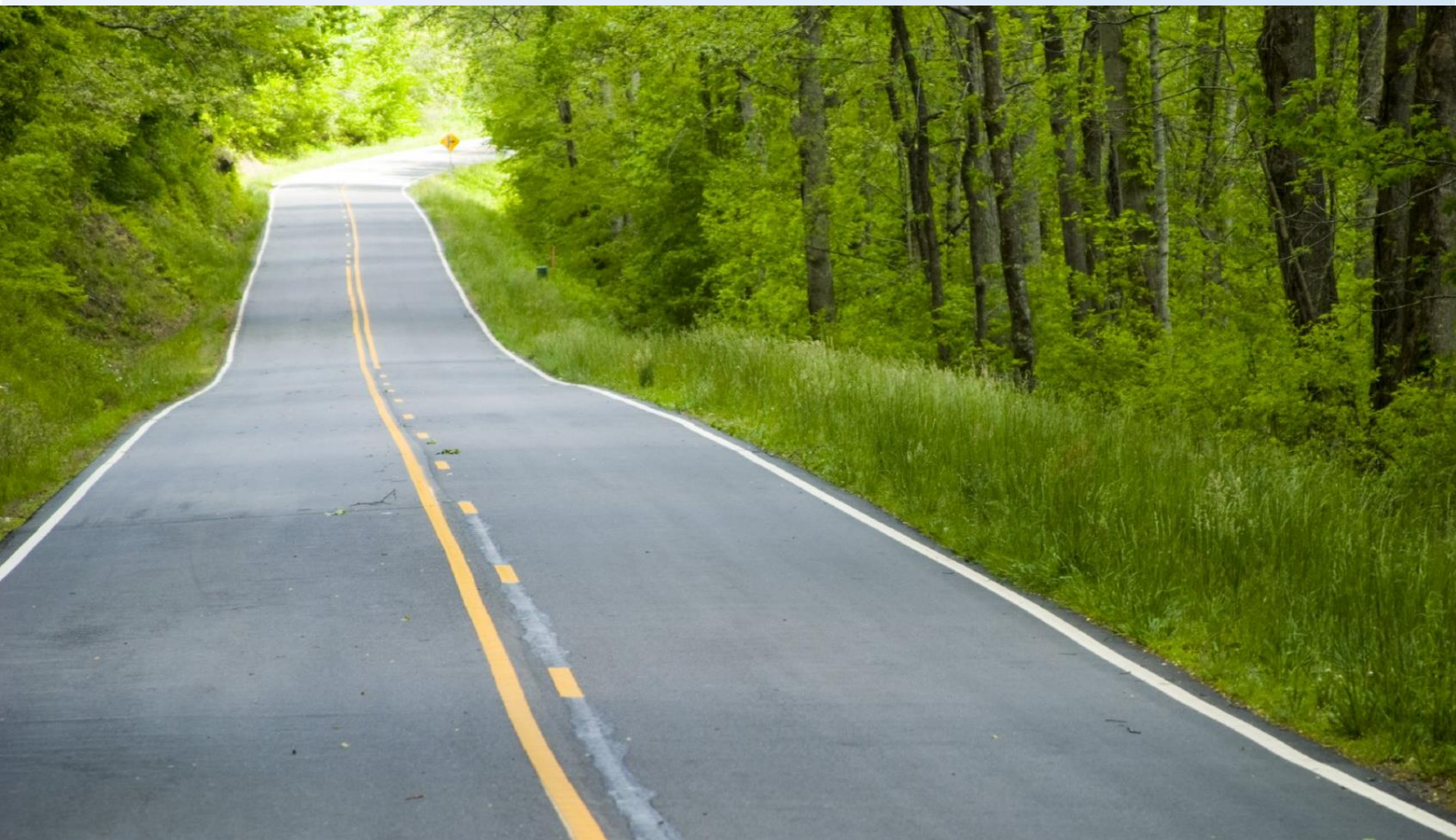




Meath County Council

COUNTY MEATH BASELINE EMISSION INVENTORY

2012 Baseline





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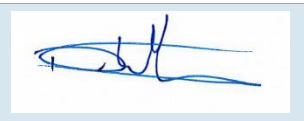
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EXECUTIVE SUMMARY

The Baseline Emissions Inventory (BEI) has been calculated for County Meath using 2012 as the baseline year. The selection of 2012 was based on the higher quality of data available in comparison to earlier recorded years, thus providing a more effective baseline. Additional calculations were undertaken using primary energy data for the years 2013-2015, and subsequently with projected data for the years 2016-2020.

A top down approach was used to calculate the energy balance by apportioning the Sustainable Energy Authority of Ireland's (SEAI)¹ national statistics to county level, using a number of comparable metrics. Although this methodology does not provide exact figures, it generates an indicative picture of Meath's current and projected energy footprint. The calculations were drawn from data available from Meath County Council's own operations and the following sectors:

- Services;
- Industrial;
- Transport;
- Residential; and
- Agricultural

These are aligned with SEAI's reporting and all aside from Agriculture are mandatory for the Covenant of Mayors SECAP, which can be voluntarily incorporated. For the above sectors, ratios calculated using figures from the CSO Census of Population (2011)² for Meath and Ireland were used to apportion national energy use totals. This included total population, total number of people employed across the different sectors and the total number of cars per household. Greenhouse gas emission factors, primarily obtained from SEAI, were used to determine the carbon, or carbon equivalent, emissions attributable to each fuel source or process. The grid emissions factors for electricity consumption were also updated for each year, using SEAI's database of historic factors for Ireland.

The results of the calculations showed that in 2012, County Meath consumed 3,764 GWh of energy. Transport, at 43 %, constituted the greatest percentage of total energy use, followed by residential at 28%. The consumption breakdown by fuel type showed oil based fuels were the predominant fuel sources in the county (58%), which is reflective of the high proportion of emissions associated with the transport sector. Additionally, the residential sector, the second biggest energy consumer in County Meath, is commonly fuelled by petroleum based fuels, which would contribute to this total. The proportion of energy originating from renewable energy appeared to be particularly low, however this may be somewhat counteracted by the hidden renewables in Ireland's electricity supply.

