BIRR ENERGY MASTER PLAN

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Contents

Birr profile

Birr is a town in the Southwest of County Offaly, which is situated near the meeting of the Camcor and Little Brosna rivers, the latter flowing on into the River Shannon near Victoria Lock. Birr is conveniently located between the N7 (Dublin-Limerick) national primary route, which is proposed to be fully upgraded to motorway status in the near future, and the M6 (Dublin-Galway). The population of the town has grown steadily over the last number of years and as per the 2022 census data approximately 6,095 people live in the town.

Saint Brendan established a famous monastery in the 6th century, around which the town later grew. However, it is likely that the area of Birr was settled long before 'Brendan's' settlement; discovered during peat milling, the famous Mesolithic site of Lough Boora, excavated in the 1970s, is located only 22km to the north.

Between 1620 and 1899 Birr was actually called Parsonstown, after the Parsons family who were local landowners and hereditary Earls of Rosse. The Parsons were granted residence at Birr's most famous landmark during the Plantation - Birr Castle, which is also the oldest inhabited home in the county. Sir Laurence Parsons built most of the structure of the present castle. The castle remains the seat of the Earls of Rosse and is home to the current peer, Brendan, 7th Earl of Rosse, with family members resident in the demesne.

Its most famous landmark, Birr Castle Demesne, has been the seat of the Parsons family - the Earls of Rosse - for fourteen generations. Today the Castle Gardens & Science Centre attracts tourists throughout the year, captivated by the stunning formal gardens, the Great Telescope and the grandeur of the castle itself. Birr Castle is also site of the Leviathan of Parsonstown, the largest telescope in the world for over 70 years, and a large modern radio telescope.

Nowadays Birr is a designated Irish Heritage Town with a carefully preserved Georgian heritage. The town centre has graceful wide streets with tree lined malls and avenues of elegant buildings, with many of the houses in John's Place and Oxmantown Mall evidencing exquisite fanlight windows of the Georgian period. This makes for a very pleasant town centre for both residents and tourists alike.

Indeed, Birr was choosen as a 'Destination Town' under the Government's 'Destination Towns' initiative launched in 2019 by the National Tourism Development Authority. Aside from the Castle and surrounding grounds, visitors flock to the surrounding hinterland to take in Slieve Bloom mountains or to visit the monastic sites which are dotted in the surrounding area. With the Draft County Plan outlining that Birr could become Offaly's 'second town', it is likely the area will continue to grow in popularity as more people and services are drawn to Birr.

Glossary of Terms

Although all efforts have been made to keep the language in this report non-technical, through the use of infographics and normal language it is not always possible. In order to mitigate against this, we have provided a glossary of key terms used through-out this report and an explanation of their meaning. An additional excellent resource for understanding all terminology around energy and environment is https://climatejargonbuster.ie/Energy Efficiency

Energy Efficiency - It is energy efficient when we use less energy to achieve the same result.

Register of Opportunities (RoO) - The Register of Opportunities is a list of projects or opportunities within your community which if executed will result in energy efficiency and a reduction in energy use and the associated CO_2 output.

Kilowatt hours (kWh) - One kilowatt-hour is equivalent to 1000 watts of energy used for 1 hour. For example, a 100-watt lightbulb switched on for 10 hours uses one kWh of electricity.

Thermal Energy - Defined as energy used to generate heat. This commonly refers to the energy used to heat homes by burning oil, timber peat or using electricity in heat pumps.

Energy Savings - Energy in what ever format it is being consumed usually costs money (€). By reducing the amount of energy consumed you are also reducing the cost associated with providing that energy.

Building Energy Rating (BER) - BER stands for Building Energy Rating. A BER certificate shows you the energy performance of your home. It is a good indicator of how much you will spend on energy (like heat and light) and how much CO_2 you will release to heat your home to a comfortable level.

The BER rating goes from A to G. A-rated homes are the most energy efficient, comfortable and typically have the lowest energy bills. G-rated homes are the least energy efficient and require a lot of energy to heat the home.

Renewable Energy - Renewable energy comes from renewable resources like wind energy, solar energy, or biomass.
These resources can regenerate naturally, and we can use them repeatedly without reducing their supply.

Carbon Dioxide/ CO_2 - Carbon dioxide is a powerful greenhouse gas. It is naturally part of the air we breathe. However, human activities like burning of fossil fuels and deforestation have led to an increase in CO_2 in the air that contributes to climate change.

Carbon Footprint - Carbon footprint measures the carbon emissions linked to a particular activity or product. It includes emissions involved in all stages of making and using a product or carrying out an activity. The lower the carbon footprint the less that a product or activity contributes to climate change.

Renewable Electricity Support Scheme (RESS) - This Government scheme provides financial support to renewable electricity projects in Ireland to help us achieve our renewable electricity goals. It also aims to increase community participation in, and ownership of, renewable electricity projects. It aims to make sure electricity consumers get value for money and to improve security of our electricity supply.

Register of Opportunities (RoO) - The Register of Opportunities is a list of projects or opportunities within your community which if executed will result in energy efficiency and a reduction in energy use and the associated CO_2 output.

Thermal Energy - Defined as energy used to generate heat. This commonly refers to the energy used to heat homes by burning oil, timber peat or using electricity in heat pumps.

Sustainable Energy Community (SEC) - An SEC is a community in which everyone works together to develop a sustainable energy system. To do so, they aim as far as possible to be energy efficient, to use renewable energy where feasible and to develop decentralized energy supplies.

Units

Throughout this report we present energy use and energy production, in kilowatt or megawatt hours per annum (KWh/yr) and (MWh/yr). These units of measurement are used regardless of the fuel used. As a reference point, a typical house consumes approximately 22MWh per annum. We also present carbon emissions in tonnes or kg of CO_2/annum. Energy costs are presented in euro spent on energy per annum.

Energy Credits - Projects that generate verifiable energy saving credits, can be sold to energy suppliers and obligated parties. The obligated Energy Suppliers then apply the energy savings towards their yearly targets, reducing overall energy consumption and carbon emissions. For a more detailed explanation please see: https://www.seai.ie/business-and-public-sector/business-grants-and-supports/energy-efficiency-obligation-scheme/

Ireland's Climate Action Plan

- The Climate Action Plan (CAP) is a roadmap developed by the Government for taking decisive action to reduce Ireland's emissions by 51% of 2018's totals by 2030, and net zero by 2050. This is done by sector with a clear goal set out for each sector. Table 1 shows the mandated emissions reductions for each sector to achieve the target.

- The statutory national climate objective and 2030 targets are aligned with Ireland's obligations under the Paris Agreement and with the European Union's objective to reduce GHG emissions by at least 55% by 2030 (compared to 1990 levels) and to achieve climate neutrality in the European Union by 2050.

- Targets for each sector of the economy will be updated annually to ensure alignment with the governments' legally binding economy-wide carbon budgets and sectoral ceilings.

- Whilst all the sectors referenced in Table 1 are relevant for the Birr EMP, of particular importance are the Transport, Electricity and Building sectors.

- One of the standout targets for the Electricity sector which is particularly relevant for the Birr SEC is the target of increasing the amount of electricity generated by renewable sources to 80%. SEC's can play their part through small-scale renewable energy generation in the community as will be discussed later in the report.

- Regarding transport, the expectation is that 1 of 3 private cars on our roads to be electric by 2030. Conversely, public and active transport services will receive heavy investment, enabling a 50% increase in daily active travel journeys and a 130% increase in public transport journeys.

Table 1 – Summary of the sectoral targets within the Climate Action Plan

Sector	Reduction	2018	2030
Electricity	75%	10.5 $MtCO_2eq$	3 $MtCO_2eq$
Transport	50%	12 $MtCO_2eq$	6 $MtCO_2eq$
Buildings (Commercial & Public)	45%	2 $MtCO_2eq$	1 $MtCO_2eq$
Buildings (Residential)	40%	7 $MtCO_2eq$	4 $MtCO_2eq$
Industry	35%	7 $MtCO_2eq$	4 $MtCO_2eq$
Agriculture	25%	23 $MtCO_2eq$	17.25 $MtCO_2eq$
Other	50%	2 $MtCO_2eq$	1 $MtCO_2eq$

Energy Master Plan Summary

To assist in achieving the Birr Sustainable Energy Community's goals, an Energy Master Plan study has been conducted. This Energy Master Plan (EMP) has been funded by SEAI to assist in developing and refining short, medium and long-term plans for the Birr Sustainable Energy Community.

The Master Plan aims to help communities understand their current energy usage and carbon footprint so that they can understand where they currently are, thereby allowing them to set reduction targets for the future.

The information gathered and tools developed to review projects will help the SEC strive toward being an exemplar model in the transition to a low carbon community.

The Energy Master Plan is based on a mixture of desktop research utilising publicly available information sets from a range of sources CSO, SEAI, POWSCAR, CIBSE, Pobal, County Council, etc.

Using modelling tools and methodologies developed inhouse by Plan Energy Consulting, the Energy Master Plan will also capture the energy consumption, emissions and spend within the community.

The EMP consists of three separate documents:
- The EMP report (this document)
- A Register of Opportunities document
- A document detailing home energy audits and non-domestic building audits

The EMP report begins with a sectoral energy breakdown that will give a broad overview of each sector's (Residential, Non-Residential, Transport) energy consumption, energy cost and contribution to CO2 emissions in the Birr SEC, followed by a brief discussion on how the SEC compares to national averages.

These sections form the basis of the recommendations and options supplied for a transition to renewable energy sources in each of the sectors as well as opportunities for energy reduction and increased efficiency within the Register of Opportunities document.

The EMP will identify the potential for the implementation of sustainable transport models such as electric vehicle (EV) charging infrastructure, alongside renewable energy generation possibilities from wind and solar.

A wide range of natural resources are often within a community's grasp, however the understanding of how to progress from a concept through to reality can be an enormous barrier. This EMP outlines the processes required by the SEC to quantify what these resources can offer, alongside how renewable projects can transition from an idea to a system that is owned by the community, contributing to the sustainable, decarbonisation of the area.

The report concludes with an Action Plan and Register of Opportunities section, which the community can use as a benchmarking tool, as they seek to become more energy efficient and reduce their carbon footprint over the next decade.

The final document is a collection of case studies, showing how various homes and buildings in the Birr SEC could be upgraded to a higher BER and increase their energy efficiency.

This report includes recommendations, demonstrating examples of what the community can do to change behaviour and increase the understanding of climate action and how those involved can contribute toward this shared objective of reducing their impact on the environment.

The EMP covers a number of Small Area Plans [1] which are defined by the Central Statistics Office (CSO) and are shown below in Figure 1.

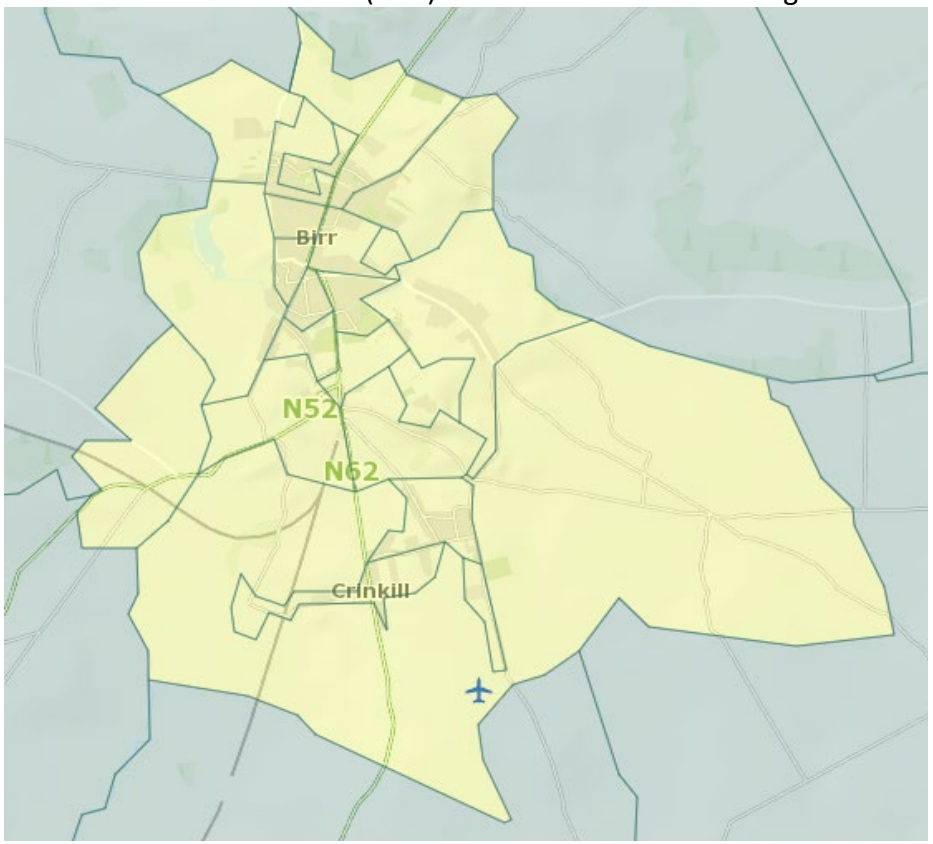


Figure 1 - The image depicts the area covered by Birr SEC. This was generated using the Small Areas as defined by the Central Statistics Office (CSO SAPMAP 2022).

