e)	Sheep (tCO_2e)
Enteric fermentation related carbon emissions	**67,736**	**48,604**	**9,526**
Total	**125,865**		

Source: https://www.teagasc.ie/environment/climate-change--air-quality/methane/; https://www.teagasc.ie/news--events/daily/sheep/measuring-methane-from-sheep-systems.php

*For the purpose of this assessment, beef cattle related methane emissions benchmark is assumed for a '500kg Beef animal on a high concentrate diet'

** For the purpose of this assessment, dairy cow related methane emissions benchmark is assumed for a '550kg Dairy cow grazing on pasture'

*** For the purpose of this assessment, sheep related methane emissions benchmark is assumed for 'ewe lambs on a grass silage based diet'

Further supporting information on agriculture sector can be found in Appendix 5.5.

4.2.5.3 Agriculture Sector Analysis (cont..)

Agriculture sector: Beef Cattle, Dairy Cows & Sheep energy related emissions

- As previously discussed, on-farm fuel combustion and electricity use contributes to national agriculture carbon emissions.
- As the majority of livestock in the DZ area are beef cattle, dairy cows and sheep, to provide for a meaningful and proportionate assessment, these livestock have been focussed on.
- To estimate carbon emissions associated with beef cattle, dairy cows and sheep within the DZ area, benchmarks (kWh/livestock/year) have been used and are presented below.
- Estimated carbon emissions related to energy consumption in beef cattle, dairy cows and sheep presented by ED are shown on the tables to the right.

	Energy consumption (kWh) for all beef cattle	Carbon emissions (tCO_2e) for all beef cattle
Total	13,100,647	3,457

	Energy consumption (kWh) for all dairy cows	Carbon emissions (tCO_2e) for all dairy cows
Total	12,655,125	3,863

	Energy consumption (kWh) for all sheep	Carbon emissions (tCO_2e) for all sheep
Total	110,352	29

*** Note that methane emissions (CH_4) have been converted to carbon dioxide equivalent (CO_2e) using IPCC conversion factors included within **Appendix 5.5.2.**

Benchmarks

	kWh/livestock/year
Beef cattle	453
Dairy cow	875
Sheep	19

Summary

	Beef cattle (tCO_2e)	Sheep (tCO_2e)	Dairy cows (tCO_2e)
Energy related carbon emissions	**3,457**	**29**	**3,863**
Total	**7,349**		

Source: Department for Environment, Food & Rural Affairs (DEFRA)

Further supporting information on agriculture sector can be found in Appendix 5.5.

4.2.6 Land Use, Land Use Change & Forestry (LULUCF)

4.2.6.1 LULUCF Sector Overview

Overview of the LULUCF sector

- At a national level, the 'Land Use, Land-use Change and Forestry (LULUCF)' sector accounts for the following categories of land use types: Forest land, Cropland, Grassland, Wetlands, Settlements, Other land and Harvested Wood products.
- Ireland's LULUCF sector is an outlier in the European Union – in each year between 1990 to 2021, the sector was reported to be a net source of carbon emissions. In addition, the sector's emissions are projected to increase significantly by 2030.
- Trends in Ireland's LULUCF emissions are largely associated with grasslands and wetlands – these land use types are shown to be sources of emissions predominantly due to the drainage of organic soils. In addition, croplands fluctuate between being a small net sink in some years and a small source of emissions in others.
- Note that estimates of whether or not land use types in Ireland (and in all regions) are 'carbon sinks' (i.e. absorbs carbon from the atmosphere) or result in net emissions are highly complex as a result of the complex synergies and dynamics between land use types, biomass and soils.

- The agriculture and LULUCF sectors are closely linked – the management of agricultural ecosystems, such as grasslands and peatlands, has a direct impact on whether or not it acts as a net carbon sink or net emitter of carbon emissions.
- The Climate Action Plan (DCCAE, 2019) outlines the role of forestry in climate action with a key aim to support new plantations, and sustainable forest management. Support measures include the promotion of agroforestry and 'neighbourfoods' and the Teagasc 'Native Woodland Scheme'.
- The Council will support the diversification of peatlands, e.g. through the development of renewable energy initiatives and/or tourism related facilities, whilst ensuring the conservation of their ecological, archaeological, cultural and educational significance in line with the National Peatlands Strategy (DAHG 2015).

- The following pages present an overview of the LULUCF and associated emissions within the DZ area.

Further supporting information on agriculture sector can be found in Appendix 5.6.

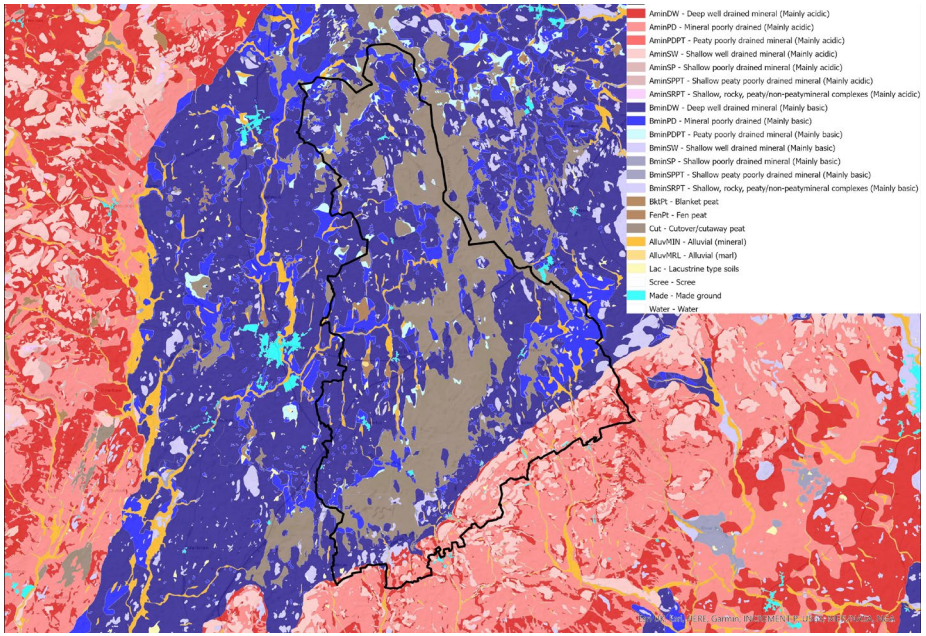
4.2.6.2 LULUCF Sector Analysis

LULUCF Sector: Soil types

- Soils (beneath grasslands, peatlands, for example) have the potential to act as vast carbon sinks if managed and utilised in an effective manner.

- As displayed below, 'deep well drained mineral soils' occupy ~40% of the Mid-Tipperary DZ area. The remaining land is predominantly underlain by peat and peaty soils, as well as poorly drained mineral soils. With better management of soils, especially as part of agricultural activities, the DZ area has the potential to sequester and store carbon and ultimately act as a carbon sink.

- To understand baseline carbon stocks and carbon sequestration rates in the DZ area, soil carbon sampling and monitoring should be undertaken. In addition, current Teagasc research is focusing on establishing Irish specific emission factors for soil carbon sequestration for inclusion in the national inventory.



DZ Area Soil Types	Area (Hectares)	% of Total Area
Deep well drained mineral (Mainly basic)	12,653	40.3%
Cutover/cutaway peat	9,366	29.8%
Mineral poorly drained (Mainly basic)	3,551	11.3%
Mineral poorly drained (Mainly acidic)	1,576	5.0%
Shallow well drained mineral (Mainly acidic)	1,149	3.7%
Shallow well drained mineral (Mainly basic)	887	2.8%
Alluvial (mineral)	779	2.5%
Deep well drained mineral (Mainly acidic)	629	2.0%
Peaty poorly drained mineral (Mainly basic)	371	1.2%
Total	**31,419**	**100.0%**

* The predominant soil types present within the DZ area are shown on the table above. A number of other soil types, including mineral alluvium and made ground, make up the remaining approximately 1.5% of the DZ area – these are not included on the table above but are included in the appendix.

Further supporting information on agriculture sector can be found in Appendix 5.6.

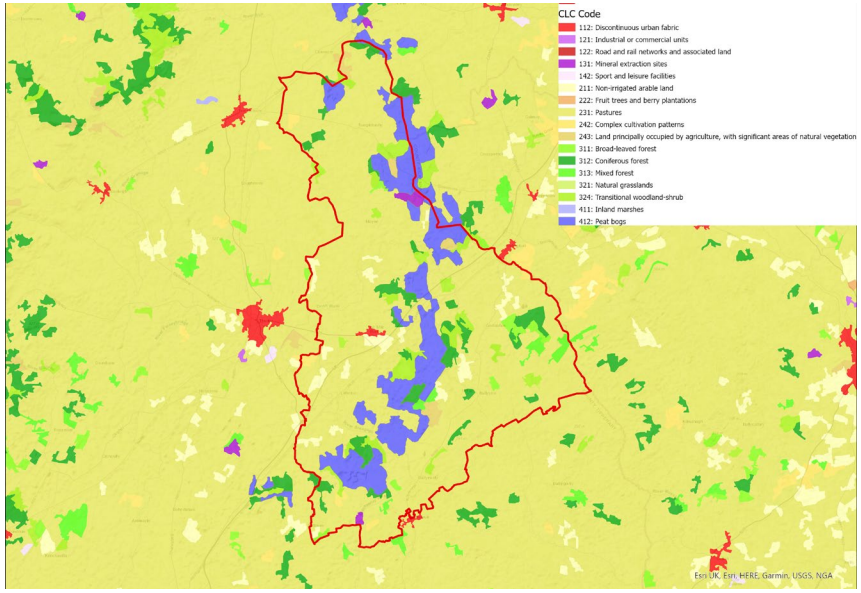
4.2.6.2 LULUCF Sector Analysis (cont..)

LULUCF Sector: Land Use types

- As shown below, grassland (or pastures) and peat bogs account for approximately 84% of land area within the Mid-Tipperary DZ area. These land areas have the potential to act as vast carbon sinks if managed and utilised in an effective manner.

- Potential for carbon storage and carbon sequestration across the DZ area is heavily dependent on the land and soil types present as well as their management and utilisation. For example, grasslands on drained organic (peaty) soils are a substantial source of carbon of approximately 20 tCO_2/hectare/year*. This is because these land and soil types store a large stock of carbon (approximately 4,000 tCO_2/hectare) and once drained, this carbon is released as CO_2.

- As an example, if the entire area of Mid-Tipperary DZ area lies on this land and soil type, it would emit an estimated 628 $ktCO_2$/year.