¹ <http://www.seai.ie/Energy-Data-Portal/>

² <http://www.cso.ie/en/census/census2011reports/>

The calculation of the total CO₂ emissions by sector, which totals 1,453 CO₂ equivalent kilotons, showed Transport still remains top at 29 %, marginally ahead of agriculture and residential which are both at 24 %. Aside from the introduction of process emissions associated with arable and livestock farming, this shift is also likely caused because petroleum emits less CO₂ per kilowatt hour than other fuels, such as peat or coal. The calculations showed that Oil is also the largest emitter of CO₂ with 50% of the total County Meath CO₂ emissions. However, due to the primary emissions factor and losses in the transmission of electricity, there is a significant increase in the percentage of emissions attributable to electricity, at 31 % of the total CO₂.

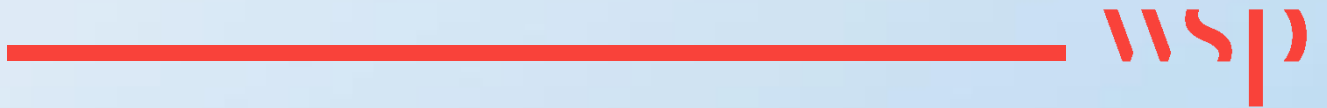
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1

PROJECT BACKGROUND



1 PROJECT BACKGROUND

Ireland, and Meath's climate is changing, predominantly due to emissions of man-made greenhouse gases such as carbon dioxide and methane. This will lead to long term changes in Ireland's climate – much hotter summer days, heavier rainfall, sea level rise and also knock on effects including the emergence of new pests, which could impact farmers in the county. There will also be positive benefits such as fewer very cold days. These changes can be seen today, and will continue to occur over the long term.

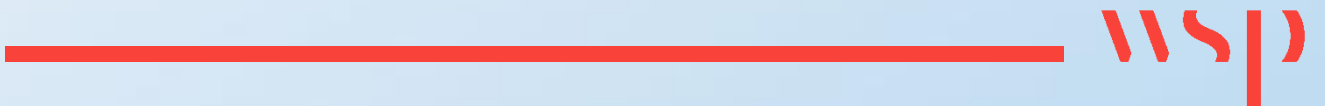
The Climate Action and Low Carbon Development Act 2015 seeks to address this and establishes the national goal to move to a low carbon, climate resilient and environmentally sustainable economy. The Act provides the statutory platform for the institutional arrangements necessary to pursue and achieve the goals. The primary focuses are on mitigation of greenhouse gases emissions that are responsible for climate change and adaption to the effects of climate change.

The Act covers the period until 2050 and will be implemented over a series of five yearly National Mitigation Plans with statutory obligations on local authorities to create their own local adaptation and mitigation plans. Renewable and sustainable energies form an integral part of the transition to a low carbon economy and provide self sufficiency and security of supply for Ireland's growing economy.

Meath County Council commissioned WSP to help develop a strong climate mitigation and adaptation strategy. As part of this work, Meath County Council wanted to estimate the quantity of greenhouse gases released across the county and determine the contribution from various emitting sources. From this estimate, a clearer picture of the current situation could be determined and would enable the county to set out effective plans to contribute towards national and international commitments to reduce greenhouse gases to 20% below 2005 levels by 2020.

2

DATA COLLECTION AND METHODOLOGY



2 DATA COLLECTION AND METHODOLOGY

2.1 APPROACH

There is no mandated approach to undertaking an emissions inventory at county level. This emissions inventory has accordingly been based on best practice guidance (e.g. Greenhouse Gas Protocol and C40), and we have aligned with methods that have been used to calculate emissions at the county and national level. It has been produced to allow comparisons with other counties and national emissions inventories. It has also been produced to be compliant with Covenant of Mayors Baseline Emissions Inventory requirements.

Details of our approach are listed below.

2.2 BASELINE YEAR

2012 was selected as the baseline year to calculate the Baseline Emissions Inventory (BEI) for County Meath. This year was selected because the activity data from the County Council was deemed to be of a higher standard from this year onwards. It therefore provided the most complete baseline from which to calculate emission reductions and to evaluate alternative energy saving actions. Calculations were also completed using primary energy data for the years 2013- 2015, and subsequently using projected data for the years 2016-2020.

A top down approach was used to calculate the energy balance in County Meath by apportioning the national statistics to county level. This enabled both historic and forecast national data to be analysed. Although this methodology does not provide exact figures, it allowed an indicative picture of County Meath's current and projected energy footprint to be developed.

MEATH COUNTY COUNCIL

Meath County Council collects a number of metrics related to energy use on an annual basis, which are reported through SEAI's Monitoring and Reporting system. This includes total electricity consumption, incorporating total use within council owned buildings and public lighting, total thermal energy use and the total energy used by the municipal fleet. These sectors are all captured within the Municipal section of the BEI. Unlike the other sectors, the Meath County Council data has only been calculated to 2016, as projections up to the year 2020 are currently unavailable.

SERVICES

The 2012 national energy balance for Ireland, which is developed each year by the Energy Policy Statistical Support Unit in the Sustainable Energy Authority of Ireland (SEAI), was used to estimate the overall energy consumption in the Services sector. This national scale data is apportioned using the ratio between the number of people employed in the services sector in Ireland (including; Commerce and Trade, Transport and Communication, Public Administration, and Professional Services), and the number of people employed within the equivalent sector in Meath, using the equation below. This information is obtained from the CSO Census of Population for 2011, which was the closest available dataset to the baseline year.

$$\text{Services Ratio} = \frac{\text{Employees in Service Sector in County Meath}}{\text{Employees in Service Sector in Ireland}}$$

INDUSTRY

As above, apportioned SEAI data was used to calculate the equivalent energy use in Meath within this sector. In this case, the ratio between the number of people employed in the industrial sector in Ireland and County Meath is used. Again, this information was obtained from the 2011 CSO Census.