[1] *Small Areas are areas of population generally comprising between 80 and 120 dwellings created by The National Institute of Regional and Spatial Analysis (NIRSA) on behalf of the Ordnance Survey Ireland (OSi) in consultation with CSO. Small Areas were designed as the lowest level of geography for the compilation of statistics in line with data protection and generally comprise either complete or part of townlands or neighborhoods. There is a constraint on Small Areas that they must nest within Electoral Division boundaries.*

Executive Summary

The table below provides a holistic overview of the energy consumption, emissions and cost associated with Birr SEC.

Table 2 – SEC Total Energy, CO_2 and Cost Analysis

		
Residential	Non-residential	Transport
58%	**22%**	**20%**

All the data on this page was calculated using data from Central Statistics Office 2022 Census of Ireland (CSO, 2022), whilst the emissions and Energy Cost were calculated using SEAI Domestic and Commercial Fuel Cost Comparison (SEAI, 2024).

The EMP breaks down the energy consumption and fuel mix within the community's catchment area into 3 key sectors consisting of:

1. Residential
2. Non-Residential (Building stock that is not classified as a home, e.g., Commercial, community or industrial buildings
3. Transport

The sectoral baseline energy usage analysis, which will be discussed in more detail in later sections, is summarised in Table 3 in the form of an energy balance for the whole catchment area. This provides a full picture of how much energy is used in each sector, which helps identify and prioritise areas for action by the Birr SEC.

Our analysis of the energy consumption within the catchment area has identified that 58% of the energy demand relates to the residential sector, 22% in the non-residential sector and approximately 20% in the Transport sector.

Table 3 – Sectoral percentage energy consumption

Birr SEC Primary Energy Baseline (kWh)				
Sector	**Electricity**	**Fossil Fuel**	**Renewable**	**Total** (MW)
Residential	24,935,709	29,150,785	1,246,023	55,333
Non-residential	8,592,138	12,620,980		21,213
Transport	45,029	18,009,714	1,293,335	19,348
Total Energy	**33,572,876**	**59,781,478**	**2,539,358**	**95,894**

Residential sector

Background

The Residential sector is one of the largest emitting sectors in Ireland, accounting for 27.5% of CO_2 emissions and roughly a quarter of the energy used in Ireland as per 2021 estimates from SEAI. Therefore, if communities want to make progress towards individual targets, as well as contributing to the national target of reducing all CO_2 emissions 51% by 2030, it is vital this sector is given particular focus.

Whilst energy usage from the residential sector has increased by almost 19% from 2014 to 2020, emissions only subsequently increased by 1%. These figures have been attributed to higher household incomes and expenditure which led to higher energy usage but have been balanced out by improvements in energy efficiency as a result of updated building regulations and homeowners increasingly more willing to invest in fabric upgrades within their homes.

The momentum within the country has been to ensure that as many homes as possible upgrade their homes insulation ahead of 2030, with the Irish Government setting the ambitious target of 'retrofitting'[2] 500,000 homes to a B2 Building Energy Rating (BER) by 2030. By retrofitting homes in a manner that focuses on enhancing their insulation, homeowners don't have to use as much energy on space heating within their home, which will naturally lead to emission reductions within the residential sector.

The residential section of this report will seek to analyse what retrofit measures may be suitable for properties in the Birr SEC based upon housing age, occupancy, ownership and type. Furthermore, the fuels used to heat homes within the Birr SEC are analysed for their emissions in tonnes of CO_2 equivalent.

The fuel mix can have a significant impact on the carbon footprint of a SEC as each fuel type has its own associated CO_2 output. For example, coal and oil produce approximately 0.4kg and 0.3kg of CO_2 respectively for every kilowatt hour of energy delivered, compared to just over 0.2kg for natural gas.

Strong emphasis is placed on the Building Energy Rating (BER) of homes in the report. The BER is based upon the provision of space heating, water heating for domestic purposes, ventilation, and lighting. The BER does not include what are called point load consumption such as plugged-in electrical appliances[3]. A breakdown of the communities BER ratings per Small Area Plan is provided, which helps identify those sectors of the community that require more investment to improve their BER. Given that a BER is a reflection of a home's energy efficiency, a lower BER implies that homeowners are using more fuel to heat their homes. Given the continued rise in energy costs, a strong BER can alleviate homeowners from fuel poverty and prevent others from going into it.

[2] A process where you look at the house's overall energy efficiency and use a combination of measures to improve it.

[3] An excellent reference which provides a breakdown of all energy used in the home is the "SEAI Energy in the Residential Sector" Report - https://www.seai.ie/publications/Energy-in-the-Residential-Sector-2018-Final.pdf.

Method

An analysis of the residential housing stock in the catchment area of Birr SEC has been carried out based on Central Statistics Office (CSO) data and the Eircode database provided by the Environmental Systems Research Institute (ESRI).

The residential housing stock is based on a baseline year of 2022 and a breakdown of the number of residential units which are vacant or classified as holiday homes is derived from the Eircode Database which is based on a baseline year of 2022. Statistics for residential heating are based on national averages against primary heating type. This allows for comparison against future census data.

The SEAI Building Energy Rating (BER) Map shown on page 15 displays colour coded 'Small Areas' of the Birr SEC. The colour of a given small area represents the median BER of dwellings in that small area. The map only contains BER Information at the Small Area level for dwellings that have had a BER completed.

The medians were derived from all geo-located dwellings with a BER in that particular Small Area. For example, Small Areas that are green represent areas with a 'good' median BER. Small Areas with dwellings that have a poor median BER are either red or purple.

SEAI's corresponding prices and emission factors as of 2022 were applied to calculate the total spend and CO_2 emissions for various sources of energy and heating.

Results and Analysis

Housing Ownership

Within the catchment area approximately 55.8% of the housing is owner occupied. 35.2% of those homes are owned outright (mortgage completely paid off). This can imply a greater appetite to engage in home retrofits as the occupiers are the decision makers in relation to energy upgrades and have a clear incentive to upgrade.

The ownership profile has a bearing on the potential for energy efficient retrofits, especially in the private rented sector where there is little incentive for a property owner to invest in energy efficiency while the benefit of reduced energy costs and increased comfort is accrued to the tenant.

A strong strategy of engagement and encouragement will be required for landlords until obligatory government regulations come into effect. In the short term, the Local Authority is more likely to invest in energy efficiency than a private landlord.

Table 4 – Percentage of homes owned outright by owner

Occupancy type	No. of homes	% of homes
Owned with mortgage or loan	472	20.6%
Owned outright	804	35.2%
Rented from private landlord	481	21.0%
Rented from Local Authority	350	15.3%
Rented from voluntary/co-operative housing body	75	3.3%
Occupied free of rent	35	1.5%
Not stated	69	3.0%
Total	**2286**	**100%**

Housing Type

A very significant percentage of the housing stock in the catchment is classified as individual houses consisting of detached, semi-detached, terrace housing with a small percentage classified as flats or apartments. Flats and apartments mainly consist of smaller developments or over the shop dwellings. The options for retrofitting a home increase with detached, semi-detached and terraced housing as there is less chance of interfering with other properties.

Table 5 - Housing Stock percentage type - (CSO, 2022)

Type of home	No. of homes	% of homes
House/Bungalow	2029	87.5%
Flat/Apartment	257	11.1%
Bed-Sit	0	0.0%
Caravan/Mobile home	34	1.5%
Total	**2320**	**100%**

Housing Age

Within the catchment area there is a good mix of housing age types which will each require different energy efficiency measures to achieve a more energy efficient housing stock. As per Table 6, 19% of Birr's housing stock would be considered modern having been constructed after the year 2000, which indicates that measures such as cavity insulation improvements and attic insulation can be promoted.

[4] External Wall insulation involves fixing insulation materials such as mineral wool or expanded polystyrene slabs to the outer surface of the wall. The insulation is then covered with a special render to provide weather resistance. A steel or fiber-glass mesh is embedded in this render to provide strength and impact resistance.

Housing which was constructed prior to the introduction of the building regulations tended to be solid wall or hollow block construction which is unsuitable for cavity insulation due to the lack of a suitable cavity. These buildings tend to be more suited to internal or external insulation measures[4]. With 49.9% of dwellings having been constructed from pre 1919 – 1990, this indicates that a sizeable number of homes will have quite straightforward opportunities to improve energy efficiency and reduce their energy requirements.

However, the types of buildings within lower age bands present many challenges due to the historic construction methods applied from their era and the materials used, alongside the important significance associated with preserving the heritage of these homes.

Table 6 – Age profile of the Birr SEC housing stock (CSO, 2022)

Period	No. of homes	% of homes
Pre 1919	301	13.2%
1919 - 1945	153	6.7%
1946 - 1960	147	6.4%
1961 - 1970	146	6.4%
1971 - 1980	218	9.5%
1981 - 1990	175	7.7%
1991 - 2000	364	15.9%
2001 - 2010	633	27.7%
2011 -2015	36	1.6%
2016 or later	56	2.4%
Not stated	57	2.5%
Total	**2,286**	**100%**

Housing Fuel Mix

The residential fuel mix as illustrated in Table 7 provides a breakdown of the different types of fuel sources used in the community for residential heating. The CO_2 Emissions is linked to the type of fuel consumed within the community. By using different fuel types, a community can significantly reduce the CO_2 footprint from the energy it consumes to heat its homes. The ideal situation for any community is to reduce the level of energy required to heat their homes through measures that enhance energy efficiency and to provide the remaining heat requirements from low or natural CO_2 producing fuel sources.

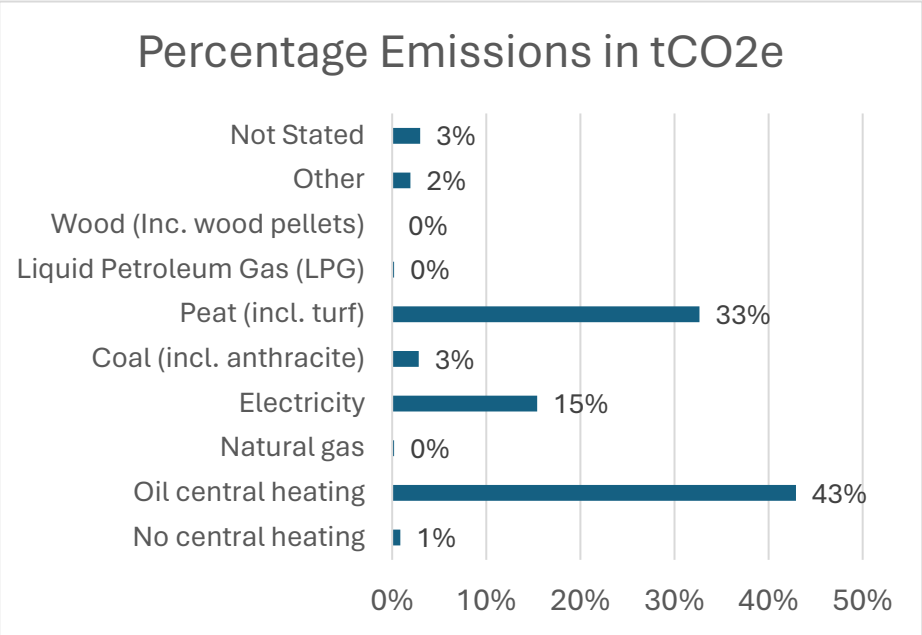


Figure 3 - Percentage emissions in tCO_2e (CSO, 2022; SEAI, 2024)

[5] Residential fuel mix is based on the primary heating source of the property and does not take into consideration secondary fuel sources as this information is not available within the CSO data.

Within Birr SEC, the main fuel types currently are oil and natural gas which make up 76% of the total CO_2 emissions. As per Table 7, combined these two fuel types make up over 73% of the thermal energy used in the Residential sector. These findings demonstrate the huge level of potential for the community to significantly reduce its carbon footprint.

Table 7 - Residential Fuel Mix[5] (CSO, 2022; SEAI, 2024)

Heating Type	No. of Units	Fuel	% of Total Thermal Energy
No central heating	23	Oil[6]	1.0%
Oil central heating	1138	Oil	49.8%
Natural gas	7	Natural Gas	0.3%
Electricity	310	Electricity	13.6%
Coal (incl. anthracite)	58	Coal	2.5%
Peat (incl. turf)	531	Peat	23.2%
Liquid Petroleum Gas (LPG)	6	LPG	0.3%
Wood (Inc. wood pellets)	81	Wood Pellets	3.5%
Other	53	Other	2.3%
Not Stated	79	Other	3.5%
Totals	**2286**		

[6] The fuel specified against no central heating is defined as 'Oil' which is in the mid-range between wood and coal. This is because this type of heating uses a variety of different fuel sources.

Housing BER Coverage

An analysis of the Building Energy Rating (BER) of the housing stock within the catchment area was carried out. An average BER rating has been determined based upon SEAIs 2023 BER database and is compared against the 2022 CSO data on the number of houses in the SEC which have had BER's carried out on them.