DZ Area Land Use Types	Area (Hectares)	% of Total Area
Pastures	22,243	71%
Peat bogs	4,107	13%
Coniferous forest	1,511	5%
Transitional woodland-shrub	1,262	4%
Non-irrigated arable land	928	3%
Land principally occupied by agriculture, with significant areas of natural vegetation	324	1%
Broad-leaved forest	301	1%
Mixed forest	300	1%
Complex cultivation patterns	223	1%
Mineral extraction sites	142	0%
Discontinuous urban fabric	61	0%
Total	**31,402**	**100%**

* Source: https://www.teagasc.ie/about/farm-advisory/advisory-regions/cork-east/farm-advice/soil-carbon-sequestration/

4.2.6.2 LULUCF Sector Analysis (cont..)

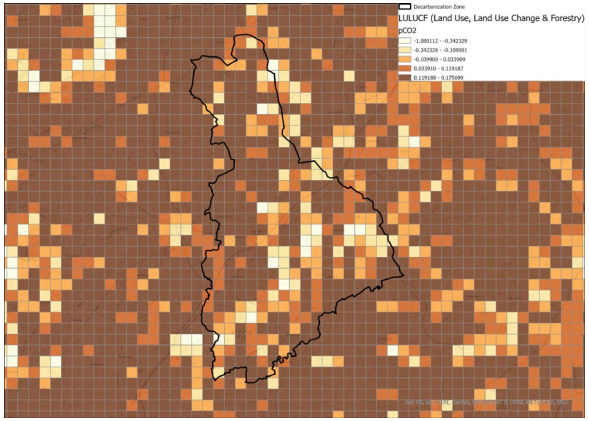
LULUCF Sector: Carbon Emissions

- According to the EPA's MapEire database, the DZ area is a net source of carbon emissions, i.e. it emits more carbon emissions than it absorbs (darker colours), largely as a result of the agriculture activities on grasslands.

- In the baseline year of 2018, the LULUCF sector accounted for approximately 32,087 tCO_2e, equating to approximately 9% of total carbon emissions in the DZ area. **Note that this is based on the MapEire database which adopts a 'top-down' assessment approach.*

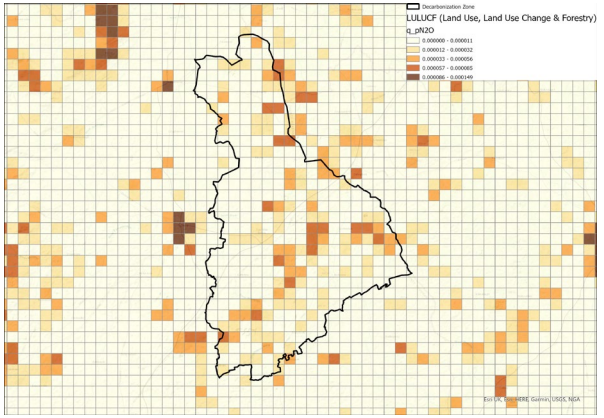
- The maps provided here provide an overview of the carbon emissions associated with land use and forestry across the Mid-Tipperary DZ area, broken down into carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O).

- A number of small areas are shown highlighted as carbon sinks, i.e. an area where there is a small amount of carbon dioxide stored rather than emitted (lighter colours). This largely correlates to areas of peatland. ***Note that Ireland's peat soils store approximately 4,000 tCO_2/hectare*.*

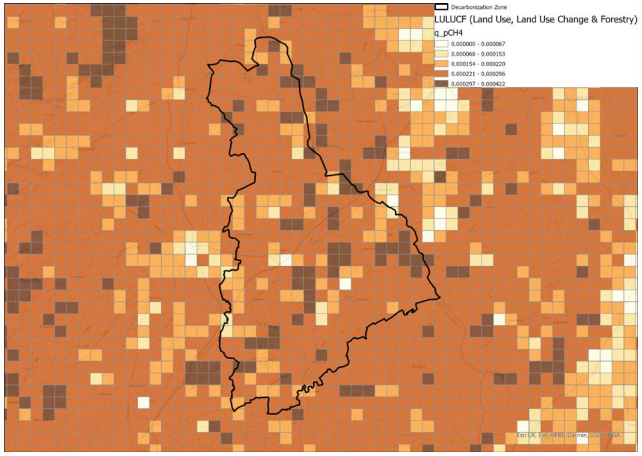


Carbon dioxide emissions associated with land use in the DZ area

Enlarged legend from above map to demonstrate the emissions/sequestration factors



Nitrous oxide emissions associated with land use in the DZ area



Methane emissions associated with land use in the DZ area

**Note that this is based on the MapEire database which adopts a 'top-down' assessment approach.*
***Source: https://www.teagasc.ie/about/farm-advisory/advisory-regions/cork-east/farm-advice/soil-carbon-sequestration/*

4.2.7 Energy & Electricity Sector

4.2.7.1 Energy & Electricity Sector Overview

Overview of energy & electricity sector

- Considerable progress has been made in decarbonising the electricity sector over the last decade, resulting in electricity emissions falling by 45% between 2005 and 2020. This has been possible through the deployment of renewables and their successful integration into the power grid, and the increased use of higher-efficiency gas turbines. The deployment of renewable energy has enabled emissions reductions during a period of increased demand, with electricity accounting for just 14.4% of Ireland's carbon emissions in 2021.

- Since 2021, there have been significant increases in prices in the international oil and gas markets, due to increased demand as the post-COVID 19 recovery continues and the disruption to traditional energy supplies following the Russian invasion of Ukraine. The resultant sharp increase in energy prices underlines the importance for Ireland to eliminate our dependency on fossil fuels and that an increase in renewable energy generation, along with supporting flexibility and demand management measures, is necessary for our future energy security.

- Targets and actions outlined in CAP 2023 focus on an acceleration towards renewable energy generation, with the aim of renewables accounting for at least 75% of energy demand by 2030. Key to the success of decarbonising the energy sector will be increased flexibility during Ireland's transition to a renewable electricity grid. The development of dynamic tariffs to incentivise consumers to move their demand to times of high renewable penetration will reduce the strain on the network at peak times.

- At 6% of its housing stock, Tipperary has the lowest proportion of A or B rated Domestic Building Energy Ratings (BER) in Ireland. Improving energy efficiency across domestic buildings in the DZ will be a key area of focus to decrease emissions across the DZ.
- Under an EU funded Concerto Programme, the Sustainable Energy for the Rural Village Environment (SERVE) Project, energy efficiency and renewable energy measures were undertaken in Nenagh and surrounding areas. A District Heating System (DHS) and a solar park were developed in the Cloughjordan Eco-Village; another DHS was installed in Gurteen Agricultural College together with a number of energy efficiency measures. In addition significant numbers of energy efficiency and renewable energy measures were installed in domestic, community and commercial building

- Tipperary County Council can support and enable the villages in the area to participate in a village network, to help them access supports such as the SEAI 'Sustainable Energy Communities' and similar collaborative actions to facilitate climate action, village regeneration, community and economic development

- The following section presents an overview of the potential opportunities for the DZ area in terms of energy efficiency and reduction as well as opportunities to support national energy decarbonisation targets.

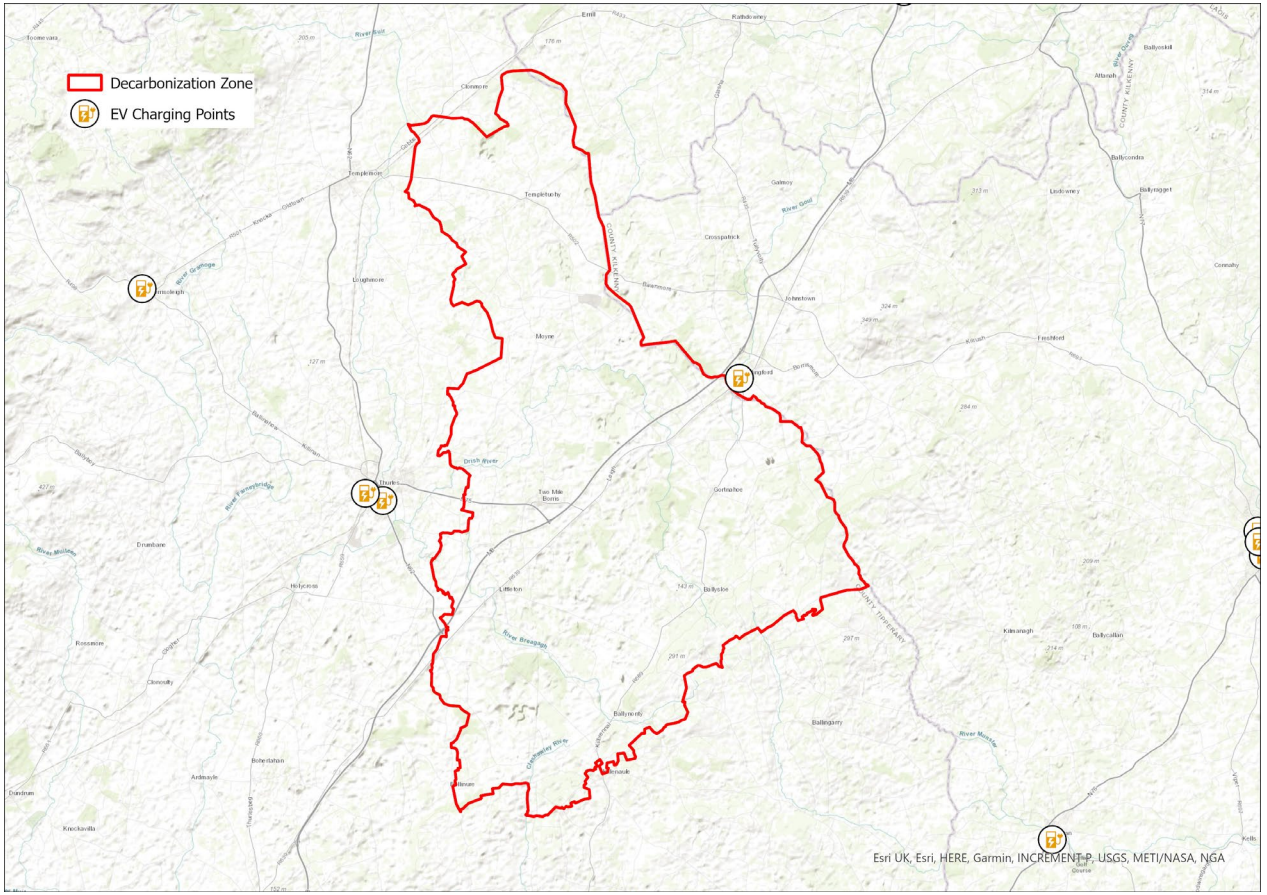
4.2.7.2 Energy & Electricity Sector Analysis

Energy & Electricity Sector: Electric Vehicle charging points

- As previously mentioned, to support the decarbonisation of the transport sector, an increased proportion of EVs in the vehicle fleet as well as the electrification of freight and public transport is required to shift away from fossil fuels.

- The current level of Electric Vehicle (EV) charging infrastructure is shown on the map to the right. There are no charging stations located within DZ boundaries, however there is one situated close to the east DZ boundary, as well as two charging points close to the west boundary.

- In order to expand the production of green energy in this region, a strong grid connection and a number of substations are needed to enable widespread EV charging infrastructure
- The next page provides an overview of grid connections and substations in the area.



Further supporting information on Energy & Electricity sector can be found in Appendix 5.7.