TRANSPORT

The ratio to apportion the national energy balance for private transport was calculated using the CSO Census statistics, which contains data on the number of vehicles owned per household in both County Meath and Ireland. To make it specific to private transport, only the total energy consumption for the Road Private Car, Road Freight, Road Light Goods Vehicles and Navigation sub-sectors are included. Fuel tourism was not

thought to contribute to a significant share of the energy use in Meath and so this is excluded as de minimis. It should also be noted that, in the absence of freight statistics specific to the county, the ratio of car ownership is being used to represent all forms of private vehicle emissions.

Total public transport energy use is calculated from the Public Passenger Services and Rail sub-sectors in the SEAI statistics. Both domestic and international aviation are excluded. As no specific public transport data is available for the county, the ratio of total population between Ireland and Meath is instead used.

RESIDENTIAL

Two conversion factors were used to downscale the national residential statistics. Firstly, a simple comparison between the total number of homes in Ireland and County Meath is used. This is then combined with the residential local factor, which is calculated using Building Energy Rating (BER) records available from SEAI. A weighted scoring system was used to rank the percentage of homes awarded each energy efficiency rating, with a higher proportion of more energy efficient homes achieving a higher score. From this it was deemed that the homes in County Meath were 11 % more efficient than the national average, which was converted to the residential local factor. The total consumed fuel mix from the residential sector was then multiplied by both of these ratios.

AGRICULTURAL DATA

Energy use in the Agricultural sector, was calculated in a similar way to the Service and Industry sectors, comparing the number of people employed in agricultural jobs in County Meath and Ireland to apportion Ireland's total energy use.

Process emissions were also calculated to provide a more comprehensive idea on the scale of greenhouse gasses produced by this sector. This was calculated using the Farm Carbon Calculator tool, which is predominately based on emissions factors provided by DEFRA. Both arable and livestock farming were taken into account, using statistics provided by the CSO 2011 Agricultural Census. For arable calculations, the national average yields per hectare for 2012 were obtained from the CSO database. Both enteric and manure management emissions were calculated using the tool and this approach aligns with IPCC recommendations.

2.3 EMISSIONS FACTORS

Greenhouse gas emissions factors were used to determine the carbon, or carbon equivalent, emissions attributable to each fuel source or process. The majority of the emissions factors were obtained from SEAI, however as a factor was not available for Plant Oil, this was instead acquired from the Covenant of Mayors handbook. The grid emissions factors for electricity consumption were also updated for each year using SEAI's database of historic factors for Ireland.

As a breakdown of the projected fuel mix was not available, the emissions factor here was instead based on the historic split of consumption across different fuel types for the baseline year. The weighting for each fuel type within each sector was calculated as a percentage of the total energy consumed in that sector, and then multiplied by each respective emissions factor. These figures were then combined to provide a representative average factor for each sector.

3

COUNTY MEATH ENERGY CONSUMPTION AND CO2 EMISSIONS



3 COUNTY MEATH ENERGY CONSUMPTION AND CO2 EMISSIONS

3.1 BASELINE YEAR CONSUMPTION EMISSIONS

In the baseline year, 2012, County Meath consumed 3,764 GWh of energy.

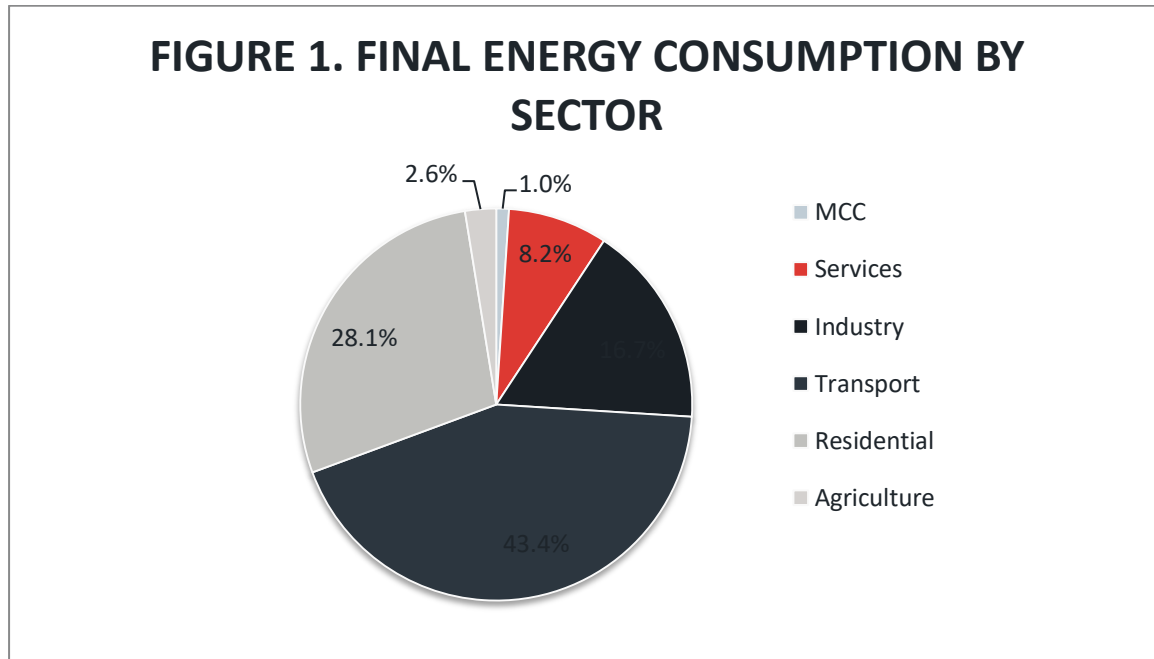


Figure 1 –Final Energy Consumption Sector

Figure 1 depicts the breakdown of total final energy consumption by sector for County Meath. Transport, at 43.4 %, constitutes the greatest percentage of total energy use, followed by Residential (28.1%). This broadly follows the pattern depicted by national statistics, but with a slightly higher percentage for transport. Based on the ratios used to apportion total energy consumption, car ownership in County Meath appears to be slightly higher than the national average, which is the likely reason for this slight shift. Industry also occupies a relatively large percentage of total energy use, at 16.7 %, however it is possible that this may be an overestimation. There is limited heavy industry occurring within the county, and although there is a reasonable proportion of the population employed within this sector, it is unlikely to be consuming the same amount of energy as the much more intensive national industrial processes, which have contributed to this skew in headline figures.