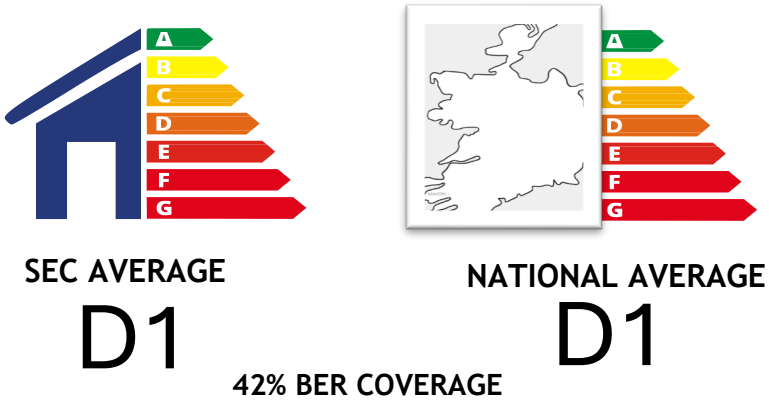


Figure 4 - Building Energy Rating information on catchment area [7](SEAI, 2024)

Of the 2,286 homes registered within the Birr SEC catchment area, a 42% of these homes have Building Energy Rating certificates. The number of dwellings in Birr with a BER of B or greater is almost identical to the national average (16% vs 15%). It is important to remember that the average of all the homes in the BER could be lower given that all homes since 2008 are legally required to have one which means many older, less efficient properties are unlikely to have a BER certificate. Despite that, it's interesting for SECs to see how each subsection of their community fares in terms of BERs. This can reveal insights into fuel poverty and nudges decision makers towards those areas in need of most investment. The following map of the SEC illustrates the median BER's which have been recorded in each Small Area Plan.

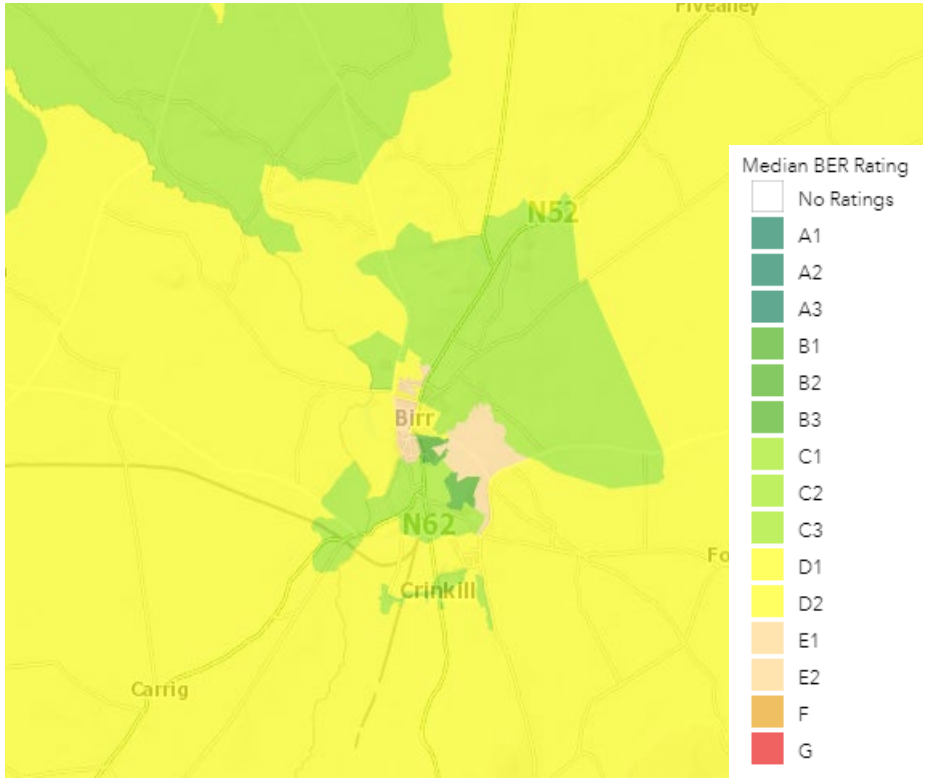


Figure 5 - Map of Median BER in SEC Catchment Area (SEAI, 2024)

[7] SEC average BER is based upon 51% of the building stock within the catchment area which currently has a BER, the average BER may be lower. Data comes from SEAI's BER database which was updated in 2022

It should be noted that this information is based on a limited number of BER data and is presented for illustrative purposes to allow for comparison in future reports.

Residential Energy Baseline

To calculate the residential sector's energy baseline, national residential data was obtained from the CSO's Small Area Population Statistics (SAPS) which lists the housing stock present in the area by house type and year of construction.

Table 8 - Residential Energy, CO_2 and Spend [8] (CSO, 2022)

	Electricity	Fossil Fuel	Renewable	Total
Total Primary Energy (kWh)	24,935,709	29,150,785	1,246,023	55,332,517
Total CO_2 (tonnes)	4,010	9,107	0	13,116
Total Spend (€)	€4,841,885	€3,216,944	€157,747	€8,216,575

For homeowners who wish to upgrade their BER's, The Sustainable Energy Authority of Ireland (SEAI) provides financial incentives to homeowners in the form of grants and supports, details of which can be found at the end of the report. It's important that homeowners are supported throughout the application process, so that they are investing in measures that are appropriate for their home.

Whilst the costs of many of the retrofit measures associated with improving a home's energy efficiency may appear prohibitive on the surface for both lower income groups and landlords alike, SEAI's 'National Retrofitting Scheme' [9] has meant home upgrades are more achievable for homeowners than ever before.

For example, homeowners can now avail of grants equivalent to 80% of the typical cost for attic and cavity wall insulation, with an upper limit of €2,500. These measures have been shown to improve energy efficiency significantly within typical Irish homes and should be an affordable measure for the majority of homeowners in the SEC.

Furthermore, the Warmer Homes Scheme [10] offers free energy upgrades for eligible homeowners who are most at risk of energy poverty. A budget allocation of €148 million was provided for the scheme in 2023, with the budget allocation for 2024 to be finalised shortly. The scheme will target the least energy efficient properties, by prioritising homes that were built and occupied before 1993 and have a pre-works BER of E, F or G. Applications will also be accepted from qualifying homeowners who previously received supports under the scheme, but who could still benefit from even deeper measures.

Given that energy costs are expected to remain at the very least the same level in the coming years, if not increase further, it is vital that homeowners in lower income groups utilise these grant streams to protect themselves against falling into, or further into fuel poverty.

[8] This table refers to the SEC's Total primary energy requirement (TPER). TPER is a measure of your energy consumption that also accounts for the energy that is consumed and/or lost beyond the boundary of the SEC, notably in generating and distributing the electricity that you use.

[9] https://www.gov.ie/en/press-release/government-launches-the-national-retrofitting-scheme/

[10] https://www.seai.ie/grants/home-energy-grants/free-upgrades-for-eligible-homes/

Retrofit

Background

As part of the Energy Master Plan 3 residential properties were selected within the community for energy assessments using the Building Energy Rating system. The audits were carried out in November 2021. In conjunction with the Building Energy Rating, an uplift report was produced for each property indicating the works which would provide an increase in the energy rating of the building up to A3. The individual building information has been redacted from the following case studies for the privacy of the homeowners.

The most significant measure which can be carried out within the community is the retrofitting of residential properties that use solid fuel and oil as their primary heating source. The Section on Residential Fuel mix indicates that the majority of residential properties are using oil or peat. The study area is not serviced by natural gas and as such the use of gas is not a viable option.

The momentum within the country has been to upgrade the fabric of buildings so that heat pumps can be utilised as the primary heating source. However, in order for heat pumps to be a viable option, buildings need to be insulated to a level where they have a Heat Loss indicator of 2.0 or less.

[11] Heat Loss Indicator (HLI) value is the total heat loss per m2 of dwelling floor area. A minimum HLI of 2 Watts/Kelvin/m2 must be achieved to be suitable for a heat pump however in some cases, where upgrades may not be cost- optimal, a value of HLI up to 2.3 Watts/Kelvin/m2 can be accepted provided additional requirements are met

SEAI define these dwellings as being 'heat pump ready' [11]. If properties are not insulated to an adequately high level, then this technology is not suitable as a primary heat source.

The government's climate action plan has set a Building Energy Rating (BER) of B2 as the target for the energy performance of retrofitted homes. This target is in line with current building regulations - 'Part L conservation of fuel and energy'[12], which specifies that buildings undergoing 'Major Renovations'[13] must achieve a BER B2 or 'Cost Optimal' level of energy performance. The following table illustrates the spread of buildings which were reviewed with the recommended retrofit measures for one of the properties laid out on the page that follows this.

Table 9 – Residential Building Energy Rating and possible uplift.

Building No.	Building Size m2	Existing BER Rating	Measures No.	Possible BER Uplift
1	173	F	9	A2
2	75	D1	8	A2
3	170	C3	9	A2

[12] https://assets.gov.ie/180475/e532a9c5-3ec6-4a4c-8309-02f8a653e2d8.pdf
[13] Major renovations refer to upgrades where more than 25% of the building envelope. Painting, re-plastering, rendering, re-slating, re-tiling, cavity wall insulation and insulation of ceiling are not considered major renovation works.

		Dwelling Type		**2 Storey, 4 Bedroom, 2 living rooms - Semi Detached Dwelling Circa 2000**								
			M2									**C3**
		Total Building Area:	**170.02**									
		Element	BER Rating	Energy Value (kWh/m2/yr)	Co2 Emissions KgCO2/m2/yr)	Energy Savings	Total Annual Space Heating kWh/yr	Space Heating in Kw/hour	Heat Loss Indicator (HLI) w/km2	Space Heating costs per year	Carbon Emissions	
		Dwelling Current Condition	**C3**	**202.45**	**51.87**	-	**24,095**	**12.55**	**2.23**	€2,891.40	8,819	
		Element	BER Rating	Energy Value (kWh/m2/yr)	Co2 Emissions KgCO2/m2/yr)	% Energy Saving	Total Annual Space Heating kWh/yr	Energy Requirement per hour for space Heating Kwh/Hour	Heat Loss Indicator (HLI)	Space Heating Cost per year €	Overall Carbon Emission KgCo2/Year KgCO2/year	
1	**Ventilation**	Install positive ventilation from loft system to ceiling in first floor landing (example https://www.nuaire.co.uk/product-list-page/drimaster-eco-range)	C3	205.85	52.78	- **1.68**	24621	**12.82**	2.26	€2,954.52	8,974	
2	**Roof Insulation**	Add 150mm quilt to existing 150m quilt insulation laid neatly and perpendicular to existing insulation U Value 0.13 w/m2k Add 100mm rigid PIR to velux surrounds on attic side.	C2	196.23	50.20	**3.07**	23,134	**12.05**	2.16	€2,776.08	8,535	
3	**Wall Insulation**	Full fill bonded bead, Kore silver or equal approved to existing partially filled cavity wall insulation. U Value 0.37 w/m2k	C2	185.49	47.33	**5.31**	21,128	**11.00**	2.03	€2,535.36	8,047	
4	**Windows**	Fit new energy efficient windows and doors throughout minimul U Value 1.20 w/m2k	C1	162.92	41.29	**11.15**	17,986	**9.37**	1.75	€2,158.32	7,020	
5	**Chimneys**	Remove open fire and block up chimney - Fit 2 mechanical extract fans in bathroom and Ensuits	B3	144.38	34.34	**9.16**	15,120	**7.88**	1.72	€1,814.40	5,838	
6	**Airtightness**	Improve Air permeability to approximately 7 m3/m2/hr by getting air test done and addressing all leakage areas and re test.	B3	136.97	32.51	**3.66**	13,975	**7.28**	1.63	€1,677.00	5,527	
7	**New Boiler and controls**	Fit new oil fired condensing boiler (efficiency 95%) and time and temperature zone control (2 no space heating zones and separate hot water zone)	B1	94.45	22.53	**21.00**	9,989	**5.20**	1.63	€1,198.68	3,831	
8	**Air Source Heat Pump**	*Install an Air to Water Heat Pump (Mitsubishl 6.0 Kw unit used in this assesment) with time and temperature zone control.	A3	51.32	9.89	**21.30**	2,285	**1.19**	1.63	€502.70	1,681	
9	**Photovoltaic**	Add 6 No. PV Panels to South facing roof 2.16Kwp (assuming 360 watts per panel)	A2	26.63	5.24	**12.20**	2,285	**1.19**	1.63	€274.20	891	

* The Heat pump used in this Assessment is a Mitsubishi 6 Kw - The Heap Pump installed MUST be specified by the Installer and/or Manufacturer.

A2

Carbon Dioxide Savings per year - Tonnes	7.93

Home Energy Assessment example – Further Commentary

There is currently too much complexity to be able to model the effect that an increase in BER would have on a home's value and include the data in the Home Energy Assessment reports (we don't know what's the house value to start with). However, according to ESRI (2012), each step up in BER grade increases the value of a property by 1.3%.

For example, bringing a D1 property with value of €300,000 to a B2 grade increases the value by approximately €20,000. More recent research from the Real Estate Alliance has shown that A & B rated homes are valued on average €36,000 more than those of a BER C rating and below [14].

The HEAs provided for Birr show several actions that can be taken from the most basic measures through to deep retrofit. Within each HEA readers can see the grants available for every individual measure and the impact of each measure if carried out on its own, relative to the other measures.

By breaking down each individual measure in this way the HEAs can be used as part of a long-term roadmap for home energy upgrades, as opposed to a big jump to a B2 BER.