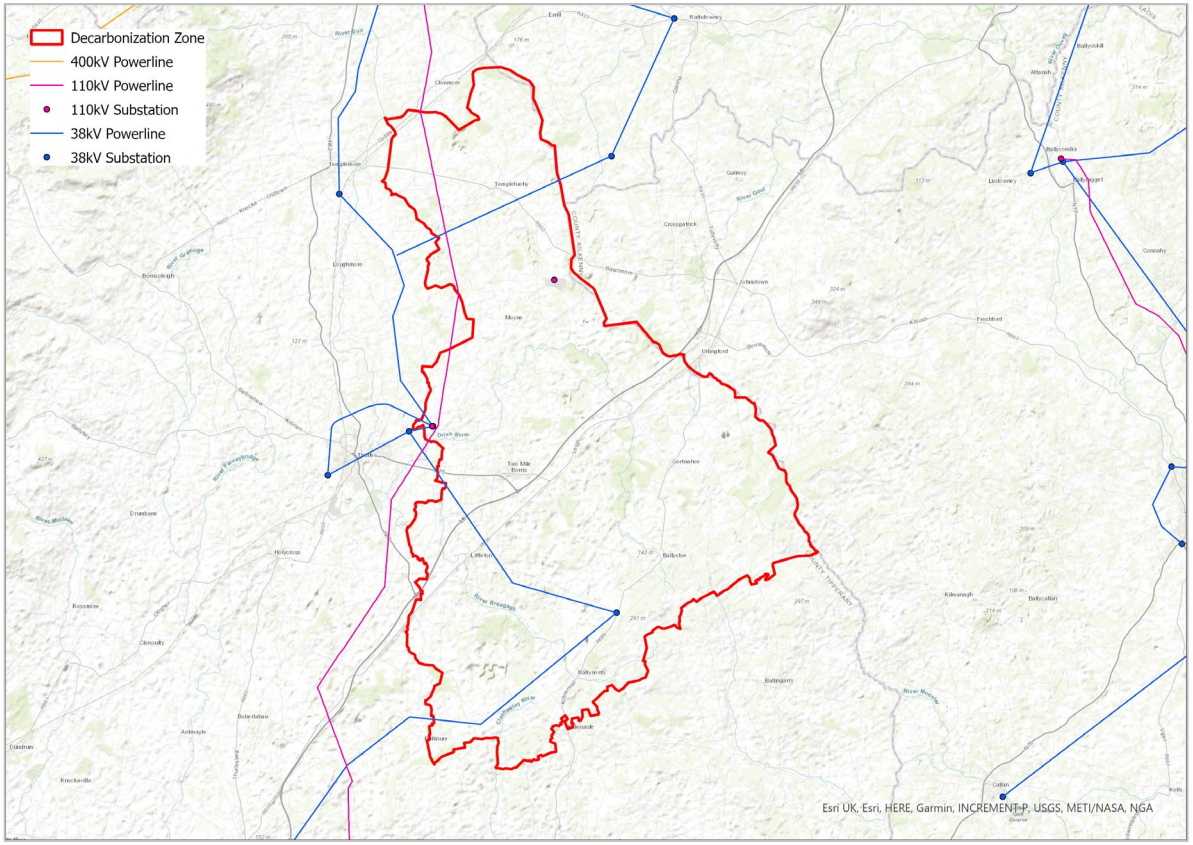
4.2.7.2 Energy & Electricity Sector Analysis (cont..)

Energy & Electricity Sector: Power Line & Substation Locations

- The Mid-Tipperary DZ area has two 38kV power lines that run into two individual 38kV substations. It also has one 110kV power line that runs into a substation. There is also another 110kV substation the north DZ. Within in the DZ there are several other 38kV and 110kV powerlines that run through the DZ. The 38kV powerlines run into three substation located west of the DZ boundary and one substation to the north east.

- The highest density of powerlines and 110kV/38kV substations in the DZ area are primarily located to the west of the DZ. There is also a 38kV substation located in the south and one 11kV substation in the north of the DZ. Expansion of renewable energy capacity should either be prioritised close to the denser regions, or the substation network could be expanded.

- In order to expand the production of renewable energy in the region, including supporting EV charging points, there will be a requirement to have strong grid connections and sub stations.



Further supporting information on Energy & Electricity sector can be found in Appendix 5.7.

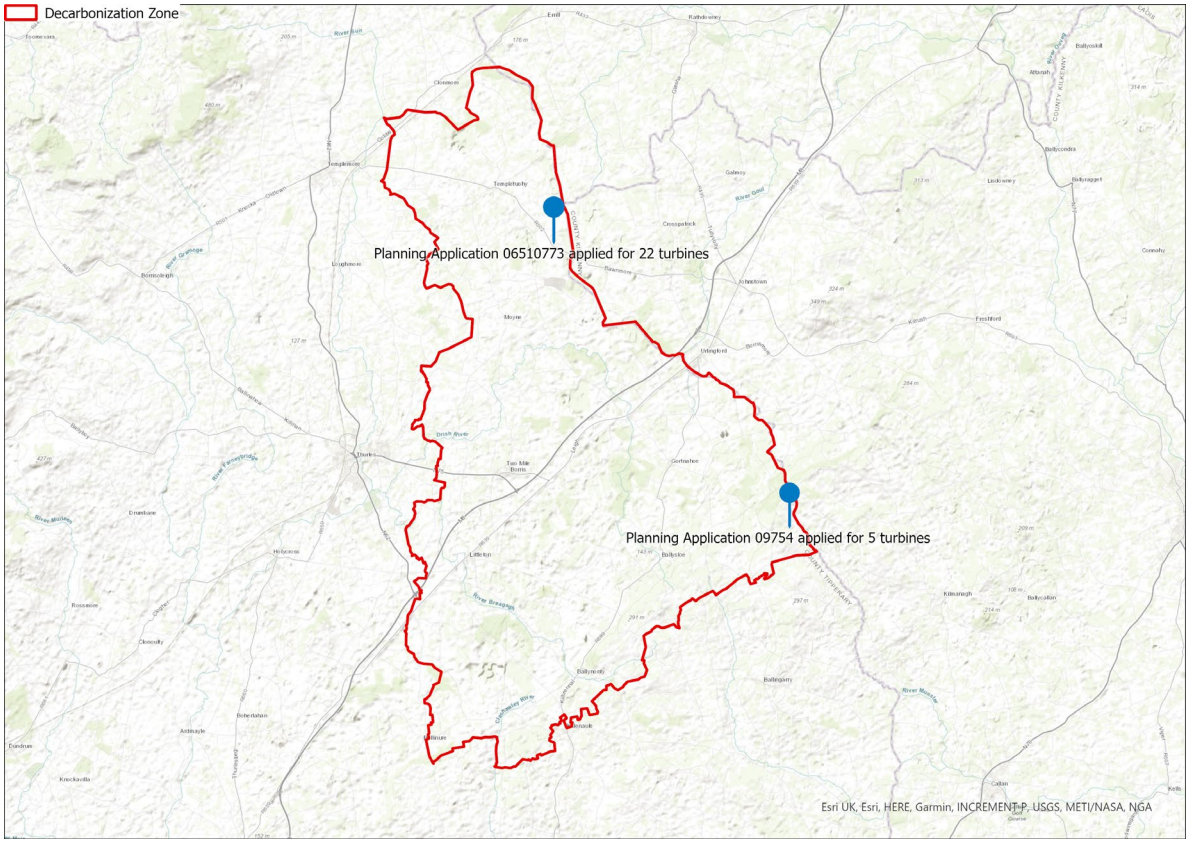
4.2.7.4 Energy & Electricity Sector Analysis (cont..)

Energy & Electricity Sector: Proposed Windfarm Developments

- The Mid-Tipperary DZ area has a18 turbine (36 MW) windfarm at the National Bioeconomy Campus located at Lisheen.

- Planning permission has been submitted for an additional 22 wind turbines at the former Lisheen Mine site. Furthermore, there is planning submitted for 5 turbines at the Cnoc Windfarm. A visual representation of these applications is presented on the right.

- These developments will play a crucial role in reducing the DZ's overreliance on fossil fuels. Access to secure, clean and affordable energy is essential for the future economic and social development of the DZ



4.2.7.5 Energy & Electricity Sector Analysis (cont..)

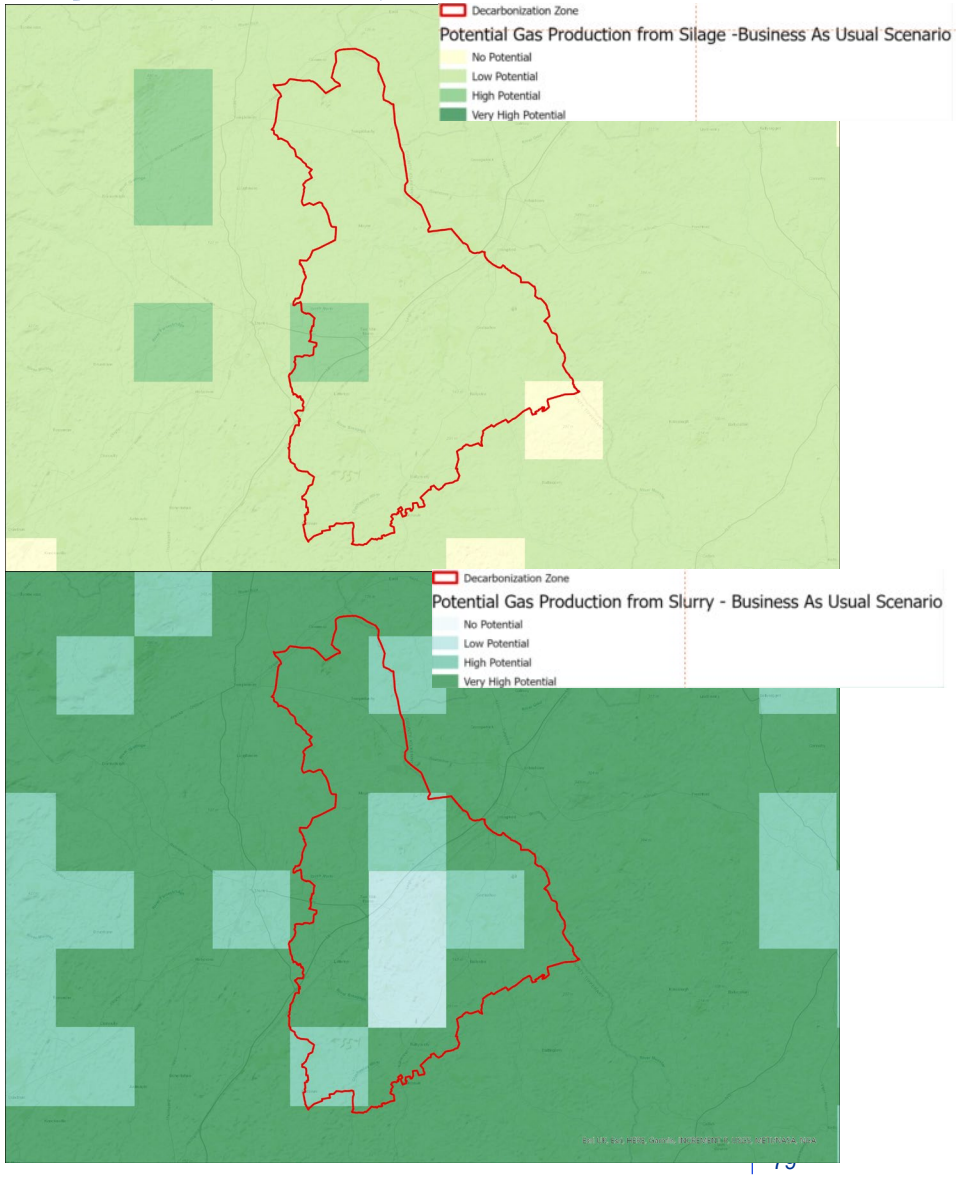
Energy & Electricity Sector: Agriculture – Gas Production

- Biogas and biomethane can be produced and utilised in a variety of ways. Anaerobic digestion (AD) plants can utilise a wide variety of feedstocks ranging from food wastes, to animal slurries to specifically grown energy crops such as grass silage.