The consumption breakdown by fuel type for the baseline year is shown in Figure 2. The high consumption of oil based fuels (58%) is not unexpected given the significant proportion of energy consumption from the transport sector. Equally, the residential sector, the second biggest energy consumer in County Meath, is frequently fuelled by petroleum based fuels, which would also contribute to this total.

The proportion of energy originating from renewable energy appears particularly low, which raises concerns for both County Meath and Ireland's ability to meet emissions reductions targets. However, it is important to note that electricity consumed is produced by a variety of different fuels, which is not reflected in the below

figure. Since the electricity sector has Ireland’s largest renewable energy penetration target (19.6 % in 20123), it is likely that a higher percentage of renewables are hidden in this data.

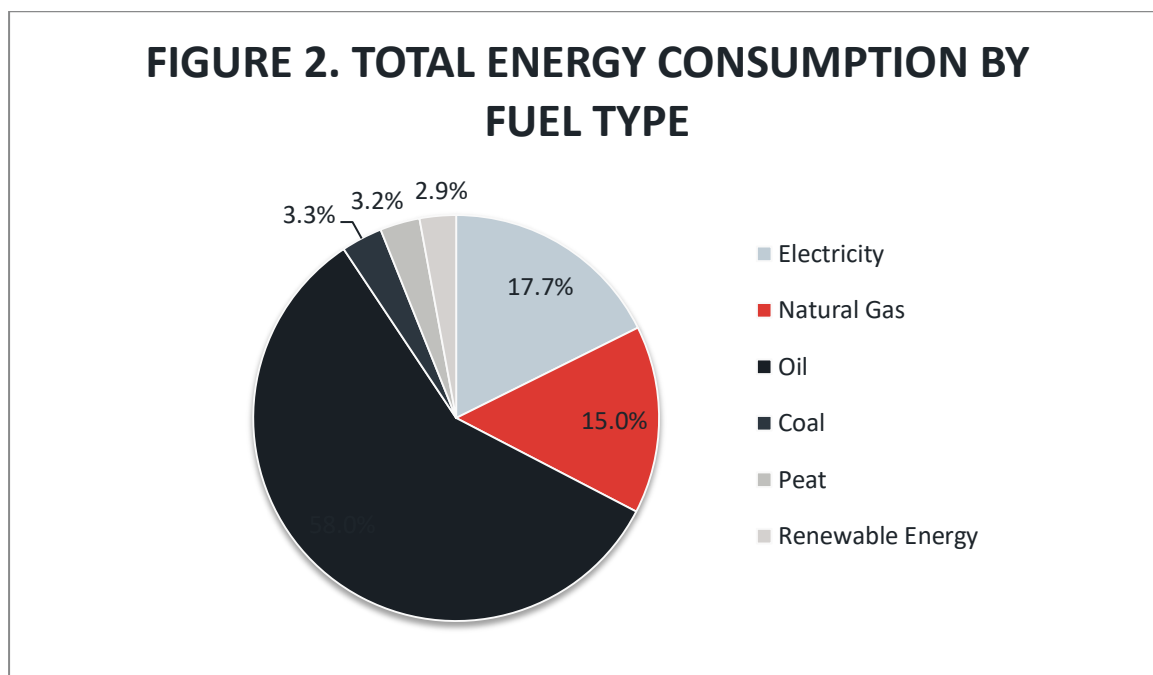


Figure 2 – Total Energy Consumption by Fuel

The breakdown of the total CO2 equivalent emissions by sector, which totals 1,453 kilotons, is shown by Figure 3. As the process emissions from the agricultural sector have now been included, there is significant shift in the level of contribution from each of the six sectors. Transport still remains top at 28.8 %, but is now just ahead of agriculture and residential which are both at approximately 24 %. The transport statistics here indicate a slightly higher proportion of total emissions than shown by the total national statistics; however this is again likely to have been caused by the above average level of car ownership in the county. Aside from the introduction of the significant process emissions associated with arable and livestock farming, this shift is also likely to have been caused because petroleum emits less CO2 per kilowatt hour than other fuels, such as peat or coal.

³http://www.energyineducation.ie/Publications/Statistics_Publications/Energy_in_Ireland/Energy_in_Ireland_Key_Statistics/Energy-in-Ireland-Key-Statistics-2013.pdf