[14] https://www.independent.ie/business/personal-finance/latest-news/energy-crisis-adds-60000-to-price-of-best-insulated-homes-42034823.html

Health and Social benefits of retrofitting

Creating an airtight, insulated home, retrofitting to a high standard and installing a decent cooling and ventilation system allows homeowners to maintain a regular, comfortable occupancy all year round. Considering that it has been estimated that we spend 90% of the time inside buildings, this counts for a lot. Homes are where we eat, sleep, spend time with families and friends, socialise and increasingly work. Therefore, being comfortable, happy, and able to function counts for a lot.

Energy efficiency retrofits in buildings create conditions that support improved occupant health and well-being, particularly among vulnerable groups. The potential benefits of energy efficiency measures include improved physical health such as reduced symptoms of respiratory and cardiovascular conditions, rheumatism, arthritis and allergies, as well as fewer injuries. In colder climates like Ireland's, energy efficiency improvements can lower rates of excess winter mortality.

From an Irish context, research from the International Energy Research Centre (IERC) at Tyndall National Institute has estimated that the increased health and wellbeing benefits associated with retrofitting homes could save the Irish economy up to €600 million annually, through gains in productivity and output, reduced sick leave and absenteeism, reduced burden on the healthcare and social welfare systems.

Annual savings on the reduction of hospital admissions alone, could be over €20m for the HSE, and over €2m to patients. The C40 Knowledge Hub references this as “housing as healthcare”. They explain that improvements to our homes offer better living conditions and therefore reduce threats of respiratory disease. Optimum ventilation staves off damp and mould and a city’s airborne pollution, leading to, for example, “a 2.5% decrease in asthma attacks”.

Whilst this is a developing area in terms of research, recent evidence shows that chronic thermal discomfort and fuel poverty also have negative mental health impacts (anxiety, stress, and depression). This is because of the financial stress of coping with high energy bills and debt that is strongly associated with fuel poverty. Energy efficiency measures that improve the affordability of energy bills in low-income homes can have a measurable effect on improving mental well-being.

The gap to target

Currently there is a labour and skills shortage in the construction sector, which means that retrofit targets are unlikely to be achieved under current conditions. The Government have begun the process of establishing ‘Retrofit Centres of Excellence’ where trainees can come to learn the skills that will allow them to become employable within this sector.

The original and biggest of the four centres is based in Mount Lucas, Co. Offaly as part of the Laois and Offaly Education Training Board. The SEC and wider Birr community should try to promote the courses and training offered at the ETB so that contractors based in their area have the appropriate skillset to carry out retrofits in their own communities.

Energy in Transport

Background

Transport in Ireland is currently deeply dependent on imported fossil fuels. Emissions from transport (excluding aviation) were the largest source of energy-related CO_2 in 2021, as they were responsible for over 30% of the total. Road transport specifically accounts for 96% of all greenhouse gases associated with transport, so a modal shift is critical.

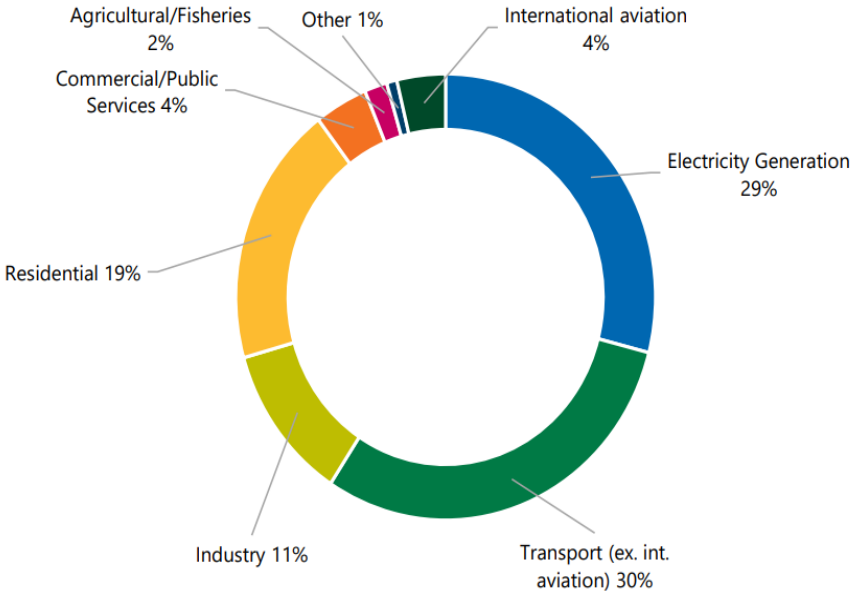


Figure 6 – Percentage share of Energy Related CO2 by sector for 2020 in Ireland (SEAI, 2024)

Whilst it's important to note that Figure 6 doesn't account for overall greenhouse gas emissions for each sector, it is reflective of the work needed to reduce Transport emissions. The Climate Action Plan stipulates that there must be a 42-50% reduction in emissions from the transport sector by 2030 if Ireland is to meet its Climate targets.

In order to achieve these emission reductions, it's clear that a transition towards more sustainable forms of transport is required. To realise this transition, many forms of transport options must be maintained, planned, and provided for the region. This ranges from safe and accessible walking and cycle routes to appropriate public transport links serving the needs of the residents, to the implementation of appropriate infrastructure to support the electrification of private car and fleet vehicles.

The standout targets for the Transport sector as part of the Climate Action Plan are to:

- Walking, cycling and public transport to account for 50% of all journeys
- 1 in 3 cars are Electric Vehicles
- Electrify mass transportation with up to 1,500 Electric Buses

This will necessitate a change in the traditional 'road hierarchy' which has dominated Irish roads for years, starting with active travel and then public transport being encourage over the private car.

Method

An analysis of the means of transport for workers and students as well as the transport fuel mix in the catchment area of Birr SEC has been carried out based on data from the Central Statistics Office (CSO). SEAI's corresponding energy usage, prices and emission factors for various forms of transport as of 2023 were applied to calculate the total spend and CO_2 emissions for various sources of fuel for vehicles in the catchment area.

Results and Analysis

Commuting to work

Commuting to work by private car is the primary method of transport in the Birr SEC with 62% of workers either driving or being driven by car. Birr is dominated by car-based movement patterns as a result of how the region has evolved over the last number of decades. The dispersed and disconnected nature of development that has taken place, has placed limitations on the movement throughout the town. This is reflected in the 2022 Census, which shows that Birr lags behind national averages in active transport usage for commuting to work. On a more positive note, the number of residents in the SEC who use bus and train services to commute is above the national average, with roughly 15% of residents using the bus to travel to education or work.

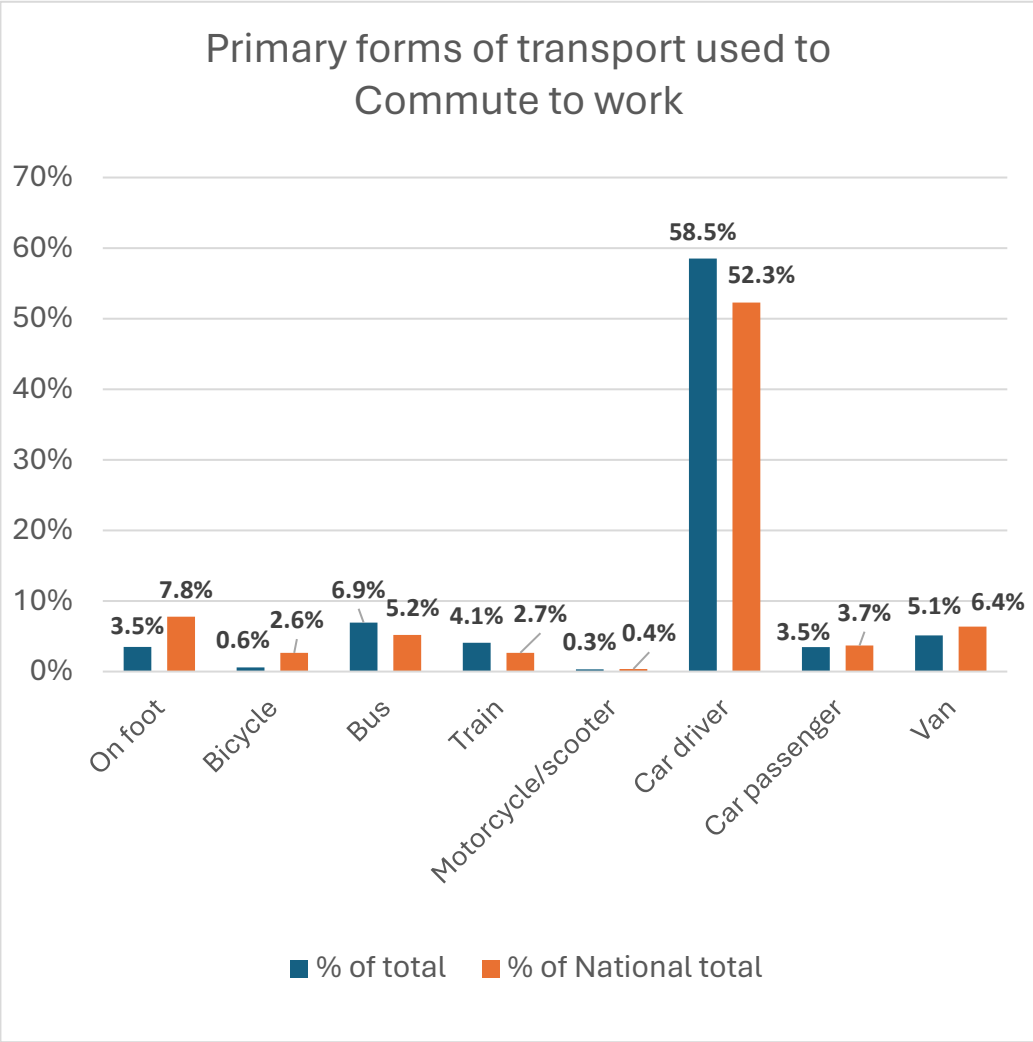


Figure 7– Primary forms of transport used to commute to work (CSO, 2022)

Reducing car journeys through remote working

The impact of COVID-19 on the nature of transport in the SEC cannot be understated and the profile will have changed significantly in the last two years, with a greater shift to home-based working and education, thus leading to a reduction in car usage. NUIG in conjunction with the Whitaker Institute released data in April 2022 from 8,428 respondents on their experience of Remote Working. At the time of data collection, 52% of respondents were working in a hybrid model (sometimes remotely, sometimes onsite), with 40% working fully remotely.

More than half (58%) of respondents said they had never worked remotely before the pandemic and almost all (95%) of respondents either agreed or strongly agreed that working remotely makes their life easier which suggests it will continue to be the norm for a significant amount of the population.

A new question was asked on the 2022 Census form about whether people ever worked from home. Nearly 750,000 people, a third of workers, indicated that they worked from home for at least some part of their week. People in occupations where relatively few workers ever worked from home were most likely to do so only one day per week. These included Health professionals, Skilled construction and building trades and Protective service occupations. Over half of workers availing of working from home in the Customer service occupational group were working from home five days a week.

Perhaps most striking, over 27% of respondents nationwide indicated that they worked from home 5 days a week. Interestingly, since the 2016 census, the percentage of the SECs residents who reported that they typically work from home has increased significantly, from 2.1% in 2016 to 7% in 2022 which has almost certainly been as a result of COVID-19. Unfortunately, data on the typical number of days worked at home by residents is not available, but we can see that 20% of residents in the SEC work at least one day from home per week.

The impact of COVID-19 led to a national experiment in the concept of hybrid or remote working models which in many cases have been seen as being successful. Many office-based jobs can be based partly or on a full-time basis at home or within remote office hubs within the community. A reduction of 40% in work associated commutes could be achieved by working remotely 2 days a week, which would mean significant progress in reducing transport emissions by 42-50%.

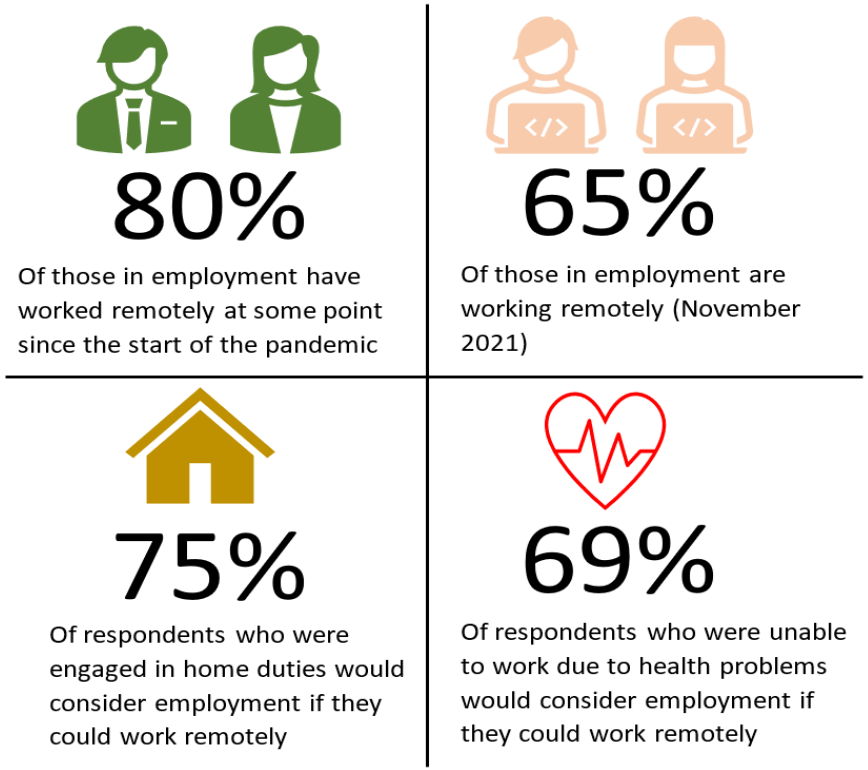


Figure 8– Results from the CSO 'Our Lives Online: Remote Work' survey from November 2021

Commuting to school or college

The outcome is similar for students commuting to primary, secondary and college education. Naturally we would expect the car to dominate the uptake for primary school children, so this slightly skews the results, but from an emissions point of view it is encouraging for the SEC that their rate is below the national average. However, there is still a lower usage of active transport amongst the student population in the community, with the SEC's usage over 4% lower than the national average. This could be a cause for concern but could also be viewed as a significant opportunity, as the community could try to address this by lobbying their local councilors/TDs and prove there is demand to invest in active travel infrastructure around schools.