- The potential biogas production from silage in the Mid-Tipperary DZ is low potential in the majority of the region, with a small pocket of high potential in the west.

- Conversely, the biogas production potential from slurry in the same region is of very high / high potential for approximately half of the land area, with some areas of low / no potential in the centre of the DZ.

- The production of biogas from this region will utilise an Irish-indigenous energy supply, produced by local by-products as feedstocks. This will enable the government's ambitions for domestic green energy production, as well as supporting the transition towards more circular models that enable the circular economy objectives of the Climate Action plan 2023.



Further supporting information on Energy & Electricity sector can be found in Appendix 5.7.

4.2.7.6 Energy & Electricity Sector Analysis (cont..)

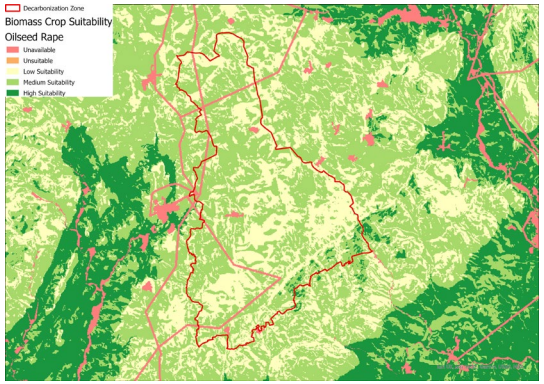
Energy & Electricity Sector: Agriculture – Biomass crop suitability

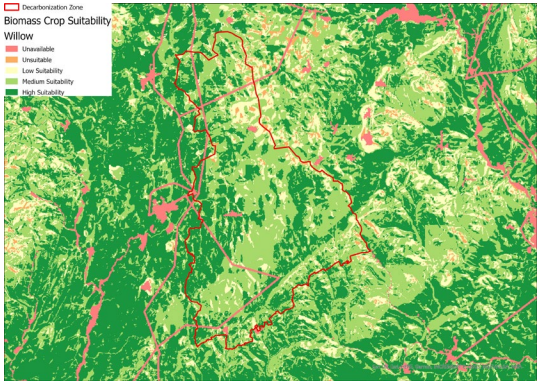
- Using local biomass crops as a fuel source for Irish energy generation promotes the use of indigenous and green resources for energy production in Ireland. This also assists in meeting the governments renewable energy targets.

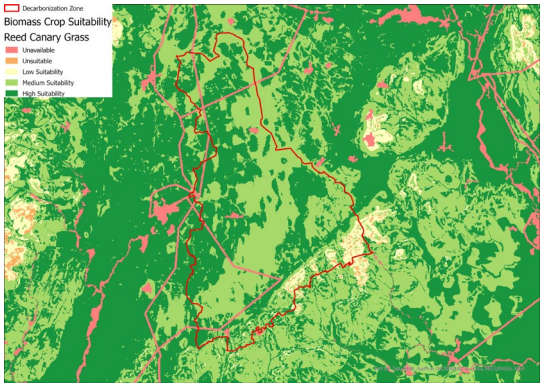
- Much of the Mid-Tipperary DZ is covered in croplands, with the vast majority of these suitable for biomass production. Of these, Oilseed rape, Willow, and Red Canary Grass have medium-high suitability categorisations, with only small pockets of land on the region being classified as unviable or unsuitable. Miscanthus scores lower than the other biomass crops as unsuitable, however some areas of the land area in the DZ falls under the low-medium classification. It would therefore be highly viable for a combination of these crops to be planted across the region as biomass crops with relatively low risk and demand for fertilisers.

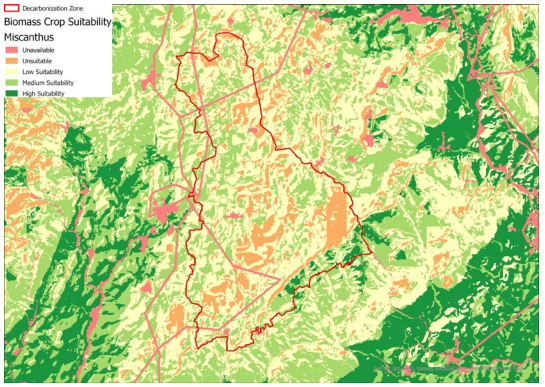
- Potential socioeconomic benefits could include providing increased/steady employment through an additional export commodity for the Mid-Tipperary DZ region.

- These biomass crops could be transported out of the DZ region to biomass-fed powerplants, such as the Bord na Mona plant in Edenderry.









4.3 Conclusions and Recommendations

4.3 Conclusions and Recommendations

Carbon emissions within an area, such as the DZ area, generally reflect trends such as the level of economic activity, energy use and potentially growth. The challenge for the DZ area (and other areas) is to support sustainable growth and improvement whilst reducing carbon emissions in a just and meaningful manner.

This report highlights the carbon hotspots within the DZ area. A range of sectoral-specific measures to reduce carbon emissions can be explored by Tipperary County Council during the next stages of the DZ development, including stakeholder engagement and a register of opportunities for action planning. Examples of key measures specific to these sectors to consider are set out on the following pages.

In addition to sectoral specific measures, local authorities can also engage with relevant government departments to develop and resource programmes which will directly and indirectly provide the necessary tools to enable an effective transition to a low-carbon economy. These include but are not limited to:

- Citizen engagement and awareness raising to promote behavioural change across the DZ area;
- Internal capacity building to equip employees with the knowledge and skills to promote decarbonisation;
- Support for external initiatives such as innovation and knowledge-sharing hubs.

In particular, the ability of this DZ area to benefit from its inclusion in the Just Transition Fund programme (JFT) will offer significant opportunities for investment in climate action, noting the correlation between many of the funding programmes under the JTF and the focus areas of the DZ outlined in the report.

4.3 Conclusions and Recommendations (cont..)

Residential (including Social Housing):

Achieving a low carbon housing stock is an important part of the DZ area successfully achieving national carbon reduction targets.

Targeting existing and proposed and/or new residential developments with suitable measures to optimise energy efficiencies and carbon emissions reductions is a key part of decarbonising the residential sector.

National, government resourced programmes to incentivise retrofit of private and social housing will be critical. The government has committed to providing increased funding to accelerate retrofitting, including free upgrades for low-income households.

Roll-out of energy management systems and smart meters to council owned buildings, such as social housing is an effective measure to manage and understand energy use and trends in demand.

Potential for renewable energy heat sources is also encouraged by the CAP, including the installation of heat pumps at existing residential units as well as new developments and use of renewable gas.

District heating is also a key part of achieving and optimising decarbonisation of the residential sector.

For proposed and new residential developments, National Building Standards revision will be required to reach net zero targets.

Commercial & Public Sector:

Similar to the residential sector, optimising the energy efficiency of existing commercial and public sector buildings is key to meeting national carbon targets.

The CAP provides an overview of key potential measures to drive decarbonisation across the commercial & public sector. For example:

- A retrofitting programme to upgrade existing buildings could optimise the energy efficiency of current building stock which range between A1 BER rated to G BER rated buildings.
- In addition, opportunities for the use of renewable energy are also encouraged including the use of heat pumps and renewable gas for commercial buildings.
- Public sector buildings can avail of SEAI supports promoting energy efficiency including the ‘Gap to Target’ tool as well as the Building Pathfinder Programme which supports building retrofits.
- Appropriate knowledge and skills are required to enable energy efficiency improvements in protected buildings – to understand, specify and install appropriate retrofitting within these protected buildings, specialists are required.
- Potential for renewable energy heat sources should be explored including the use of renewable gas as well as district heating opportunities to reduce energy consumption and carbon emissions at public and protected buildings.
- Leveraging the public procurement process can embed low carbon, sustainable criteria at the earliest stages of new public sector building developments.

4.3 Conclusions and Recommendations (cont..)

Transport:

A shift to active travel and increased uptake of public transport is key to the achievement of Ireland's national carbon targets.

A key focus of the CAP and also mentioned in the National Planning Framework (NPF) is sustainable mobility. The provision of sustainable modes of travel such as public transport, walking and cycling will contribute towards reducing greenhouse gas emissions.

As highlighted in the report, the primary mode of transport in the DZ is the private car, with current public transport options limited. Further expansion of the local link network and improved connectivity to larger transport hubs such as Thurles will increase the uptake of sustainable transport modes.

In addition, investment in electric vehicles (EVs), and increased charging facilities are part of the solution. The provision of EV charging is driven by the Department of Transport (DOT) and the Department of the Environment, Climate and Communications (DECC).

Tipperary County Council could play a role in advocating for Sustainable Travel and Mobility, and better connectivity in the area with national transport networks in a number of ways:

- Support 'Local Link' in decarbonising their fleet;
- Support the roll out EV charging points in the area;
- Through the Green Schools Programme carry out a review of school's travel patterns.

Waste & Circular Economy:

Local authorities can play a key role in minimising waste and embracing circular economy principles. Tipperary County Council can consider the implementation of targeted initiatives to reduce waste-related emissions and embrace circular economy principles, including:

- Deposit and return schemes for plastic and aluminium beverage containers;
- Promotion of trials for better public recycling opportunities on street and at Bring Centres;
- Improvement of segregation and collection performance to increase recycling and reduce contamination.

This DZ designation based around Lisheen Mine and Lisheen Bog area, centred on the National Bioeconomy Campus recognises the importance of the Bioeconomy in Tipperary and the potential for synergies with other areas including renewable energy, tourism and amenity. The Bioeconomy has major untapped potential to support both climate change mitigation and adaptation and an innovative circular economy with value-added opportunities. This is because in current bio-based industrial systems, the full value of biomass is not fully unlocked and there is very significant potential to sustainably cascade the use of biomass and create value from biological waste.

Tipperary County Council could seek to maximise funding opportunities through the EU-Just Transition Fund and other available programmes to realise the vision for the National Bio-Economy Campus.

In addition, capacity building will play a key role in closing Ireland's circularity gap at a local level. Current measures in place to support this include the Local Authority Prevention Network (LAPN), which involves cooperation between the EPA and local authorities to build local authority expertise and capacity in waste prevention and circular economy at the local level.

4.3 Conclusions and Recommendations (cont..)

Agriculture:

As presented in this BEI assessment, agricultural activities in the DZ area account for a large proportion of total carbon emissions.