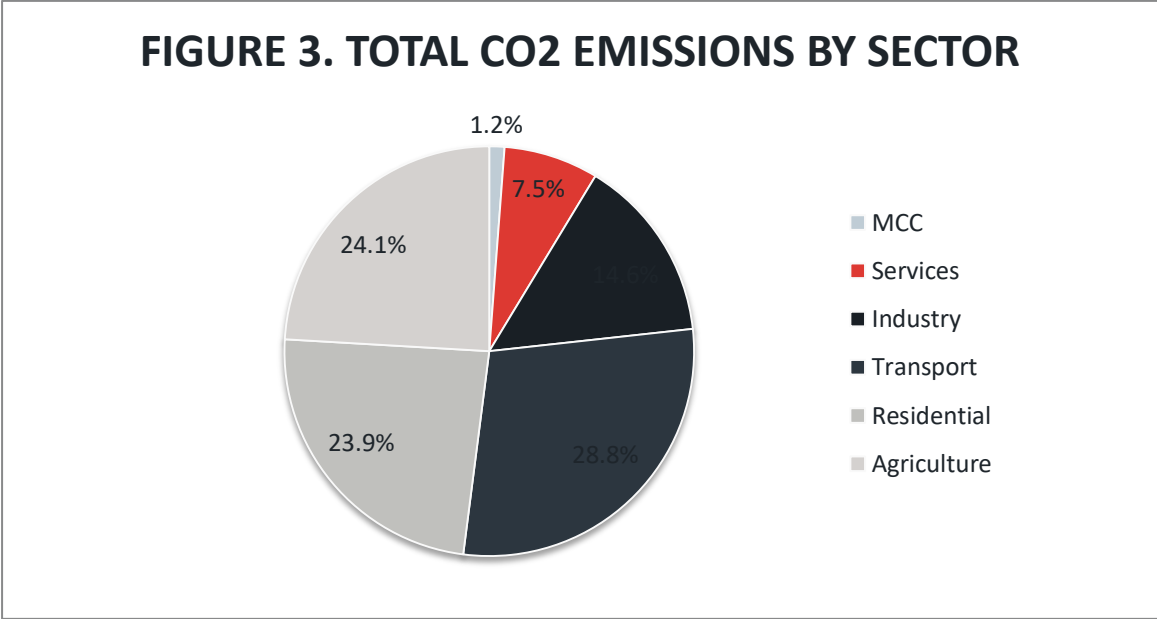


Figure 3 – Total CO2 Emissions by sector

Figure 4 indicates that oil is also the largest emitter of CO2 with just fewer than 50% of the total County Meath CO2 emissions, which again aligns well with Ireland’s total emissions figures. However, due to the high primary emissions factor and losses in transmission, there is a significant increase in the percentage of emissions attributable to electricity, at 31 % of the total CO2. Natural Gas follows with 10 % of the share, Coal and Peat total approximately 8%, with Renewable Energies contributing 1.6 %. Although this may seem quite a high figure, biofuels are the dominant source of renewable use in the county, which still contribute a reasonable level of CO2 emissions. It should also be noted that the total CO2 emissions associated with energy use is 1,133 CO2 equivalent kilotons, as this excludes the process emissions produced by Meath’s agricultural sector.

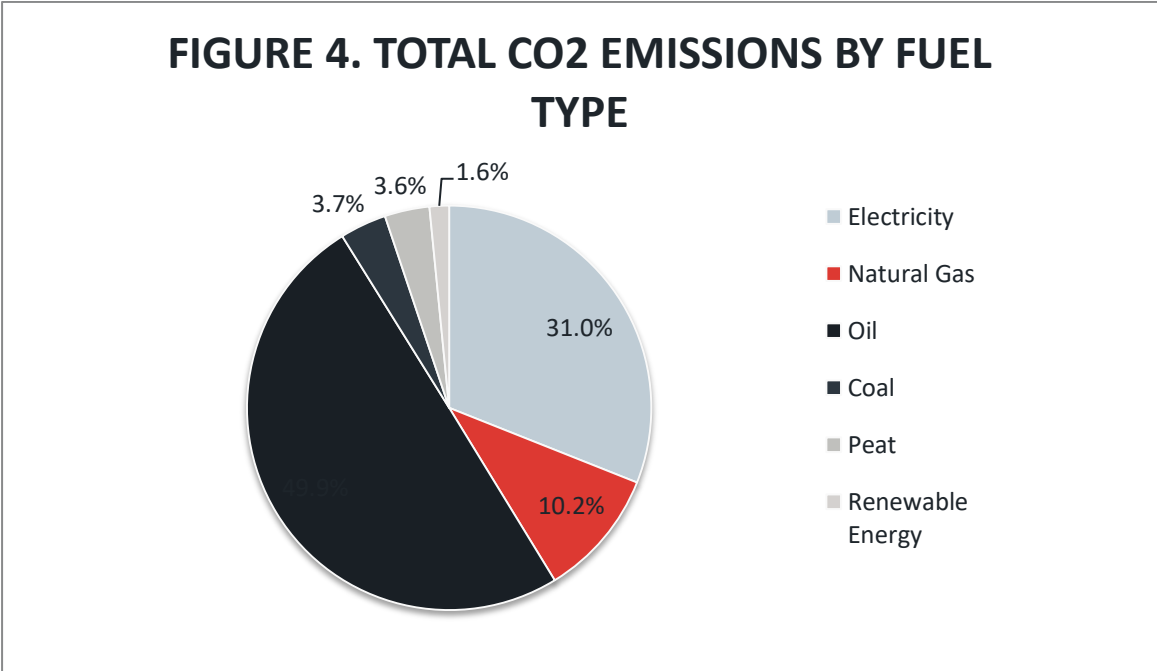


Figure 4- Total Emissions by Fuel Type

3.2 PROJECTED ENERGY CONSUMPTION & EMISSIONS

The energy consumption for Meath County is projected to remain relatively steady from 2017-2020 as illustrated in Figure 5. A 63 GWh (1.68%) increase in overall energy consumption is projected, with a 79GWh (4.41%) increase in the Transport sector being the majority contributor to this rise. Residential energy consumption is projected to experience a 39 GWh (3.98%) reduction over the three years, largely due to the increase in uptake of energy efficient components (smart meters, lighting etc.) within existing houses and energy efficient features (insulation, boilers etc.) being built into new housing stock.