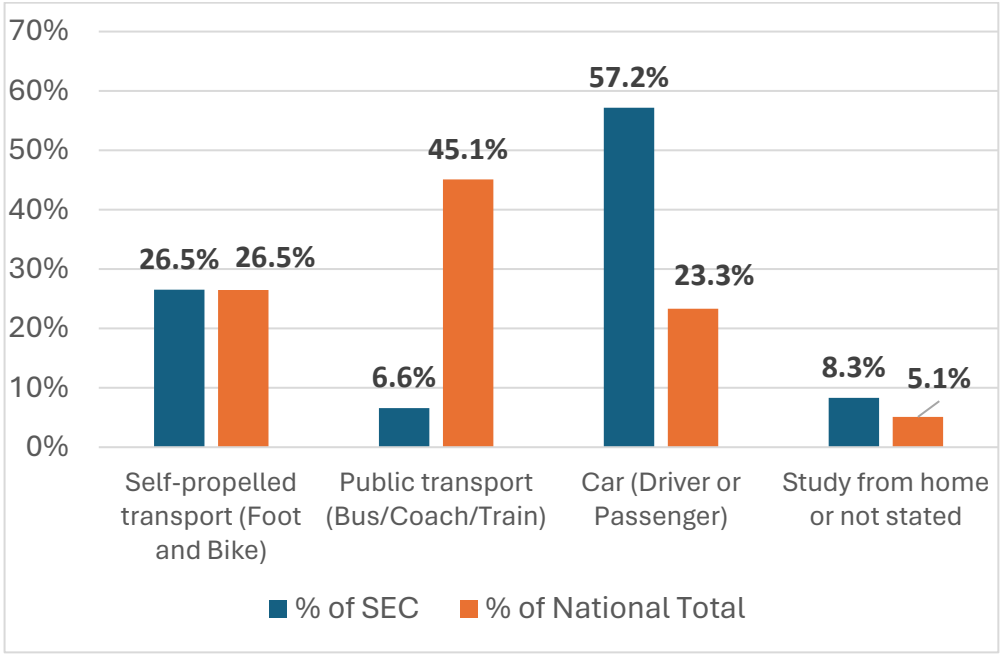


Figure 9 – Primary forms of transport for primary, secondary and college students (CSO,2022).

To increase this rate the SEC could look to seek funding or grants in order to improve the active travel infrastructure in their community so that walkways and cycle paths are safer for students.

For example, The Safe Routes to School (SRTS) Programme launched in is open to all schools in Ireland to apply for active travel funding and delivery. Over €15 million was provided in Round 1 of funding to accelerate the delivery of walking and cycling infrastructure on key access routes to schools and on school grounds.

Often times, one of parent's primary concerns about their children using active transport to go to school is their safety when going out alone. One way to combat this is through a 'Cycle Bus'. A Cycle Bus is where students cycle along a designated route to school with parents accompanying them.

Similar initiatives have popped up over the country, except rather than cycling, parents' guide children by foot in what is known as a 'Walking Bus' [15].

However, this is slightly compensated by Birr' impressive level of students who take public transport to school or college, sitting 12.5% above the national average.

[15] https://www.waterfordsportspartnership.ie/pdfs/walkingbusstartuppack.pdf

Energy consumption from transport

An analysis of transport related energy consumption was carried out for the Birr SEC catchment area. The analysis was based upon a statistical analysis of vehicle ownership along with the types of vehicles used and their associated carbon emissions. [16] As already referenced, the Census data shows that the majority of commutes within the Birr SEC catchment area are by car or van.

Table 10 – Means of commuting in the SEC (CSO,2022)

Commuting to work	No. of people	% of total
On foot	663	17.5%
Bicycle	95	2.5%
Bus	103	2.7%
Train	23	0.6%
Motorcycle/scooter	1	0.0%
Car driver	1465	38.7%
Car passenger	852	22.5%
Van	161	4.3%
Other	15	0.4%
Work/study from home	172	4.5%
Not stated	235	6.2%
Total	**3785**	**100%**

[16] The renewable portion of the fuels has been taken as follows: renewable content of electricity consumed (40% in 2020), 5% of petrol consumption and 7% of diesel consumption (as per the Biofuels Obligation Scheme).

Based on the information on vehicle ownership within the catchment area, it is possible to calculate the energy consumption and carbon footprint for the transport sector. A national stock breakdown has been used to calculate energy consumption and emissions (56.9% diesel, 42.7% petrol, 0.4% Battery Electric Vehicle (BEV)) based on national average km travelled.

Table 11 – Private Vehicle Transport Energy and CO_2 impacts (CSO,2022; CODEMA, 2019)

		National average annual km	kWh/km (TPER)	gCO_2/km
	Petrol	12,113	0.73	167
Car	**Diesel**	19,681	0.70	167
	BEV	12,958	0.38	65
Motorcycle		2,741	0.41	94
Van		19,787	1.01	243
Truck		44,671	3.47	832

Based on this information and values, a conservative estimate of energy used in transport is shown in Table 12 below.

Table 12 - SEC Transport Energy, CO_2 and Spend (CSO, 2022; SEAI, 2024)

	Electricity	Fossil Fuel	Renewable	Total
Total Primary Energy (kWh)	45,029	18,009,714	1,293,335	19,348,077
Total CO_2 (tonnes)	11.71	4,627	0	4,639
Total Spend (€)	€8,105	€3,008,900	€0	€3,017,005

Electric Vehicles

Replacement of diesel and petrol cars by Battery Electric Vehicles (EV) is a national policy aim in the medium term. The Climate Action Plan targets 800,000 zero emission vehicles by 2030. Concurrently the number of EVs on Irish roads has been increasing year upon year.

In 2023, 22,789 EVs were purchased which was an increase of 45% on 2022 and accounted for approx. 18% of all new car purchases in Ireland. Despite the increase in demand, there is still some slowness from car owners to embrace EVs particularly in more rural areas.

Many drivers are not fully aware of their typical driving ranges and see the standard EV range of 250km as not enough. It is important to note however, that battery range has increased rapidly in the past few years. 2019 (i.e. pre-COVID) car journey data from the CSO shows that the average journey outside of Dublin was 15.3 km which suggests this 'range anxiety' is unwarranted.

Furthermore, for 47% of commuters in the SEC their average journey time is less than 30 minutes. We can assume that even with rush hour traffic this is within a distance of 8-15kms and thus well within the range of EVs, so the data does not concur with range anxiety.

The occasional need for drivers to travel further than the standard 250kms range of an EV could be addressed by identifying where a quick pit stop at a rapid charging station could be made prior to making the journey.

It is possible for a person to track their actual travel times and distances over the course of a year using tools such as Google timeline. This could be promoted at transport workshops to illustrate quite how occasional a >250km car journey is for most people.

Home charging currently accounts for 80% of charging points in Ireland and is the most cost effective and convenient charging method. However, with an increase in demand for EVs there is urgent need for non-domestic charging infrastructure, particularly for those who live in accommodation that doesn't cater for a private EV charger.

The Electric Vehicle Charging Infrastructure Strategy 2022 – 2025 published by the Department of Transport outlines four main categories of infrastructure to serve different user needs according to where, when and how drivers need to charge their EV's. These are home charging, residential neighbourhood charging (including on-street and co-charging), destination charging (e.g. sports facilities, shops, hotels, tourist locations) and motorway/ en-route charging (ultra-rapid charging).

Figure 10 – Overview of Electric Vehicle charging points (Yellow Pins) available in the Birr SEC

Even with the will of the SECs residents to purchase EVs, there needs to be a corresponding upgrade in the existing EV infrastructure in Birr. As Figure 10 illustrates, there are 4 publicly available EV chargers across the SEC. For a SEC that has over 2,723 cars registered, this is a sparse network of EV charging which may does not cater for those individuals who are living in terraced housing within Birr.

There are plenty of areas in the SEC where destination charging would be useful and, if implemented, would encourage the purchase of EV's in the community. In cities and towns in Ireland and elsewhere, EV charge points for different types of electric vehicles are being clustered to form sustainable mobility hubs, for example the recent development in Finglas.

An analysis of the impact of changing 20% of the existing private vehicle fleet to battery electric vehicles and reducing work-associated commutes by 20% through remote and increased active travel is detailed in Table 13. It indicates that a CO_2 reduction of 1,083 tonnes and a reduction in energy spend of approximately €706,914 per annum. These are savings which can be recirculated around in the local economy, creating a more economically sustainable community.

Table 13 - SEC Transport Energy, CO_2 and Spend with 20% Electric Vehicles and 20% decrease in work associated commuting (CSO, 2022; SEAI, 2024)

	Electricity	Fossil Fuel	Renewable	Total
Total Primary Energy (kWh)	945,610	12,908,516	983,086	14,837,213
Total CO_2 (tonnes)	246	3,310	0	3,556
Total Spend (€)	€170,210	€2,136,687	€3,637	€2,310,534

The key benefit for an EV driver is the reduced operational costs associated with fuel to power the car. The following fuel costs for an EV are based upon home charging with night rate electricity in 2023.

Table 14 - Comparison of CO_2 impacts and fuel costs based on 250km per week (SEAI, 2023; Bonkers.com, 2023)

Vehicle	Weekly fuel cost	Weekly gCO_2
Electric e.g. Nissan LEAF	€9.84	13,800
Volkswagen Golf (Petrol)	€33.40	41,750
Volkswagen Golf (Diesel)	€35.51	28,000

The Birr SEC should consider a public EV awareness event to promote the suitability of electrical vehicles for suburban environments. Whilst the one-off purchase cost can be more expensive than a fossil fueled car, electric vehicles are significantly cheaper to run, with SEAI reporting running costs for a diesel car as €1000 more expensive annually than an electric vehicle [17].

Households with 2 vehicles could purchase an EV alongside their first car for shorter journeys as a starting point on the route to electric vehicles. SEAI provides a series of supports to incentivise the transition from fossil fuel-based vehicles towards electrical vehicles, details of which can be found at the end of the report.

[17] https://www.seai.ie/technologies/electric-vehicles/compare-and-calculate/comparison-results/?vehicle1=8164927&vehicle2=7910676&vehicle3=4147520&vehicle4=4271646

However, it is acknowledged that it is still a significant outlay to purchase an EV and will be beyond many individuals' financial limits. Whilst we do anticipate the accelerated growth of a 'second-hand' market to grow in the next five years, in the short term the Birr SEC should focus on implementing the 'Avoid-Shift-Improve' or ASI model for transport within the community. Until the cost of EVs comes down, it is important that communities embrace the ASI model and continue to use it even when the secondhand market for EVs begins to mature as EVs alone will not decarbonise the transport sector.

Table 15 – Avoid–Shift–Improve Transport model

Pillar	Description	Example
Avoid	Avoid or reduce travel or the need to travel	Transitioning to increased remote working. Walking or cycling where possible
Shift	Shift to more energy efficient modes	Using public transport such as bus services
Improve	Improve efficiency through vehicle technology	Moving towards electric vehicles

Car dependency

Car ownership

In order to meet the Transport reduction targets set by the Irish Government, the number of car journeys will need to decrease substantially. Naturally this means moving away from the traditional fossil fuelled car and towards alternative forms of transport that have a lower carbon intensity. Whilst EVs will undoubtably form part of the solution to reduce emissions from transport, other modes of transport will help to alleviate reliance on EVs.

Based on census data we know that there are 2,723 cars between the 4,771 people who are legally of age to drive in the Birr SEC (17 and over). This means there are 57 cars per 100 adults in Birr. This doesn't account for those individuals who do not have a driving license, so the number of people who are able to drive them is likely to be lower.

If we assume that all drivers in Birr operate diesel powered vehicles, then the annual average CO_2 emissions per driver in Birr is 3.13 tonnes. (Based off the County Offaly average annual km driven in 2019[18]). Given the unpredictable and skewed transport data as a result of COVD-19 from 2020-2022, it is more beneficial for the SEC to use the conservative estimate of the 2019 data.

[18] https://www.cso.ie/en/releasesandpublications/ep/p-tranom/transportomnibus2019/roadtrafficvolumes/

There were 2,286 homes in Birr as per the 2022 census, meaning there are 1.19 cars available for every home in Birr, with 32% of homes owning more than one car. The idea of replacing a multi-car home with an EV was referenced earlier, but the SEC could also appeal to those homeowners with more multiple cars to replace one with an e-bike.