Although larger than national trends (Ireland's agriculture sector accounts for approximately one-third of annual carbon emissions), it reflects the dependence of the DZ area on the agriculture sector.

CAP 23 and Teagasc have called out a range of key measures for farmers and the agricultural sector to implement in order to effectively reduce emissions, including reducing chemical fertiliser use, reducing calving age and improving animal feeding.

Tipperary County Council could explore opportunities to engage with farmers as well as government bodies and Teagasc.

The council could explore nature-based solutions for the agricultural sector, as well as provide information to farmers on low-carbon farming practices. The consideration of a collaborative/innovative approach to Nature-Based (NBS) with multiple stakeholders across the DZ could see the development of biodiversity-rich solutions to support water quality improvement, carbon capture and flood risk management, among others.

In addition, Tipperary County Council could further explore the bioeconomy potential of the DZ, with a specific focus on the agricultural sector to support and promote the development of the National Bio-Economy Campus located at Lisheen. The first National Policy Statement on the Bioeconomy was published in 2018, and subsequently, during 2018 the first Bioeconomy Day in Ireland was held at the National Bioeconomy Campus, where the IBF as well as the Campus were officially launched that day.

LULUCF:

Afforestation and rewetting of grasslands are key measures that Tipperary County Council can support while acknowledging the DZ area's reliance on agricultural activities.

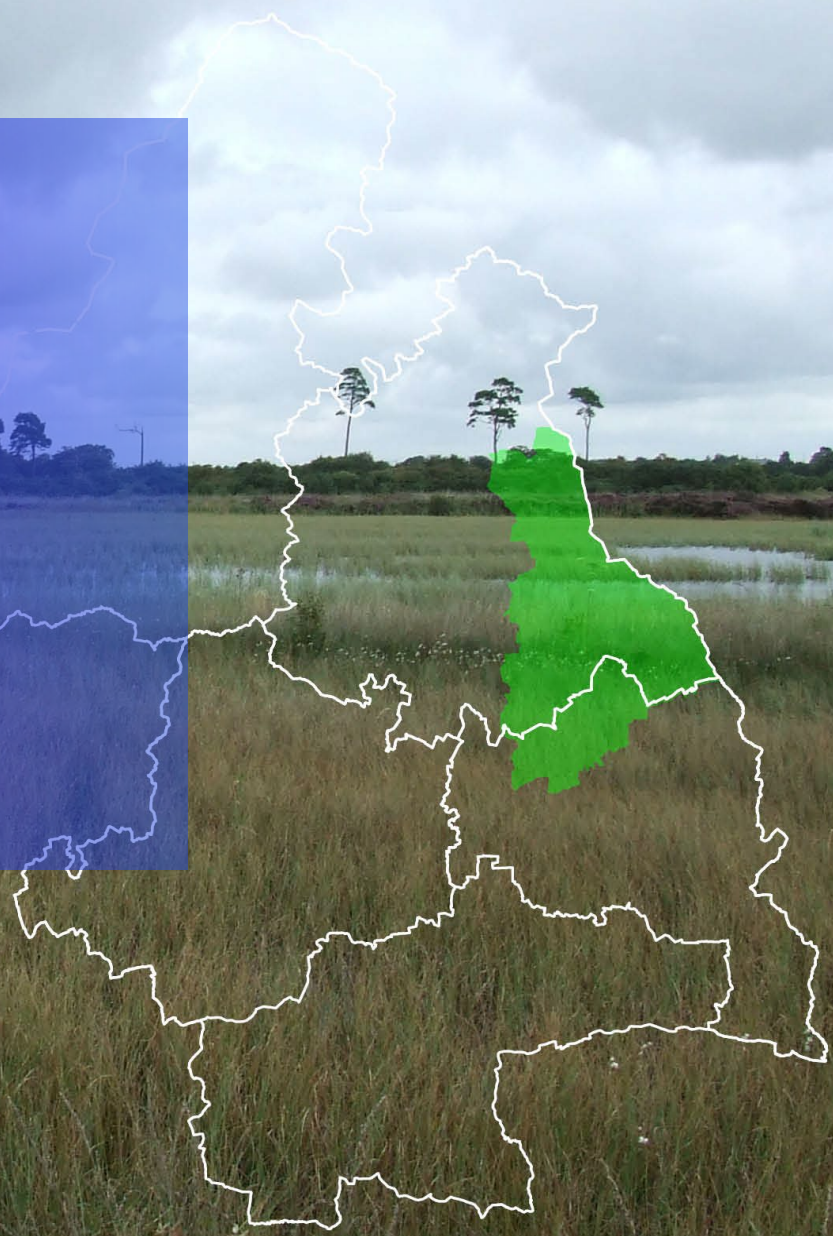
In addition, improving the management of land is imperative for the LULUCF sector to become a sink, rather than a source of carbon emissions. Tipperary County Council could explore opportunities to support farmers and the agriculture sector to better manage agricultural land to optimise carbon storage.

As highlighted in the LULUCF chapter, restoring and/or enhancing the existing pasture and peatlands within the DZ could pivot the region to being a net sink of GHG emissions rather than the current state as being a net source. Other opportunities could include diversification of peatlands, for example, the sustainable development of renewable energy, and or tourism-related facilities, whilst ensuring the conservation of their ecological, archaeological, cultural and educational significance in line with the National Peatlands Strategy.

Furthermore, The Climate Action Plan (DCCAE, 2019) deals with the role of forestry in climate action with a key aim of supporting new plantations and sustainable forest management of existing forests. Support measures include the promotion of agroforestry and 'neighbourfoods' and the Teagasc 'Native Woodland Scheme'.

05

Appendices



5.1 Socio Economic

5.1.1 Data Sources, Assumptions & Limitations: Spatial Data

Sector	Data source	Data source link	Data assumption	Data limitation
Socio-economic	Unemployment 2016	https://www.cso.ie/en/census/census2016reports/census2016smallareapopulationstatistics	Number of unemployed by small area	2016 data is used to reflect 2018 baseline year. This is due to no 2018 specific data being made available. 2016 data is deemed a reasonable proxy for 2018.
	POBAL Deprivation 2016	https://www.pobal.ie/research-analysis/open-data	Deprivation Index 2016 by ED	2016 data is used to reflect 2018 baseline year. This is due to no 2018 specific data being made available. 2016 data is deemed a reasonable proxy for 2018.
	Population Density	https://www.cso.ie/en/census/census2016reports/census2016smallareapopulationstatistics	Total Population per Small Area	2016 data is used to reflect 2018 baseline year. This is due to no 2018 specific data being made available. 2016 data is deemed a reasonable proxy for 2018.
	Zoning	https://viewer.myplan.ie	Tipperary County Development Plan 2022 - 2028	No limitation in data set.

5.2 Residential Sector

5.2.1 Data Sources, Assumptions & Limitations: Spatial Data

Sector	Data source	Data source link	Data assumption	Data limitation
Residential	Housing Stock	https://www.cso.ie/en/census/census2016reports/census2016smallareapopulationstatistics	Average Built Year of Housing Stock by Small Area	2016 data is used to reflect 2018 baseline year. This is due to no 2018 specific data being made available. 2016 data is deemed a reasonable proxy for 2018.
	BER Ratings	https://gis.seai.ie/server/services	Domestic BER Ratings	No limitation in data set. Additional information on the data source can be found here: Understand BER Ratings | Home Energy | SEAI
	Annual Heat Demand	https://gis.seai.ie/server/services	Residential Sector – Annual Heat Demand	No limitation in data set. Additional information on the data source can be found here: Map Of Heat Demand In Ireland | SEAI GIS Maps | SEAI

5.2.2 Data Sources, Assumptions & Limitations: Non-Spatial Data

Sector	Data source name & description	Data source link	Data assumption	Data limitation	Overview of methodology used
Residential	CSO	https://data.cso.ie/	No. of housing units in the DZ area	Data used is representative of 2016 data is used to reflect 2018 baseline year. This is due to no 2018 specific data being made available. 2016 data is deemed a reasonable proxy for 2018	CSO data on number of residential buildings has been combined with BER Research Tool data to estimate total energy consumption
	SEAI BER Research Tool	https://ndber.seai.ie/BERResearchTool/ber/search.aspx	The average energy consumption per dwelling type and built period	The research tool does not contain total delivered energy consumption of all houses in the DZ area but can be considered a good proxy.	
	CSO	https://data.cso.ie/	Fuel breakdown of the residential sector within the DZ	CSO data reflective of 2016 has been used to inform fuel type breakdown within the residential sector. This data is reflective of the DZ area residential sector activities.	
	SEAI Conversion Factors	https://www.seai.ie/data-and-insights/seai-statistics/conversion-factors/	Carbon intensity factors for each energy source	The SEAI conversion factors represent some of the most robust carbon benchmarks for fuel types in Ireland and would be considered a strong proxy for carbon calculations in the DZ	
	Tipperary Co Co	Tipperary Co Co	No. of social housing units in the DZ	No limitation in data set	Social housing stock has been provided by Tipperary County Council.

5.2.3 Supporting Data: Residential Sector

Residential Sector: Energy & Carbon Emissions

Weighted average of CSO data of dwelling types in DZ area. ***Note that number of house/bungalow & flat/apartment by construction period is not available from the CSO.***

	Number														
Built Period	BALLYMURREEN	BUOLICK	FENNOR	GRAYSTOWN	KILCOOLY	KILLENAULE	LITTLETON	LONGFORDPASS	MOYNE	NEW BIRMINGHAM	POYNTSTOWN	RAHELTY	TEMPLETOUHY	TWO-MILE-BORRIS	TOTAL
All years	**89**	**229**	**189**	**152**	**105**	**453**	**390**	**97**	**185**	**163**	**71**	**242**	**301**	**283**	**2,949**
Before 1919	20	36	31	34	22	66	33	20	39	22	21	32	76	13	**464**
1919 to 1970	23	42	57	38	22	45	40	5	16	13	9	17	28	12	**369**
1971-1990	22	52	49	34	23	39	43	8	14	22	7	18	39	16	**386**
1991-2000	8	28	15	17	10	37	31	5	11	19	1	18	18	9	**228**
2001-2005	7	33	16	12	11	57	90	10	21	25	5	39	29	41	**396**
2006-2011	7	33	16	12	11	61	63	11	19	11	7	22	25	44	**342**
2012 onwards	3	5	5	4	5	61	37	8	17	18	7	33	28	53	**284**

Weighted average of CSO data of dwelling types in DZ area.

	Number														
Dwelling type	BALLYMURREEN	BUOLICK	FENNOR	GRAYSTOWN	KILCOOLY	KILLENAULE	LITTLETON	LONGFORDPASS	MOYNE	NEW BIRMINGHAM	POYNTSTOWN	RAHELTY	TEMPLETOUHY	TWO-MILE-BORRIS	TOTAL
All households	95	233	191	153	105	453	395	99	185	164	72	245	302	286	**2,979**
House/Bungalow	95	232	191	152	105	446	392	99	183	164	72	245	301	286	**2,963**
Flat/Apartment	0	1	0	1	0	7	3	0	2	0	0	0	1	0	**16**

5.2.4 Supporting Data: Residential Sector

Residential Sector: Occupied Dwellings: Energy & Carbon Emissions

Central heating energy source split of holiday homes across EDs within the DZ.