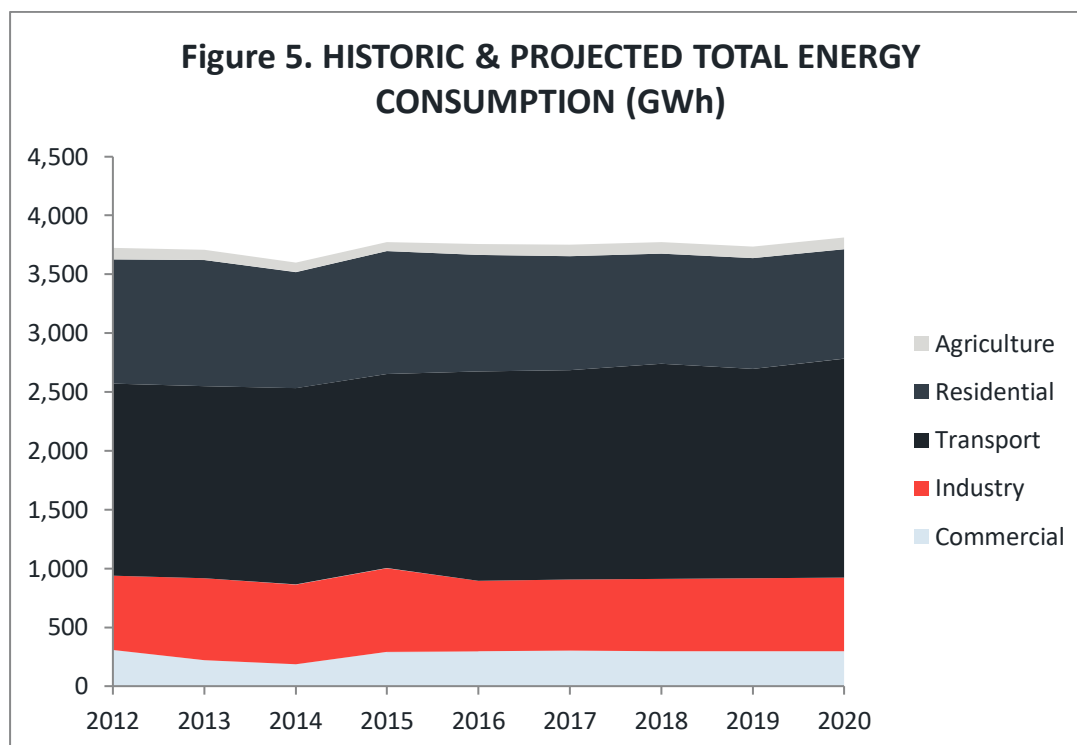


Figure 5 – Historic & Projected Total Energy Consumption

CO2 emissions are projected to follow the same trend as energy consumption from 2017-2020, as shown in Figure 6. A 13 KtCO2e (0.88%) overall increase is projected, which is again primarily attributed to a rise in Transport sector emissions of 20 KtCO2e (4.41%) over the three years. Residential emissions are projected to fall by 13 KtCO2e (4%) over the same period. Again, this will primarily be due to the increased uptake of energy efficient components within existing houses and energy efficient features.

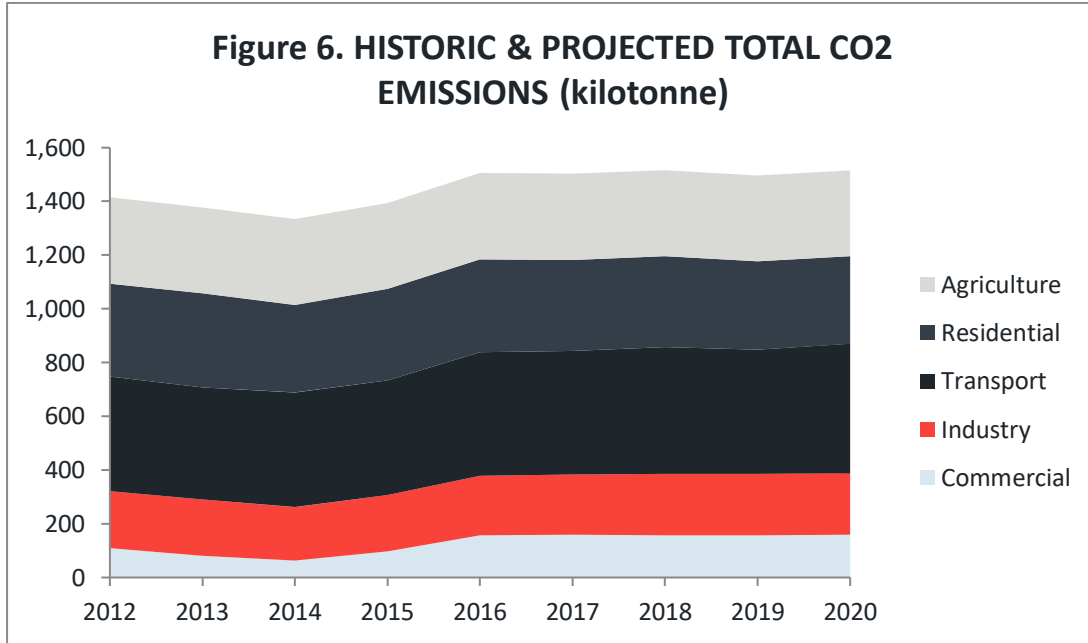
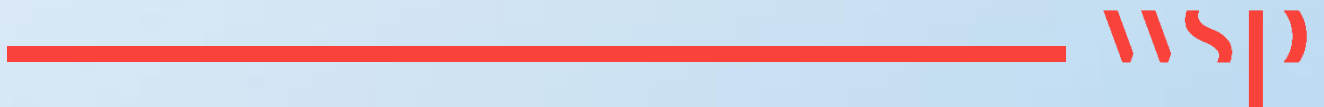


Figure 6 – Historic & Projected Total CO2 Emissions

4

MEATH COUNTY COUNCIL ENERGY CONSUMPTION AND CO2 EMISSIONS



4 MEATH COUNTY COUNCIL ENERGY CONSUMPTION AND CO2 EMISSIONS

4.1 BASELINE YEAR CONSUMPTION EMISSIONS

In the baseline year, 2012, Meath County Council consumed 39.26 GWh of energy.