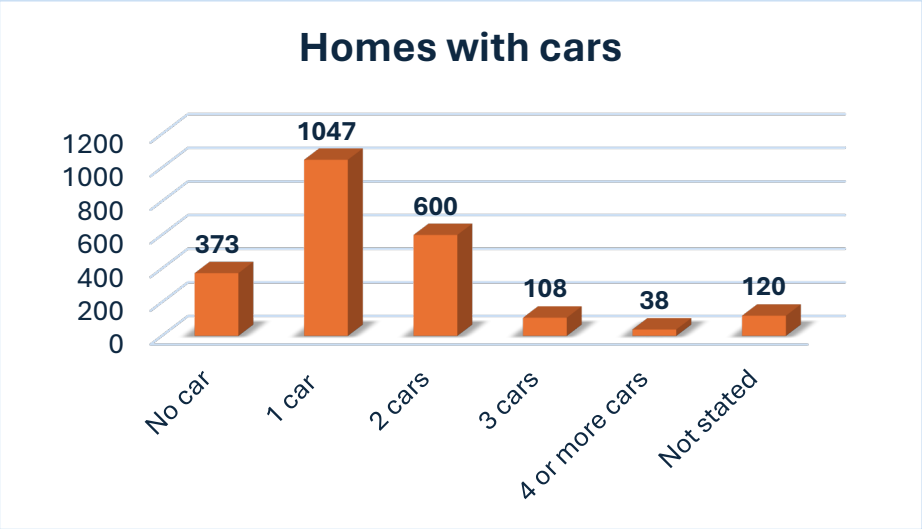


Figure 11 – Bar chart evidencing number of cars each home owns in SEC (CSO, 2022)

E-bikes

Electric bikes (e-bikes) have risen in popularity in urban environments over the past decade and now represent a real alternative to more mature forms of transport when it comes to shorter journeys (<5km). As the name suggests, an e-bike is one with an electric motor. There are many types of e-bikes, from those that only have a small motor to assist the rider's pedal-power, or more powerful e-bikes that do not need to be pedalled at all.

E-bikes would open up cycling to members of the community who perhaps don't feel confident enough in their cycling ability to navigate the town and surrounding area on a traditional self-propelled bicycle. It also negates one of the traditional criticisms of bicycles, that when compared to a car that they take longer/are not as convenient, as studies have shown e-bikes to reduce journey times by at least a fifth and up to 45%.

This in turn means that longer journeys are more feasible for e-bike users, as less physical effort is required to cycle from place to place. The SEC could follow the example of the Mulranny SEC who in 2022 launched a community e-bike rental scheme. What makes the Mulranny SEC scheme stands out is that the e-bikes are charged using electricity generated from Solar PV with battery storage at Mulranny's Tourist Office. Outdoor sockets, powered by the Solar PV array are available to the public as a free E-bike charging point.

Whilst estimates for how many grams of CO_2 e-bikes emit per kilometre driven vary widely due to differing methodologies, if a conservative estimate of 10g/CO_2/km was used, this is approximately 17 times less emissions per kilometre than a diesel-powered car. If approximately a quarter of the 2 car households and all 3 & 4 car households made this swap (296 homes) and we assume that all cars are diesel powered and every car owner was driving the County Offaly average, the SEC would save roughly 929 tonnes of CO_2. Of course, it isn't reasonable to expect people to cycle the same amount as they drive, so if those journeys deemed 'cyclable' (return journeys of 7.5km) were counted for from this total then that would equate to 154 tonnes.

This may be seen as difficult transition to make, but if we look at the average commute times for work, school and college in Birr, the commute times lends itself to a reduction in cars given almost half of the SECs population have a commute time of under 15 minutes (49.5%). Of course, it would be presumptuous to read too much into the commute times, particularly for those under 15 minutes as this is likely to be skewed by students attending school.

Table 16 – Commute time for residents in the Birr SEC to education or work (CSO, 2022)

	No. of people	% of total
Under 15 mins	1720	49.5%
1/4 hour - under 1/2 hour	611	17.6%
1/2 hour - under 3/4 hour	386	11.1%
3/4 hour - under 1 hour	123	3.5%
1 hour - under 1 1/2 hours	149	4.3%
1 1/2 hours and over	129	3.7%
Not stated	360	10.4%
Total	**3478**	**100%**

A more detailed transport study which evidences where individuals are going on their commute, along with a breakdown of what mode of transport they use would provide a more reflective outlook of the transport profile in the SEC.

Increasing the rate of cycling

It is understood that the SEC is home to a cycling club. Perhaps the cycling club could use their influence to provide demonstrations within the local schools and education centres, so to educate younger members of the community about safe cycling and developing good habits that will continue into adulthood.

By encouraging more people, particularly younger people to use bicycles, investing in bicycle infrastructure and getting people in the habit of seeing more bikes in their town, this will encourage intergenerational cycling that would have a lasting impact on the towns transport profile. Given the increasingly higher diesel and petrol costs for fuelling motor vehicles, economically a bicycle has become a more attractive choice, given that after the initial purchase there are essentially no costs bar maintenance.

Furthermore, the initial cost of purchasing a bicycle could be offset for individuals with the Bike to Work Scheme. Under the scheme an employer can pay for a new bicycle (including bicycle accessories) and the employee then repays the cost in regular instalments from their gross salary.

An employee can save on the costs of cycling to work because your repayments come out of your salary before tax, USC and PRSI are deducted. This means that someone on the highest rate of tax will save almost half of the cost of a new bike and equipment. The scheme applies to bikes and equipment up to the value of €1,250 and for e-bikes and related safety equipment up to the value of €1,500.

The Birr SEC could encourage employers within the community who aren't currently offering this scheme to do so and promote the Bike to Work scheme to employees on a regular basis.

Commuting and car usage

It is extremely difficult to accurately calculate the mean car mileage for the Birr SEC. We can see what the average commuting time is for those attending education or going to work, but this doesn't indicate which mode of transport they used.

There are 2,723 cars in circulation within the Birr SEC. From that total 1,465 cars are used for commuting to work, school or college. This means that there are approximately 1,258 cars that are not regularly used for commuting purposes, which are more likely to drive a below average amount of distance annually.

This reaffirms the previous point that there are sections of the community who drive such little distances annually, that they could replace their car with a different mode of transport.

Non-residential sector

Background

In order to achieve a 51% reduction in Carbon emissions by 2030 and a subsequent 'Climate neutral economy' by 2050, the business community will have to go through a period of transition in the same way as other sectors of the economy. Over the next decade businesses are encouraged to invest in a greener future, through sustainable products, services and business models.

Many of the avenues that the non-residential sector can take to reduce their carbon footprint and move towards a more sustainable model show crossover with the opportunities in the residential sector. However, there are a significant number of commercial processes such as refrigeration within convenience stores, air compressors at warehouse facilities and lighting arrangements in the hospitality industry which use significant amounts of energy and require tailored strategies to reduce this.

Given the turnover that some SMEs are recording in Ireland it can be difficult to have oversight of all monetary outgoings from a business. Therefore, many business owners simply don't notice the amount of unnecessary energy they are using in the day-to-day running of their business.

For this reason, an important theme throughout all these reports is the importance of engaging employee's regarding good energy management and educating all building users on the ways in which everyone within the building can contribute towards saving energy. Simple measures, such as installing lights with motion sensors, or switching off any equipment not in use rather than leaving them on standby, have proven to be successful in saving energy.

The recent Government announcement aimed at accelerating the decarbonisation of Irish businesses will see a new €55 million programme to help businesses plan for a more sustainable future and accelerate their decarbonisation journeys. The programme, which will run over the next five years will primarily comprise of the following:

- The Climate Planning Fund for Business, will give businesses a €1,800 grant to devise a personalised plan to identify how best to eliminate their reliance on fossil fuels and up to €50,000 matched funding to go towards specific capacity building

- The Enterprise Emissions Reduction Investment Fund will offer up to €1 million for manufacturing businesses to upgrade their processes. With funding to invest in energy monitoring and tracking, carbon neutral heating processes, smart metering and research and development

Method

An analysis of non-residential energy consumption within the SEC catchment was carried out using various data sources including Chartered Institution of Building Services Engineers (CIBSE) TM46 Energy Benchmarks, Valuations Office and Energy Consumption and SEAI's 'Extensive Survey of Commercial Building Stock in Ireland'.

In order to estimate the potential energy usage of all non-residential premises within the catchment area, a method based on estimated floor area and business category was implemented. Energy benchmarks for various business categories were sourced from "CIBSE TM46 Energy Benchmarks and Energy Consumption Guide" and were applied to the floor area data available.

Table 17 – An example of the CIBSE energy values applied to a typical office. These are multiplied by the area (m^2) of each Office Building in the SEC, the data for which is obtained from the Valuations Office

	Annual data for an office
Typical Electricity consumption (kWh/m^2)	95
Typical fossil fuel consumption (kWh/m^2)	330
Typical Electricity emissions ($kgCO_2/m^2$)	31.4
Typical fossil fuel emissions ($kgCO_2/m^2$)	62.7

[19] climatetoolkit4business.gov.ie

Results and Analysis

Below is an overview of the estimated total energy usage, emissions and spend from the non-residential sector within the Birr SEC. This helps the SEC get an idea of just how much their non-residential sector needs to reduce its energy usage by in order to keep in line with the Irish Government's targets in the Climate Action Plan.

Table 18 - SEC Non-Residential Energy, CO_2 and Spend (CIBSE, 2012)

Electricity consumption (MW·h)	Thermal Energy consumption (MW·h)	Electricity emissions (tCO_2)	Thermal Energy emissions (tCO_2)	Total emissions (tCO_2)	Total Energy Spend (€)
8592	**12621**	**4731**	**2398**	**7129**	**€4,157,104**

Support for SMEs

Aside from the recommendations contained within the EMP and supplementary non-residential audits, businesses can utilise the ClimateToolKit [19] website launched by the government to help businesses get started in taking climate action. This online tool allows SMEs to input some simple information and get an estimate of their carbon footprint and a personalised action plan to reduce it. Each tailored action plan includes straight-forward, practical instructions and highlights the relevant help that is available from Government, through agencies such as Enterprise Ireland, the Local Enterprise Offices and SEAI.

SEAI have also launched a free, online, learning platform called the 'SEAI Energy Academy' which is designed to help businesses increase their energy efficiency and reduce their energy related costs. It delivers short, interactive, animated modules on a wide array of topic areas including business and office energy efficiency.

Furthermore, SEAI are currently running an energy audit scheme that offers SMEs a €2,000 voucher towards the cost of a high-quality energy audit [20]. These energy audits are suitable for businesses with an annual energy spend of over €10,000. These energy audits delve deeper than those contained within the report, analysing the sites suitability for various renewable technologies, the most significant users of energy in their business and their overall carbon footprint.

A highly detailed audit like this gives business owners the confidence to take appropriate steps to improve both their energy efficiency and reduce their annual energy bills.

As part of this energy master plan, four premises were audited to identify any opportunities within these premises for energy efficiency measures. The recommendations within the reports are based on utility data, a site audit and related engineering calculations. The site audit consisted of a walk-through of the facility and review of the electrical and mechanical systems and equipment.

The premises which were audited are detailed in the following list and a detailed report was provided to each of the property owners the results of which are located within the supplementary document to this report. The audits identified several opportunities within the premises which can be developed into energy efficiency projects. The standout projects are:

- **Birr Courthouse**
  3kWp Solar PV installation on the roof space.

- **Birr Credit Union**
  Upgrading the existing non-condensing oil boilers to a new condensing model is proposed, this would yield about 15% in oil savings due to the increase in boiler efficiency from about 75% to 90%.

- **Marian Hall**
  Thorough internal insulation to be placed in attics and walls which could help reduce energy used for heating by 30%

- **St Brendan's Community School**
  The existing external windows in the original building are single-glazed. This make-up a well above average percentage of the building envelope and are the cause of the majority of heat loss from the building. These should be upgraded to double or triple glazed. The windows in the newer extensions are double-glazed and they are adequate.

[20] https://www.seai.ie/business-and-public-sector/small-and-medium-business/supports/energy-audits/

Reducing energy use

It is common knowledge that large companies have a significant impact on the environment due to their size and scale of operations. As a result, it is widely acknowledged they have a responsibility to reduce their energy use and decarbonise in order to mitigate the negative impact of their operations on the environment.

By taking the lead in this manner and reducing energy use, these larger companies can provide a positive example and set a template for smaller businesses and public buildings to follow. This can create a ripple effect that can lead to a significant reduction in greenhouse gas emissions across industries and communities.

Clubs and community groups

Clubs and community groups, especially sports clubs, play an essential role in bringing people together and fostering a sense of community. However, these organisations also have a role to play in minimsing their energy usage.

By using energy-efficient equipment, implementing energy-saving practices, and promoting awareness among members, sports clubs can significantly reduce their energy consumption and contribute to a more sustainable future. Not only does this benefit the environment, but it can also save the organisation money on energy costs in the long run. Moreover, reducing energy use can set a positive example for members and the wider community, demonstrating the importance of sustainable practices and inspiring others to follow suit.