	Percentage													
Fuel type	BALLYMURREEN	BUOLICK	FENNOR	GRAYSTOWN	KILCOOLY	KILLENAULE	LITTLETON	LONGFORDPASS	MOYNE	NEW BIRMINGHAM	POYNTSTOWN	RAHELTY	TEMPLETOUHY	TWO-MILE-BORRIS
Coal	66%	63%	70%	68%	62%	64%	61%	63%	66%	62%	55%	78%	48%	70%
Peat	0%	0%	1%	0%	0%	0%	0%	1%	0%	1%	0%	0%	<1%	0%
Oil	2%	1%	1%	3%	4%	1%	2%	1%	1%	2%	1%	2%	2%	2%
LPG	2%	14%	6%	7%	5%	19%	7%	1%	3%	6%	14%	5%	5%	10%
Natural Gas	20%	17%	19%	15%	17%	11%	25%	31%	26%	23%	25%	11%	40%	14%
Renewables	2%	0%	0%	1%	0%	<1%	1%	0%	0%	0%	0%	0%	1%	0%
Electricity	6%	5%	3%	4%	10%	4%	3%	2%	4%	5%	4%	4%	2%	3%
Wood	0%	0%	0%	1%	2%	1%	2%	1%	1%	0%	0%	1%	1%	1%
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

5.2.5 Supporting Data: Residential Sector

Residential Sector: Energy & Carbon Emissions

Calculation of average energy consumption for housing units in the DZ grouped by dwelling type and construction period

	kWh/year
Dwelling type	**All years**
All years	28,905
Before 1919	50,461
1919 to 1970	32,759
1971-1990	24,066
1991-2000	26,826
2001-2005	25,262
2006-2011	20.930
2012 onwards	18,568

KPMG calculation of average energy consumption for housing units in the DZ grouped by dwelling type

	kWh/year
Dwelling type	**All years**
House/Bungalow	28,905
Flat/Apartment	N/A*

**Note that apartments within the DZ did not contain any BER Research Tool data on total delivered energy.*

SEAI carbon emission conversion factors

Energy source	gCO_2/kWh
Coal	340.6
Peat	355.9
Residual Oil	273.6
LPG	229.3
Natural Gas	204.7
Renewables	0
Electricity	375.2
Wood	15.1

5.2.6 Supporting Data: Residential Sector

Residential Sector: Occupied Dwellings: Energy & Carbon Emissions

CSO 2016 CSO Occupancy of homes across EDs within the DZ.

	%														
Fuel type	**Ballymurreen**	**Buolick**	**Fennor**	**Graystown**	**Kilcooly**	**Killenaule**	**Littleton**	**Longfordpass**	**Moyne**	**New birmingham**	**Poyntstown**	**Rahelty**	**Templetouhy**	**Two-Mile-Borris**	**Average**
Occupied	93%	82%	67%	87%	87%	82%	93%	87%	84%	88%	83%	87%	85%	90%	86%
Temporarily absent	0%	2%	2%	2%	0%	2%	0%	3%	3%	2%	3%	2%	2%	3%	2%
Unoccupied holiday homes	0%	2%	1%	2%	2%	1%	0%	0%	0%	1%	2%	0%	3%	2%	1%
Other vacant dwellings	7%	14%	5%	9%	12%	15%	7%	11%	13%	10%	12%	10%	10%	6%	10%

5.2.7 Supporting Data: Residential Sector

Residential Sector: Social Housing: Energy & Carbon Emissions

Number of social housing units in the DZ area

	Number
Electoral District	Social Housing units
All EDs	347

Calculation of average energy use for all social housing units in the DZ

	kWh/year
Dwelling type	All years
All households	20,294

5.3 Commercial & Public Sector

5.3.1 Data Sources, Assumptions & Limitations: Spatial Data

Sector	Data source	Data source link	Data assumption	Data limitation
Commercial & Public	BER Ratings	https://gis.seai.ie/server/services	Non-Domestic BER Ratings	No limitation in data set. Additional information on the data source can be found here: Understand BER Ratings | Home Energy | SEAI
	Annual Heat Demand	https://gis.seai.ie/server/services	Commercial and Public Sector – Annual Heat Demand	No limitation in data set. Additional information on the data source can be found here: Map Of Heat Demand In Ireland | SEAI GIS Maps | SEAI
	Buildings Number and Locations	Tipperary County Council	Geodirectory Building Use Locations	2022 data is used to reflect 2018 baseline year. This is due to no 2018 specific data being made available. 2022 data is deemed a reasonable proxy for 2018.

5.3.2 Data Sources, Assumptions & Limitations: Non-Spatial Data

Sector	Data source name & description	Data source link	Data assumption	Data limitation	Overview of methodology used
Commercial & Public Sector	OSI (PRIME2 dataset)	https://osi.ie/wp-content/uploads/2018/04/PRIME2-Client-Documentation-Concepts-V-02.4.pdf	Number of buildings by type in the DZ area reflecting the 2018 baseline year	The OSI PRIME2 dataset is considered a strong proxy for spatial data pertaining to commercial building types across Ireland, however a potential limitation could be the generic classification of some buildings that were removed from our analysis (e.g., general buildings, which could be either residential or commercial)	The OSI data combined with CIBSE benchmarks has been used to calculate the estimated energy consumption for each of the building types in the DZ area. National commercial and public sector energy split (%) has been applied to energy consumption and converted to carbon emissions.
	CIBSE (energy benchmarks for building types)	https://www.cibse.org/knowledge-research/knowledge-resources/knowledge-toolbox/benchmarking-registration#:~:text=CIBSE's%20Energy%20Benchmarking%20Tool%20is,of%20energy%20use%20in%20buildings.	CIBSE benchmarks are assumed to be representative of same building types in the DZ	CIBSE benchmarks are a UK data source based on energy consumption data gathered in the UK. The benchmarks do not reflect actual energy consumption in the DZ area but are considered a good proxy.	
	SEAI (national energy breakdown for commercial and public sector)	https://www.seai.ie/publications/Previous-Energy-Balances.xlsx	National fuel energy split was used, in conjunction with local knowledge and energy SME input to decide on the most relevant energy split for the commercial and public sector in Mid-Tipperary DZ	The national energy split reflects energy consumption of the commercial and public sector at a national level. Although not an actual reflection of energy consumption at the DZ area level, it is a considered to be a good proxy.	
	SEAI Conversion Factors	https://www.seai.ie/data-and-insights/seai-statistics/conversion-factors/	Carbon intensity factors for each energy source	The SEAI conversion factors represent some of the most robust carbon benchmarks for fuel types in Ireland and would be considered a strong proxy for carbon calculations in the DZ	

5.3.3 Supporting Data: Commercial & Public Sector

Commercial & Public Sector: Energy & Carbon Emissions

Breakdown of commercial building types in the DZ area

Row Labels	Count of GUID	Sum of Area
Other	**228**	**54,464.44168**
Building General	184	47,589.00534
Church	1	89.123408
Detached Building	36	4,570.578448
Garda Station	1	30.721467
Gate Lodge	1	75.306012
Semi-Detached Building	3	313.948938
Stable	2	1,795.758062
Mixed Use	**429**	**78,520.89335**
Building General	346	62,511.85224
Castle	1	359.899582
Detached Building	80	14,732.39292
Garda Station	1	152.593095
Stable	1	764.155511
Commercial	**134**	**59,966.29228**
Building General	117	48,169.14716
Church	3	1,361.103061
Clubhouse	1	586.706867
Detached Building	2	362.695853
Hotel	1	3,590.781054
School	10	5,895.858283
Grand Total	**791**	**192,951.6273**

5.3.4 Supporting Data: Commercial & Public Sector

Commercial & Public Sector: Energy & Carbon Emissions

Energy benchmarks used for commercial buildings types in the DZ area

Building type	Typical practice fossil fuels (kWh/m²)	Typical practice electricity (kWh/m²)	Building type	Typical practice fossil fuels (kWh/m²)	Typical practice electricity (kWh/m²)
Retail	169	287	Police Station	164	143
Office	151	85	Fire station	173	83
Restaurant/ public house	1250	730	Town Hall	159	101
Hotel	400	140	Car Park (enclosed)	0	15
Warehouses	169	67	Other	333	162
Workshops/ maintenance depot	311	39	Department Stores	248	294
Industrial process building	96	0	Banks and building societies	98	101
Hospitals and primary health care	267	113	Cinema	620	160
Community/ day centre	139	47	Courts (combined County/Crown)	122	82
Nursing residential homes and hostels	337	83	Library	106	69
Schools and colleges	111	41	Post offices	210	70
Church	150	20			
Sports ground changing facility	216	164			

Carbon emissions factors

Energy source	gCO_2/kWh
Oil	274
Coal	341
Natural Gas	205
Electricity	375
Renewables	0

National Commercial and Public Sector energy consumption breakdown

Fuel split in commercial sector	Commercial/Public Services	%	% fossil fuel only
Coal	0.52	0.03%	0.1%
Oil	241	14%	40%
Natural Gas	329	20%	54%
Renewables	39	2%	7%
Electricity	1,079	64%	-
Total	**1,688**	**100%**	**100%**

5.3.5 Supporting Data: Commercial & Public Sector

Commercial & Public Sector: Energy & Carbon Emissions

Commercial & Public Sector carbon emissions by ED

ED	Number of buildings	Fuel use (tCO2e)	Electricity use (tCO2e)	Total
Ballymurreen	32	913.5	732.5	**1646**
Buolick	69	975.1	925.5	**1900.6**
Fennor	70	835.1	1019.6	**1854.7**
Graystown	30	390.7	334.8	**725.52**
Kilcooly	46	553.6	653.9	**1207.4**
Killenaule	53	1668.7	1438.1	**3106.7**
Littleton	101	2003.6	1816.8	**3820.5**
Longfordpass	37	1112.7	986.8	**2099.5**
Loughmore	1	11.2	9.3	**20.463**
Moyne	83	1043.5	1099.5	**2143**
New birmingham	43	608.4	563.9	**1172.3**
Poyntstown	28	234.7	206.7	**441.39**
Rahelty	51	633.2	606.1	**1239.3**
Templetouhy	90	1077.0	1086.9	**2163.9**
Two-Mile-Borris	57	882.9	793.4	**1676.2**
Grand Total	**791**	**12943.8**	**12273.7**	**25218**

5.4 Transport

5.4.1 Data Sources, Assumptions & Limitations: Spatial Data

Sector	Data source	Data source link	Data assumption	Data limitation
Transport	Transport Carbon Emissions	https://projects.au.dk/mapeire/spatial-results/download	MapEire modelled transport carbon emissions	No limitation in data set. Additional information on the data source can be found here: https://projects.au.dk/mapeire/spatial-results
	POWSCAR (Place of Work, School or College)	Census 2016 Place of Work, School or College - Census of Anonymised Records (POWSCAR) - CSO - Central Statistics Office	Commuting and Carbon Emissions	2016 data is used to reflect 2018 baseline year. This is due to no 2018 specific data being made available. 2016 data is deemed a reasonable proxy for 2018.
	Bus Stops	Data.gov.ie	Bus stops Locations	No limitation in data set.