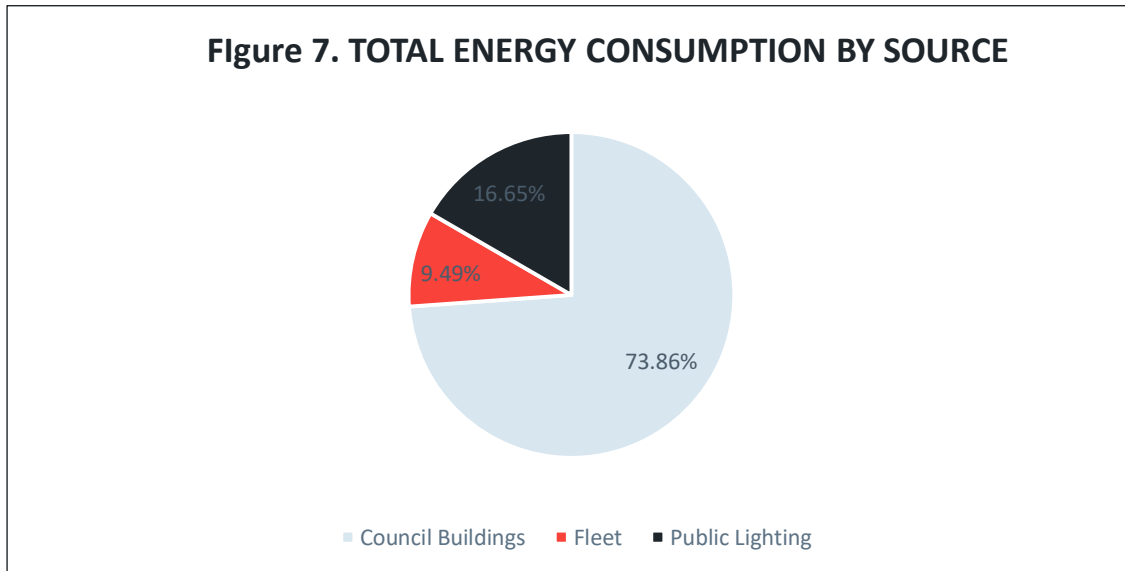


Figure 7 – Total Energy Consumption by Source

Figure 7 depicts the breakdown of total energy consumption by source for Meath County Council. Council buildings, at 73.86% constitute the vast majority of energy consumption. This is due to council buildings consuming energy throughout the day for heating and lighting purposes whereas public lighting (16.65%) and fleet vehicles (9.49%) will only be operational for smaller amounts of time and require much less energy to operate.

The total carbon emissions breakdown by source is shown in Figure 8. In the baseline year, 2012, Meath County Council emitted 17,399 tonnes of CO₂. The carbon emissions largely mirror the energy usage percentage split with electricity again making up the vast majority at 74.81% and public lighting and electricity making up 19.62% and 5.58% respectively. The most significant change in total share is in Fleet emissions, where the use of renewable biofuel in municipal vehicles has led to a reduction in total emissions share in comparison to its energy usage share.

Figure 8. TOTAL CARBON EMISSIONS BY SOURCE

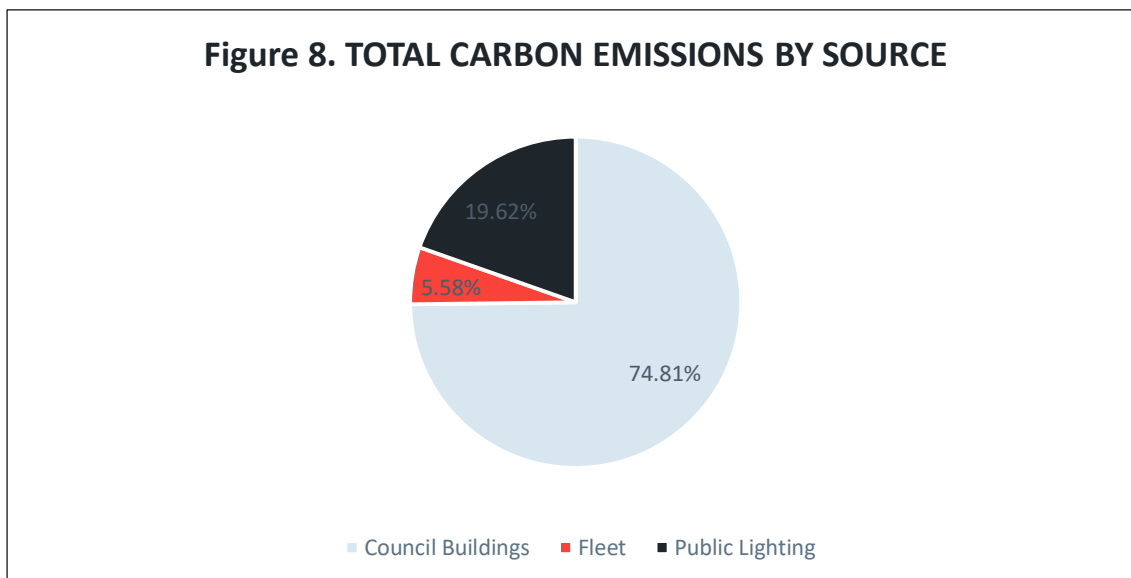


Figure 8 – Total Carbon Emission by Source

The consumption breakdown by fuel type for the baseline year is shown in Figure 9. The high consumption of electricity (71.7%) is not unexpected given the significant proportion of energy consumption from lighting and equipment within the council’s buildings and electricity used in street lighting. Natural Gas (14.92%) and Diesel (9.14%) are the two other significant energy consuming fuel sources with Heating Oil (3.24%), Liquid Gas (0.65%), Biofuel (0.21%) and Gasoline (0.14%) making up the remainder. The lack of renewable energy sources, save the biofuel used in fleet vehicles, is potentially concerning however it is important to note that the electricity sector has Ireland’s largest renewable energy penetration target (19.6 % in 20124), it is likely that a higher percentage of renewables are hidden in this data.