This is particularly important in the SEC which is home to dozens community groups and sports clubs. Interestingly, sports club's energy profile is often heavily skewed towards electrical energy usage, with conventional floodlights consuming vast amounts of electricity.

In fact, in an Energy Audit carried out by PlanEnergy into a Tennis Club based in Co. Cork revealed that the floodlights represented 79% of the total electrical load on site. The energy audit analysed how many hours the floodlights tend to be on over the course of a year and was able to come up with a representative estimate of their usage and subsequent energy consumption.

Table 22 – Breakdown of the electricity bills for Carrigaline Tennis Club

Energy User	Cost per yr (€)	Usage per yr (kWh)
Tennis Court Floodlights	€ 8,228	20,452
Car Park Lighting	€ 123	307
Indoor Lighting	€ 151	374
Others	€ 1,868	4,643
Total	€ 10,369.17	25,776

This high energy consumption not only puts a strain on the environment but also on the club's finances, with over €8,200 spent annually to power the floodlights. To address these issues, sports clubs are increasingly turning to LED floodlights.

LED floodlights use significantly less energy than traditional lights, while still delivering bright, high-quality lighting. This makes them an ideal solution for sports clubs looking to reduce their environmental impact and save money on energy bills. Furthermore, LED floodlights have a longer lifespan than conventional lights, reducing the need for replacements and maintenance costs.

For clubs and societies in the SEC that use floodlights or similar energy intensive equipment, it is important they carry out a similar audit so that they can make informed decisions about the extent to which they should invest in upgrading their energy efficiency.

If we take the example of the tennis club, it was estimated that it would cost €46,836 to upgrade the existing 36kW floodlight array. An energy audit would reveal how much lighting is actually used over the course of year and which lighting to prioritise depending on the usage the pitch gets. This will ensure the club is not using money to upgrade its efficiency for equipment it doesn't actually need.

Renewable Electricity

Wind Development in the SEC

Offaly County Council have determined that wind farm development is not permissible in vast swathes of the County.

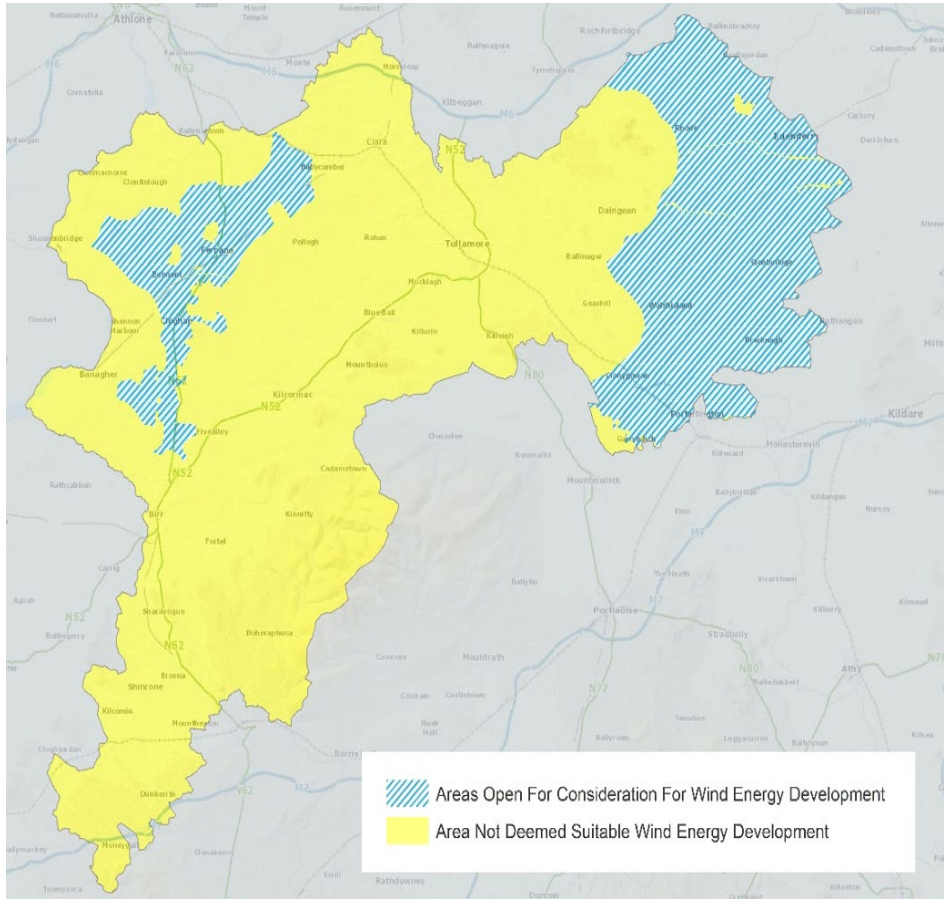


Figure 14 – Map evidencing those areas in Co. Offaly favored for wind development (Offaly County Council Planning, 2023)

Of course, this could change as Ireland begins to scale up its renewable energy generation in the coming years, so the SEC should keep tabs on any updates Offaly County Council make regarding areas where wind turbines are acceptable.

The development plan is scant on detail regarding Solar applications but at a high level at the very least the prospects for Solar PV development in County Offaly are promising. The County Development Plan for Offaly does not include a separate map for Solar PV generation, but it does target 145 MW of Solar energy by the end of County Development Plan Period (2027). Therefore, there is potential to work with the council if a viable site is identified.

Proximity to substations

The use of energy is supported and influenced by the presence of specific energy infrastructure in the local area. In terms of electricity supply, Figure 15 evidences the 38kV sub stations that are in the region of Birr. Generally, 5km is seen as the limit for any non-utility (major development) scale developments. Fortunately, the Dallow substation is located under 5km away from the SEC and has 11.3MW of available capacity, which is more than enough for a community owned project.

This would be a very attractive prospect for a solar project that would fall under the RESS scheme. This data is based on the ESB Network Capacity map which is intermittently updated to reflect the capacity of substations across the country.

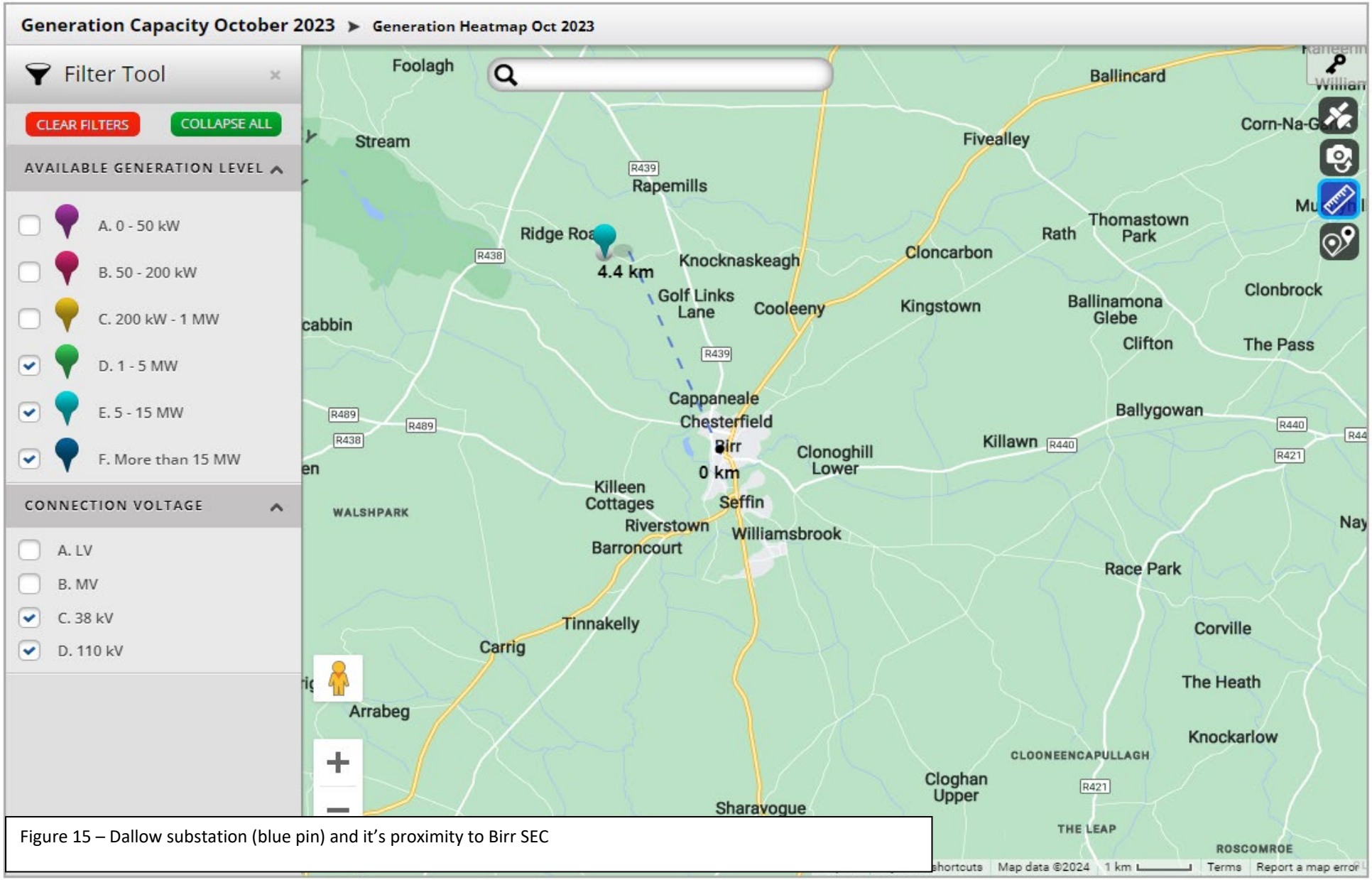


Figure 15 – Dallow substation (blue pin) and it's proximity to Birr SEC

Of course, a community owned project does not necessarily have to exist within the SEC boundary, but for management purposes it's preferential that it is as close as possible. Furthermore, a smaller scale project, one up to 0.5MW could connect to the Medium or Low Voltage network (non 38kV substation) without the need for a direct connection to a substation, however a high level feasibility study would be required to confirm if this is possible.

It's important to be aware that all substations have a certain amount of capacity for electrical generation. In simple terms, this means we cannot build and connect an unlimited amount of Renewable Energy generating projects to the electricity grid without first upgrading it so that there is sufficient capacity available.

Residential Solar PV energy reductions

Towards the end of 2022 the Irish Government announced that houses, regardless of location, may now install unlimited solar panels on their rooftops without any requirement for planning permission (subject to certain conditions). This means it is now more attractive for homeowners to install larger Solar PV systems, given that the previous planning law constrained homeowners to using a maximum of 50% of their roof space for Solar PV.

In order to evaluate the practical potential for Solar PV in the Birr SEC, we have assumed that at least 33% of homes in the SEC (762) will be suitable for Solar PV.

We have also assumed optimal roof orientation, with a 30-degree tilt on a South facing roof, with only mild overshading. We have been unable to include community and commercial buildings within our analysis due to absence of data on the roof area of the buildings.

Table 19 – Overview of the Solar PV potential in the SEC if 33% of homes installed Solar PV

Solar PV system	Potential output (MWh per year)	Percentage of residential electricity demand this would cover
2 kWp	1,551	6.2 %
3 kWp	2,327	9.3 %
4 kWp	3,103	12.4 %
5 kWp	3,880	15.5 %

Of course, this total would be much higher if we applied these calculations to 100% of homes in Birr SEC, increased the potential Solar PV system or we were able to include the Commercial/Public buildings, but this gives the SEC a realistic overview of what they could potentially achieve in the next decade.

Renewable Electricity Support Scheme

The Government of Ireland has put in place a scheme called the Renewable Electricity Support Scheme (RESS) [21] which aims to deliver increased community involvement in renewable energy projects. This scheme provides financial support for renewable electricity projects of over 0.5 MW in size in the Republic of Ireland.

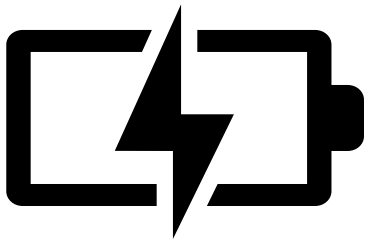
RESS is an auction-based scheme, which invites renewable electricity projects to bid for capacity and receive a guaranteed price for the electricity they generate.

Support schemes like RESS, in place all over the world, are a way of ensuring that renewable energy technologies replace the use of fossil fuels in our economy. Communities are incentivised to invest in renewable technologies by Governments who contract to buy electricity at a guaranteed price for the long term, typically a period of about fifteen years.

In total, about 3,000 'gigawatt-hours' will be put up for auction by the state. The most cost-efficient bidder will be the first picked, the second most cost-efficient will be the second picked and so on until all the gigawatt-hours are accounted for. In essence this means only the most efficient project offering a price at the lowest level will get picked.