5.4.2 Data Sources, Assumptions & Limitations: Non-Spatial Data

Sector	Data source name & description	Data source link	Data assumption	Data limitation	Overview of methodology used
Transport	Transport Omnibus	https://www.cso.ie/en/statistics/transport/transportomnibus/	Number of vehicles licenced by end of 2018 in Tipperary.	Number of vehicles for Tipperary County have only been made available. To estimate number of vehicles in the DZ area, total numbers have been proportioned down based on population.	To estimate transport emissions in the DZ area number of vehicles by vehicle type has been combined with transport energy split provided by SEAI to understand energy consumption by transport mode. This energy consumption has then been converted into carbon emissions using robust SEAI factors. Note that this assessment accounts for vehicles owned and licenced within the area and does not reflect all transport movements within the DZ area.
	SEAI National Energy Balance	https://www.seai.ie/publications/Previous-Energy-Balances.xlsx	Total energy consumed per transport mode presented by energy source	Representative of national data rather than the DZ area.	
	SEAI Conversion Factors	https://www.seai.ie/data-and-insights/seai-statistics/conversion-factors/	Carbon intensity factors for each transport energy source	n/a	
	POWSCAR (Place of Work, School or College)	Census 2016 Place of Work, School or College - Census of Anonymised Records (POWSCAR) - CSO - Central Statistics Office	Commuting patterns into and out of the DZ area to surrounding EDs for work, school and college. Trips are assumed to be daily, single trips.	2016 data is used to reflect 2018 baseline year. This is due to no 2018 specific data being made available. 2016 data is deemed a reasonable proxy for 2018.	To estimate carbon emissions associated with commuting patterns in the DZ area, POWSCAR data has been relied upon to understand distances travelled from start to end point by residents travelling in and out of the DZ area. Distances have been applied to the travel mode split typical of the DZ area. Total distances by travel mode have then been converted into carbon emissions using robust UK Government factors.
	CSO	https://www.cso.ie/en/census/census2016reports/census2016smallareapopulationstatistics	Travel modes for work, school and college for residents of the DZ area	2016 data is used to reflect 2018 baseline year. This is due to no 2018 specific data being made available. 2016 data is deemed a reasonable proxy for 2018.	
	CSO	https://www.cso.ie/en/releasesandpublications/er/vlftm/vehicleslicensedforthefirsttimedecemberandyear2018/	Private car fuel split	n/a	
	UK Government Conversion Factors	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/715426/Conversion_Factors_2018_-_Full_set__for_advanced_users__v01-01.xls	Carbon intensity factors for each transport mode	n/a	

5.4.3 Supporting Data: Transport Sector

Transport Sector: Energy & Carbon Emissions

Licenced vehicles in the DZ area in 2018

Licenced vehicles categories (Transport Omnibus)	DZ area (number)*	Tipperary County Council (number)
Road Freight	9	191
Road Light Goods Vehicle	1,056	23,582
Road Private Car	3,568	79,705
Public Passenger Services	26	591
Total	**4.658**	**104.069**

Carbon emissions factors

Energy source	gCO_2/kWh
Gasoline	251.9
Gasoil / Diesel /DERV	263.9
LPG	229.3
Natural Gas	204.7
Electricity	375.2

5% of Tipperary County Council residents reside in the DZ area. Numbers of licenced vehicles in the DZ area have been estimated by multiplying Tipperary County Council licenced vehicles (made available by the CSO Transport Omnibus) by 5% to reflect likely licenced vehicles numbers in the DZ area.

National Transport Energy consumption broken down by transport mode and energy source. ***Note that 'Oil' is a sum of 'Gasoline', 'LPG', 'Gasoil/Diesel/DERV' and 'Renewables' is a sum of 'Biodiesel' and 'Bioethanol'. These 'sub-categories' are included in italics below for completeness.***

	Energy consumption (MWh)									
Transport mode	**Oil**	***Gasoline***	***LPG***	***Gasoil / Diesel /DERV***	**Natural Gas**	**Renewables**	***Biodiesel***	***Bioethanol***	**Electricity**	**Total**
Road Freight	8,182,762	-	-	8,182,762	346	350,788	350,788	-	-	8,533,895
Road Light Goods Vehicle	3,828,407	-	-	3,828,407	-	164,120	164,120	-	-	3,992,528
Road Private Car	23,129,880	7,845,370	21,540	15,262,970	-	914,095	654,310	259,785	12,389	24,056,364
Public Passenger Services	1,537,385	75,657	-	1,461,728	-	65,168	62,663	2,505	-	1,602,553
Total	**36,678,434**	**7,921,027**	**21,540**	**28,735,867**	**346**	**1,494,171**	**1,231,881**	**262,290**	**12,389**	**38,185,340**

5.4.4 Supporting Data: Transport Sector

Transport Sector: Commuting & Carbon Emissions

Transport mode to work or school in the DZ area in 2018

Transport Mode	Total %
On foot	**14%**
Bicycle	**1%**
Bus minibus or coach	**6%**
Train DART or LUAS	**1%**
Motorcycle or scooter	**1%**
Car driver	***71%***
Diesel	**45%**
Petrol	**21%**
Plug-in Hybrid Electric Vehicle	**4%**
Battery Electric Vehicle	**1%**
Hybrid	**0%**
Van	**4%**
Work mainly at or from home	**2%**
Total	**100%**

Carbon emissions factors

Transport Mode	Carbon factor (kg CO_2e/pass.km or kg CO_2e/km)
On foot	-
Bicycle	-
Bus minibus or coach	0.10
Train DART or LUAS	0.04
Motorcycle or scooter	0.12
Diesel	0.18
Petrol	0.18
Plug-in Hybrid Electric Vehicle	0.12
Battery Electric Vehicle	0.07
Hybrid	0.13
Van: Diesel	0.26

Private car fuel type, national data

Fuel type	Petrol	Diesel	Electric	Hybrid	Other	Total
% of private cars using fuel type	29%	64%	1%	6%	0%	100%

5.5 Agriculture

5.5.1 Data Sources, Assumptions & Limitations: Spatial Data

Sector	Data source	Data source link	Data assumption	Data limitation
Agriculture	Agriculture Carbon Emissions	https://projects.au.dk/mapeire/spatial-results/download	MapEire modelled agriculture carbon emissions	No limitation in data set. Additional information on the data source can be found here: https://projects.au.dk/mapeire/spatial-results

5.5.2 Data Sources, Assumptions & Limitations: Non-Spatial Data

Sector	Data source name & description	Data source link	Data assumption	Data limitation	Overview of methodology used
Agriculture	CSO & Department for Agriculture, Food and the Marine (DAFM)	https://data.gov.ie/dataset/dafm-2020-average-beef-and-dairy-herds-per-electoral-division?package_type=dataset https://data.cso.ie/	Number of Livestock broken down by livestock type	2020 data is used to reflect 2018 baseline year. This is due to no 2018 specific data being made available. 2020 data is deemed a reasonable proxy for 2018	Total livestock numbers have been combined with: • Teagasc's methane emissions benchmarks to estimate enteric fermentation related emissions in the DZ area • Defra estimated energy consumption benchmarks
	Teagasc	https://www.teagasc.ie/environment/climate-change--air-quality/methane/	Methane emissions benchmarks representing beef cattle and dairy cow enteric fermentation (gCH_4/beef cattle/day & gCH_4/dairy cow/day)	n/a	
	Defra	n/a	Carbon dioxide emissions benchmarks representing beef cattle and dairy cow on-farm diesel consumption and electricity use (kWh/beef cattle/month, kWh/dairy cow/month, litres/beef cattle/month, litres/dairy cow/month)	n/a	
	Ireland's Provisional Greenhouse Gas Emissions, EPA	https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/GHG_Final-emissions-data_1990-2021_AR5_Web.xlsx	National carbon emissions breakdown for agricultural by emissions source	n/a	The EPA's 2018 annual carbon emissions data has been used to understand the % contribution of each agriculture emissions source to total national agriculture carbon emissions. This % contribution has been used to uplift emissions in the DZ area to estimate total carbon emissions in the DZ area.
	SEAI Conversion Factors	https://www.seai.ie/data-and-insights/seai-statistics/conversion-factors/	Carbon intensity factor for electricity grid	n/a	This energy consumption has then been converted into carbon emissions using robust SEAI and UK Government carbon factors.
	UK Government Conversion Factors	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/715426/Conversion_Factors_2018_-_Full_set__for_advanced_users__v01-01.xls	Carbon intensity factor for diesel use	n/a	
	Global Warming Potentials (GWPs) over 100 Year time period	https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Chapter_07_Supplementary_Material.pdf	GWP is a measure of how much energy the emissions of 1 tonne of a gas will absorb over a given period of time, relative to the emissions of 1 tonne of carbon dioxide. It allows for comparisons of global warming impacts of different greenhouse gases.	n/a	IPCC GWP100 conversion factors have been applied to methane emissions to convert to carbon dioxide equivalent.

5.5.3 Supporting Data: Agricultural Sector

Agricultural Sector: Enteric fermentation related emissions

Dairy Cows (CH4)

ED	Dairy Cattle	High	High g CH4/Year	High t CH4/Year	High tCO2e
Ballymurreen	1,155	381,150	139,119,750	139	3,881
Buolick	1,434	473,220	172,725,300	173	4,819
Fennor	1,574	519,420	189,588,300	190	5,290
Graystown	-	-	-	-	-
Kilcooly	1,035	341,550	124,665,750	125	3,478
Killenaule	805	265,650	96,962,250	97	2,705
Littleton	513	169,290	61,790,850	62	1,724
Longfordpass	484	159,720	58,297,800	58	1,627
Moyne	2,990	986,700	360,145,500	360	10,048
New Birmingham	515	169,950	62,031,750	62	1,731
Poyntstown	-	-	-	-	-
Rahelty	948	312,840	114,186,600	114	3,186
Templetouhy	2,095	691,350	252,342,750	252	7,040
Two-Mile-Borris	915	301,950	110,211,750	110	3,075
Total	**14,463**	**4,772,790**	**1,742,068,350**	**1,742**	**48,604**

Dairy Cows benchmarks (550kg Dairy cow grazing on pasture)

	gCH4/day
Low	320
high	330

Source: https://www.teagasc.ie/environment/climate-change--air-quality/methane/

5.5.4 Supporting Data: Agricultural Sector

Agricultural Sector: Enteric fermentation related emissions

Beef Cattle (CH4)

ED	Beef Cattle	g CH4/day	g CH4/year	t CH4/year	tCO2e
Ballymurreen	353	81,190	29,634,350	30	827
Buolick	1,851	425,730	155,391,450	155	4,335
Fennor	2,051	471,673	172,160,463	172	4,803
Graystown	2,283	525,033	191,636,863	192	5,347
Kilcooly	1,444	332,178	121,244,788	121	3,383
Killenaule	2,670	614,043	224,125,513	224	6,253
Littleton	1,499	344,655	125,799,075	126	3,510
Longfordpass	1,062	244,260	89,154,900	89	2,487
Moyne	3,982	915,745	334,246,925	334	9,325
New Birmingham	1,814	417,220	152,285,300	152	4,249
Poyntstown	1,241	285,488	104,202,938	104	2,907
Rahelty	1,792	412,045	150,396,425	150	4,196
Templetouhy	4,787	1,100,895	401,826,675	402	11,211
Two-Mile-Borris	2,093	481,390	175,707,350	176	4,902
Total	**28,920**	**6,651,543**	**2,427,813,013**	**2,428**	**67,736**