Figure 9. TOTAL ENERGY CONSUMPTION BY FUEL SOURCE

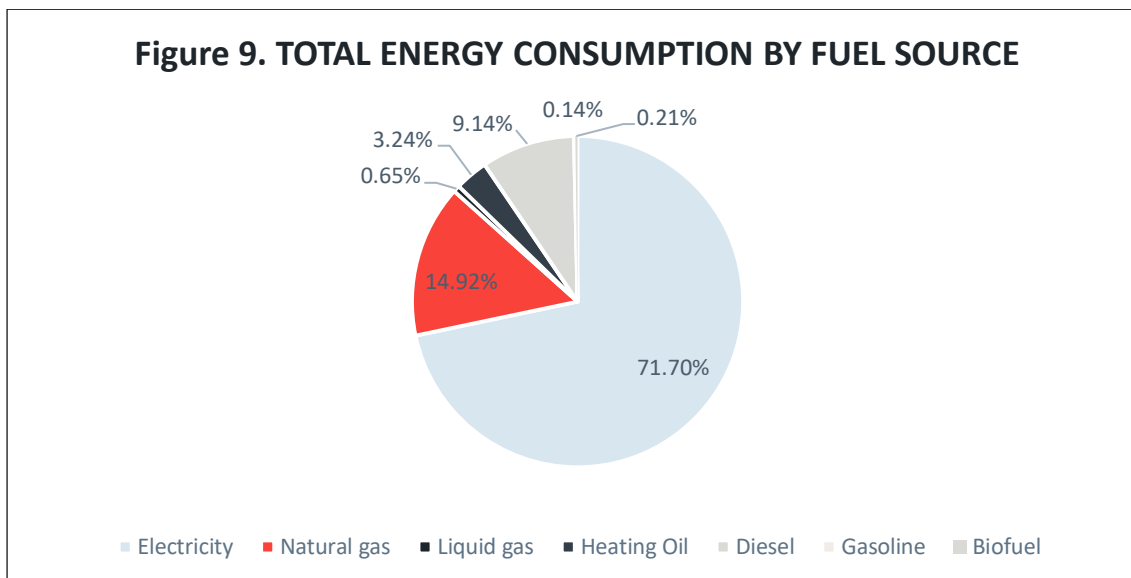


Figure 9 – Total Energy Consumption by Fuel Source

⁴http://www.energyineducation.ie/Publications/Statistics_Publications/Energy_in_Ireland/Energy_in_Ireland_Key_Statistics/Energy-in-Ireland-Key-Statistics-2013.pdf

As expected from the energy consumption figures, Figure 10 indicates that electricity is the largest emitter of CO₂ with over 85% of the total emissions (17,399 tCO₂). Natural gas follows with 6.8% of the share due to its use as a significant fuel in council building heating. Diesel, used in fleet vehicles, contributes 5.43% of total emissions with Heating Oil contributing 1.88%. Liquid Gas (0.33%), Gasoline (0.08%) and biofuel (0.07%) all contribute very small amount of emissions which reflects their limited use as a fuel source across Meath County Councils operations.

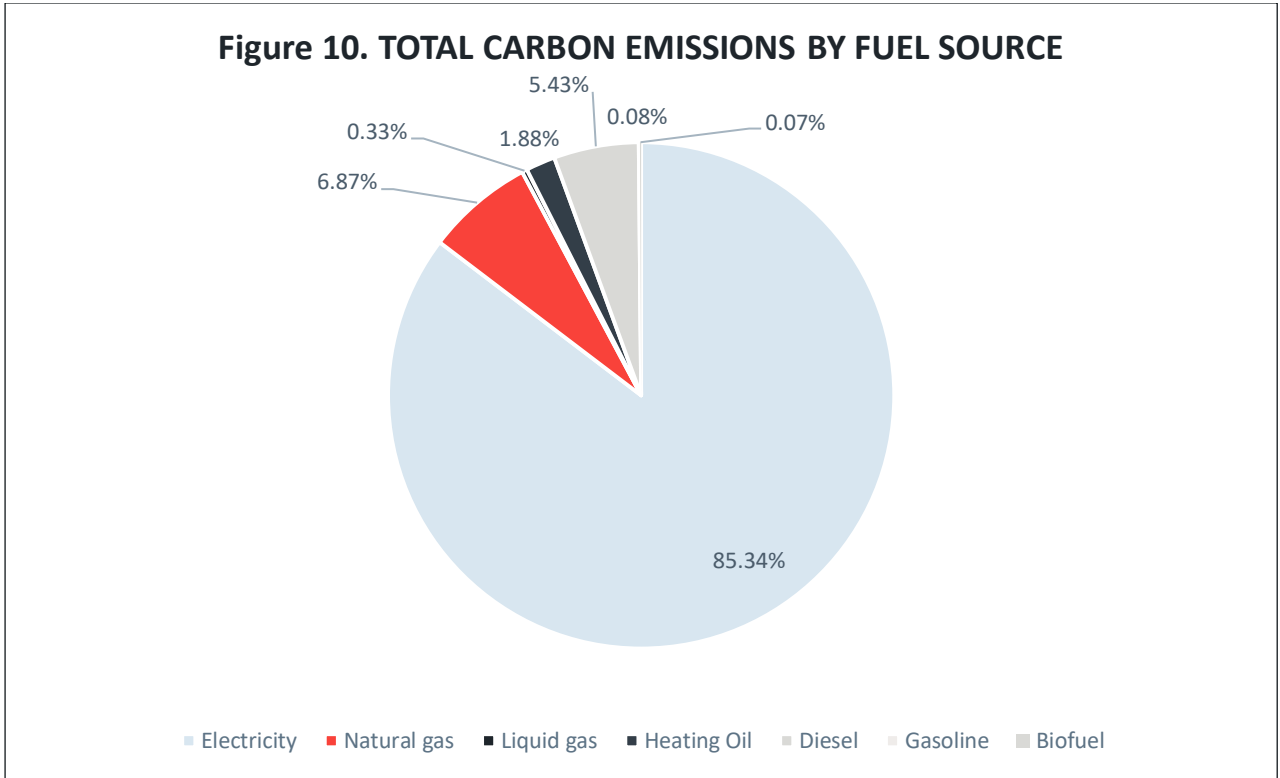
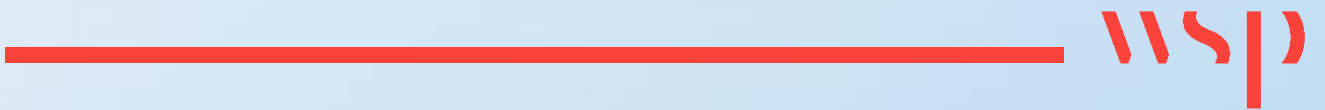


Figure 10 – Total Carbon Emission by Fuel Source

5

CONCLUSION



5 CONCLUSION

The BEI presented here provides a good representation of the total energy use and associated CO₂ equivalent emissions in County Meath in 2012 and will enable a clear vision of the priorities for action to be developed. It will also allow the impact of any potential measures to be evaluated and their progress to be tracked. Based on the above projected calculations, which demonstrate a business-as-usual scenario, the EU emissions reductions targets for Ireland (20 % of the total 2005 emissions by 2020) will not be reached. It is apparent that the transport, residential and agricultural sectors are consistently contributing to a significant percentage of total emissions. It would therefore be most beneficial to target emission reducing actions in these areas, to enable County Meath to contribute effectively to the national requirement to reduce CO₂ significantly.



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