Beef Cattle benchmarks (500kg Beef animal on a high concentrate diet)

	gCH4/day
Low	230

Source: https://www.teagasc.ie/environment/climate-change--air-quality/methane/

5.5.5 Supporting Data: Agricultural Sector

Agricultural Sector: Enteric fermentation related emissions

Sheep (CH4)

ED	Sheep	g CH4/day	g CH4/year	t CH4/year	tCO2e
Ballymurreen	-	-	-	-	-
Buolick	2,773	637,790	232,793,350	233	6,495
Fennor	-	-	-	-	-
Graystown	-	-	-	-	-
Kilcooly	-	-	-	-	-
Killenaule	633	145,590	53,140,350	53	1,483
Littleton	-	-	-	-	-
Longfordpass	-	-	-	-	-
Moyne	-	-	-	-	-
New Birmingham	1,741	-	-	-	-
Poyntstown	-	-	-	-	-
Rahelty	-	-	-	-	-
Templetouhy	661	152,030	55,490,950	55	1,548
Two-Mile-Borris	-	-	-	-	-
Total	**5,808**	**935,410**	**341,424,650**	**341**	**9,526**

Sheep benchmarks (ewe lambs on a grass silage based diet)

	gCH4/day
Low	230

Source: https://www.teagasc.ie/news--events/daily/sheep/measuring-methane-from-sheep-systems.php

5.5.6 Supporting Data: Agricultural Sector

Agricultural Sector: Energy related emissions

Dairy Cows (CO2)

ED	Dairy Cattle	kWh electricity	kWh mobile machinery	Total kWh	Electricity related carbon emissions tCO2e	Mobile machinery related carbon emissions tCO2e	Total carbon emissions tCO2e
Ballymurreen	1,155	375,375	635,250	1,010,625	141	168	308
Buolick	1,434	466,050	788,700	1,254,750	175	208	383
Fennor	1,574	511,550	865,700	1,377,250	192	228	420
Graystown	-	-	-	-	-	-	-
Kilcooly	1,035	336,375	569,250	905,625	126	150	276
Killenaule	805	261,625	442,750	704,375	98	117	215
Littleton	513	166,725	282,150	448,875	63	74	137
Longfordpass	484	157,300	266,200	423,500	59	70	129
Moyne	2,990	971,750	1,644,500	2,616,250	365	434	799
New Birmingham	515	167,375	283,250	450,625	63	75	138
Poyntstown	-	-	-	-	-	-	-
Rahelty	948	308,100	521,400	829,500	116	138	253
Templetouhy	2,095	680,875	1,152,250	1,833,125	255	304	560
Two-Mile-Borris	915	297,375	503,250	800,625	112	133	244
Total	**14,463**	**4,700,475**	**7,954,650**	**12,655,125**	**1,764**	**2,099**	**3,863**

Dairy Cows energy benchmarks

Agricultural Benchmarks	Unit	Electricity	Heat	Mobile Machinery	Total	Country	Source	Year
Dairy Cows	kWh/livestock/yr	325	0	550	875	UK	DEFRA	2010

5.5.7 Supporting Data: Agricultural Sector

Agricultural Sector: Energy related emissions

Beef Cattle (CO2)

ED	Beef Cattle	kWh mobile machinery	Mobile machinery related carbon emissions tCO2e
Ballymurreen	353	159,909	42
Buolick	1,851	838,503	221
Fennor	2,051	928,990	245
Graystown	2,283	1,034,086	273
Kilcooly	1,444	654,245	173
Killenaule	2,670	1,209,397	319
Littleton	1,499	678,821	179
Longfordpass	1,062	481,086	127
Moyne	3,982	1,803,620	476
New Birmingham	1,814	821,742	217
Poyntstown	1,241	562,286	148
Rahelty	1,792	811,550	214
Templetouhy	4,787	2,168,285	572
Two-Mile-Borris	2,093	948,129	250
Total	**28,920**	**13,100,647**	**3,457**

Beef Cattle energy benchmarks

Agricultural Benchmarks	Unit	Electricity	Heat	Mobile Machinery	Total	Country	Source	Year
Beef Cattle	kWh/livestock/yr	0	0	453	453	UK	DEFRA	2007

5.5.8 Supporting Data: Agricultural Sector

Agricultural Sector: Energy related emissions

Sheep Cattle (CO2)

ED	Sheep	kWh mobile machinery	Mobile machinery related carbon emissions tCO2e
Ballymurreen	-	-	-
Buolick	2,773	52,687	14
Fennor	-	-	-
Graystown	-	-	-
Kilcooly	-	-	-
Killenaule	633	12,027	3
Littleton	-	-	-
Longfordpass	-	-	-
Moyne	-	-	-
New Birmingham	1,741	33,079	9
Poyntstown	-	-	-
Rahelty	-	-	-
Templetouhy	661	12,559	3
Two-Mile-Borris	-	-	-
Total	**5,808**	**110,352**	**29**

Sheep energy benchmarks

Agricultural Benchmarks	Unit	Electricity	Heat	Mobile Machinery	Total	Country	Source	Year
Sheep	kWh/livestock/yr	0	0	19	19	UK	DEFRA	2007

5.6 : LULUCF

5.6.1 Supporting Data: LULUCF

LULUCF Soil Types (CORINE)

DZ Area Soil Types	Area (Hectares)	% of Total Area
Deep well drained mineral (Mainly basic)	12,653	40.3%
Cutover/cutaway peat	9,366	29.8%
Mineral poorly drained (Mainly basic)	3,551	11.3%
Mineral poorly drained (Mainly acidic)	1,576	5.0%
Shallow well drained mineral (Mainly acidic)	1,149	3.7%
Shallow well drained mineral (Mainly basic)	887	2.8%
Alluvial (mineral)	779	2.5%
Deep well drained mineral (Mainly acidic)	629	2.0%
Peaty poorly drained mineral (Mainly basic)	371	1.2%
Fen peat	173	0.6%
Lacustrine type soils	101	0.3%
Made ground	86	0.3%
Alluvial (marl)	43	0.1%
Shallow poorly drained mineral (Mainly basic)	29	0.1%
Shallow, rocky, peaty/non-peatymineral complexes (Mainly basic)	17	0.1%
Water	4	0.0%
Shallow, rocky, peaty/non-peatymineral complexes (Mainly acidic)	4	0.0%
Shallow peaty poorly drained mineral (Mainly basic)	2	0.0%
Grand Total	**31,419**	**100.0%**

5.7 : Energy & Electricity

5.7.1 Data Sources, Assumptions & Limitations: Spatial Data

Sector	Data source	Data source link	Data assumption	Data limitation
Energy & Electricity	Total Heat Demand with Building Use	https://gis.seai.ie/server/services Tipperary County Council	Heat Demand and Geodirectory Building Use Locations	No limitation in data set. Additional information on the data source can be found here: Map Of Heat Demand In Ireland | SEAI GIS Maps | SEAI
	Power Lines and Substations Locations	https://gis.seai.ie/server/services	Power Lines and Substations Locations	No limitation in data set.
	Electric Vehicle Charging Points	Data.gov.ie	Electric Vehicle Charging Points	No limitation in data set.
	Agriculture Gas Production	https://gis.seai.ie/server/services	Agriculture Gas Production	No limitation in data set.
	Agriculture Biomass Crop Suitability	https://gis.seai.ie/server/services	Agriculture Biomass Crop suitability	No limitation in data set.

5.8: Waste

5.8.1 Data Sources, Assumptions & Limitations: Spatial Data

Sector	Data source	Data source link	Data assumption	Data limitation
Waste	Waste Facilities and Wastewater Treatment Plants	https://gis.epa.ie/arcgis/services	Waste Facilities and Wastewater Treatment Plants	No limitation in dataset.

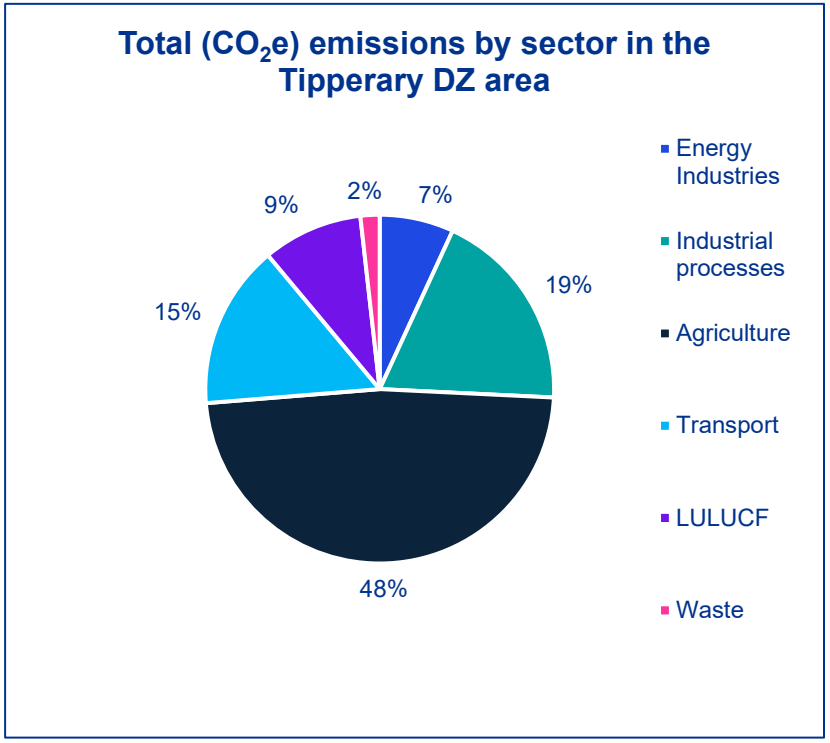
5.9 : 'Top-down' Assessment Results

5.9.1 Supporting Data: 'Top-down' Assessment Results

Top-Down Assessment of the DZ area

The EPA's MapEire database has been used to inform a 'top-down' assessment of carbon emissions within the Mid-Tipperary DZ area – the results of this 'top-down' analysis are shown on the chart and table below.

Note that the MapEire database does not include analysis of residential and commercial and public sector. Note that the majority of emissions associated with Energy Industries are associated with electricity generation rather than consumption of energy.



Sector	Total tCH_4	Total tCO_2	Total tN_2O	Total tCO_2e
Energy Industries	5,707	17,971	48	23,726
Industrial processes	43	64,909	275	65,226
Agriculture	115,415	2,363	47,714	165,492
Transport	66	51,696	748	52,511
LULUCF	2,615	28,281	1,191	32,087
Waste	5,714	3	416	6,133
Total	129,559	165,223	50,394	345,175

Credits

Credits

Thanks to Kevin Collins for providing photographs used in this document.