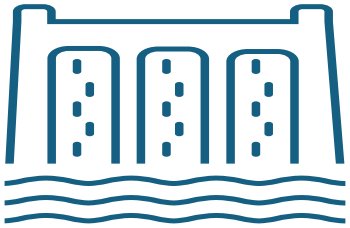
Eligible technologies under the RESS scheme include:

Onshore wind turbines/solar thermal/solar PV technology



Onshore wind turbines/solar thermal/solar PV technology with battery storage

High-efficiency Combined Heat and Power (CHP) boilers fueled exclusively by waste, biomass or biogas



Hydroelectric

All projects looking for support under the RESS scheme will need to meet certain criteria before becoming successful. There are three aspects of community participation in RESS:

- Community Led Projects
- Community Benefit Funds
- Community Enabling Framework

[21] https://www.dccae.gov.ie/en-ie/energy/topics/Renewable-Energy/electricity/renewable-electricity-supports/ress/Pages/default.aspx

Community Led Project Criteria

The application must be made in conjunction with a Sustainable Energy Community (SEC). The SEC must be identified in the Declaration of a Community-Led Project, together with a description of the relationship between the Applicant and the Sustainable Energy Community. In addition:

- Project size must be between 0.5 and 5 Megawatts
- Fully (100%) owned by a Renewable Energy Community (REC)- primary purpose is community benefit (environmental, economic, or social) rather than financial profit
- Community group must be based on open and voluntary participation
- Participation based on local domicile (within close proximity to the RESS project)

Community Benefit Funds

A key feature of RESS is that all projects must establish a 'Community Benefit Fund' to be used for the wider economic, environmental, social and cultural well-being of the local community. The amount payable by RESS Projects into the Community Benefit Fund by the Government is mandated at €2 per Megawatt hour of electricity generated from a RESS Project. This means there are quantifiable funds made available annually for the benefit of the local community.

This will allow communities to further invest in local renewable energy, energy efficiency measures and climate action initiatives. For RESS-1 alone it is envisaged that almost €4m in annual payments, over a period of approximately 15 years, will be paid into the Community Benefit Funds in communities that host RESS-1 projects.

With several more RESS auctions planned in the coming decade the total funds involved are several hundred million euro in value over the lifetime of RESS.

Recently it was announced that Community-led projects seeking to apply to future RESS auctions, must be 100% owned by the community, as opposed to being majority owned as was the case for RESS-1. Therefore, Community-Led Projects must now meet the following requirements:

(a) at all relevant times, be 100% owned by a Renewable Energy Community (the "Relevant REC") either by way of (i) a direct ownership of the RESS 2 Project's assets, or (ii) a direct ownership of the shares in the Generator; and
(b) at all relevant times, 100% of all profits, dividends and surpluses derived from the RESS 2 Project are returned to the Relevant REC.

Community Enabling Framework

Project planning, grid infrastructure and community buy-in remain the major obstacles to a community led development. Community consensus is the key to the successful development of a community owned project. If there is consensus within the community, an application can then be made to SEAI (or another funding body) to carry out a feasibility study for a renewable energy development in the areas within the community identified. This feasibility study should look at grid capacity and constraints, planning constraints, environmental designations, and residential buffer zones around the proposed sites.

One of the key community provisions as part of RESS is the Community Enabling Framework which provides end-to-end support to create a community energy sector in Ireland that can flourish sustainably over time and one that will deliver meaningful impact to communities nationwide. SEAI have been appointed by the Department of Environment, Climate & Communications (DECC) as the implementation body for this Framework which will provide a range of supports including:

1. **Trusted Intermediary:** this is effectively the RESS community team within SEAI. This is the first place that communities go to seek help with their RESS projects. The contact email is: CommunityRESS@seai.ie

2. **Information warehouse**: SEAI have developed a number of toolkits to help communities understand the RESS journey[22]. Toolkits include: onshore wind, solar PV, the planning process and grid connection. There are several more in development. The Toolkits provides a set of guidance modules across a number of different areas (including technology options, business planning, project development stages, setting up an organisation / governance strategy) to support development and delivery of a Renewable Energy project.

3. The **Trusted Advisor** (TA) service from SEAI is now available for communities who want to develop their own electricity generation projects. The TAs will help the SECs through the development stages of a generation project. This will include two free feasibility studies to determine if the community generation project is viable.

4. **Financial supports**: this is the community RESS enabling grant. The total grant available is 80% of eligible costs up to a maximum of €180,000. Entry to the grant programme is based on the successful completion of the feasibility stage conducted by an SEAI appointed TA from above. The grants can be drawn down in €25,000 tranches on completion of key milestones. A requirement before drawing down the second tranche is the undertaking of a public engagement event to ensure that the generation project is socialised within the community.

[22] https://www.seai.ie/community-energy/ress/enabling-framework/

Register of Opportunities (RoO)

The Register of Opportunities (RoO) developed for Birr SEC provides a list of projects in three categories which have been identified within the community.

Behavior and Energy Efficiency and Renewable Energy Projects have been identified, which have both short- and medium-term timescales. The RoO provides for a detailed project specific planning tool including project cost, energy impact and carbon savings.

The Register of Opportunities (RoO) is a live document used to identify, evaluate, and plan your energy projects and is **a separate document to this EMP**. The complete RoO is provided in a supplementary document to this report. The Sustainable Energy Community owns this document and is responsible for using, editing and improving the content in order to match its ambitions.

The RoO is presented in an excel workbook because some parts contain formulas to calculate financial and energy savings.

The key criteria when selecting projects where are suitable to progress are:

1) Return on investment or payback period
2) Complexity of the project
3) Are the project costs known?
4) Is supporting funding available?
5) What impact is the project going to have on the community?

Key standout projects are listed below with a full breakdown included in the Register of Opportunities document:

- 6kWp Solar PV system at St Brendan's Community School
- LED floodlight installation at sports club
- 100 homes within SEC to install Solar PV systems part of group purchase scheme
- Community electric bike scheme
- Deep retrofit of 30% homes in the community that fall into the 'Fuel Poor' category
- Feasibility study for a Renewable Energy Support Scheme (RESS) community power project

Note: *The costings provided are indicative only and quotations should be sought from suitably qualified contractors following an appropriate design and specification process.*

Action Plan for Birr SEC

Capacity Building

One of the key elements in the development of a successful Sustainable Energy Community is the ability to build capacity within the group which is required for the implementation of successful projects. By increasing the capacity of the SEC there is a higher probability that the group will be able to take on more complex projects as their confidence grows. Capacity building can be achieved by utilising the mentors appointed to the group by SEAI to arrange educational and training initiatives as well as vocational and third level education bodies. The SEC can also work with other established SECs to arrange shared learnings

Energy Master Plan Dissemination to Community

The dissemination of the Energy Master Plan throughout the community is one of the key actions for the SEC now that the plan has been completed. The Energy Master Plan will provide the community with an understanding of what their current energy profile is and where they as a community should put their efforts in reducing their energy and carbon footprint.

Communication and Engagement Events

Engagement with other community organisations to identify shared needs especially in the development of existing community assets for remote working may be beneficial to the greater community. The upgrading and reimagining of community buildings through BEC grants to provide remote working hubs, childcare facilities, or social hubs feeds into the DO stage of the SEC's plan.
Please refer to the sections below for more information on grants. In addition to other community groups, private sector groups such as energy project developers which have community benefit funds may be interested in providing support to the SEC, but only if they are aware of its existence.

Low Lying Fruit First

The SEC is encouraged to develop low-effort, low-cost efficiency projects first to increase their internal capacity and skills. These low-effort, low-cost efficiency measures can be quick wins for the community and encourage the group to tackle more complex, higher effort projects in the future. These projects also provide a focus point for the greater community to prompt discussions and knowledge sharing experiences.

In a residential setting this could include the sharing of a Home Energy Kit around the community, so that individuals can identify significant energy users in their home, allowing them to make more informed decisions about how to reduce their daily energy use.

Enhancing community centres in a way that allows individuals to work remotely will have a sizeable impact on reducing emissions associated with commuting to work.

For businesses or public buildings that operate for 40+ hours a week, they should begin a process of selecting the lowest wattage bulb needed to light the room/area and consider the size of the space and how much natural light the space gets.

Annex A – Grant Streams

Community Grant Program

The Community Grant Program is the national retrofit initiative which provides capital grants for energy efficiency projects in Irish communities. The maximum grant available per application in the Communities Energy Grant is €5,000,000, with no singular project exceeding €2,000,000. It is recommended applicants consider grant applications of at least €100,000 due to the level of administration involved in this program.

Successful Community projects must demonstrate some or all of the following characteristics:

- Community benefits
- Multiple elements, not a single focus
- Mix of sustainable solutions
- Innovation and project ambition
- Justified energy savings
- An ability to deliver the project

The following list outlines the types of measures that SEAI want to support through the Communities grant program

- Building Fabric Upgrades
- Technology and System upgrades
- Integration of renewable energy sources
- Domestic Combined Fabric Upgrade
- Single Building Demonstration projects will be considered under the Communities Grant

Community Grant Program 2024 Funding Levels

Domestic support rates are in line with the grant offering available under One Stop Shop (OSS) relevant grants are available to review on SEAI's website using the link:

https://www.seai.ie/grants/home-energy-grants/one-stop-shop/

Fuel Poor homes will be supported at the rates applying to Approved Housing Bodies indicated in the OSS offering. The 2 measures listed below will receive additional support for Fuel Poor homes as follows:

	Detached	Semi Detached	Terrace	APT
External Wall Insulation	€14,000	€11,000	€6,500	€4,500
Internal Wall Insulation	€9,500	€7,000	€4,500	€3,000

Non-Residential	
Type	**Funding Level**
Not for profit/community	30% Up to 50% (may be available subject to state aid rules and SEAI approval in advance)
Private sector	Up to 30%
Public Sector	> 30% ≤ 50%

SEAI's Home Energy Grants

https://www.seai.ie/grants/home-energy-grants/

SEAI primarily has three grants and supports schemes for individual homeowners who wish to make energy upgrades to their home:

- Free Energy Upgrade
- Individual Energy Upgrade Grants
- One Stop Shop Service

Free Energy Upgrade

This SEAI grant provides free energy-efficient home upgrades for homeowners that receive certain welfare payments. Homeowners will receive a free assessment from an SEAI surveyor who will recommend the most suitable upgrades for the property.

Eligible Free Energy Upgrade home improvements		
Attic insulation	Cavity wall insulation	External wall insulation
Internal wall insulation	Replacement windows	Heating Systems upgrade
Heating controls	Ventilation	Compact fluorescent lamps (CFLs)
Draught proofing	Lagging jacket	

To qualify for any of these SEAI grants under the Free Energy Upgrade Scheme, homeowners need to meet all of the following criteria:

- The home must be your main residence and you must be the homeowner
- The home was constructed before 2006. It must have also been lived in prior to this date
- The home has an energy rating of C, D, E, F, or G.
- You receive one of the following government payments:
  - Fuel Allowance scheme
  - Working Family Payment
  - One-Parent Family Payment
  - Domiciliary Care Allowance
  - Carers Allowance. You must be living with the person you are caring for
  - Disability Allowance for more than six months. You must also have a child less than seven years old
  - Job Seekers Allowance for more than six months. You must also have a child less than seven years old

The Free Energy Upgrade grant will cover all expenses for a Home Survey, Contractor Selection, Contractor Works and a BER certificate. It is important to note that it will be the Surveyor who decides the improvements to make, the homeowner cannot choose which specific upgrades they would like.

Individual Energy Upgrade Grants

This grant allows the homeowner to choose which home improvements to bring, choose the registered contractor, and complete the work yourself. Despite being more in charge of this grant, you still need to wait for the approval of the grant before starting the project.

	Individual Energy Upgrade Grants			
Measure	**Detached**	**Semi D/End of Terrace**	**Mid Terrace**	**Apartment**
Ceiling insulation	€1,500	€1,300	€1,200	€800
Cavity Wall Insulation	€1,700	€1,200	€800	€400
External Wall Insulation	€8,000	€6,000	€3,500	€3,000
Internal Insulation	€4,500	€3,500	€2,000	€1,500
Air to Air Heat pump system	€3,500			
Air to water Heat pump system	€6,000			€4,500
Ground source to water Heat pump system	€6,000			€4,500
Heat Pump Technical Assessment	€200			
Heating Controls (Homes built pre-2011)	€700			
Solar Water heating	€1,200			
Solar PV (Homes built pre-2021)	€1,800 for 2kWp system, additional €300 per kWp up to €2,400			

To qualify for any of the SEAI individual energy upgrade grants, you need to meet all four of the following criteria:

- The home must be your main residence and you must be the homeowner
- For any of the insulation and heating controls grants, your home must have been constructed and lived in before 2011
- For any of the heat pumps and renewable energy systems grants, your home must have been constructed and lived in before 2021
- Your home must not have received the same home improvement government grant in the past

One Stop Shop Service

Under this programme, homeowners will be able to receive a complete home energy upgrade. These will be managed by registered contractors who will manage the entire process for you. From the initial assessment, placing the SEAI grant application for you, conducting the work, and providing the final BER.

	One Stop Shop Service grants			
Measure	**Detached**	**Semi D/End of Terrace**	**Mid Terrace**	**Apartment**
Home Energy Assessment	€ 350			
Air Tightness	€ 1,000			
Mechanical Ventilation	€ 1,500			
Solar Hot Water	€ 1,200			
Bonus for reaching B2 with a Heat Pump	€ 2,000			
Heating Controls	€ 700			
Air to Air Heat Pump system	€ 3,500			
Floor insulation	€ 3,500			
External doors (max of 2)	€800 per door			
Heat Pump Systems	€6,500			€4,500
Central Heating System for Heat Pump	€2,000			€1,000

	One Stop Shop Service grants			
Measure	**Detached**	**Semi D/End of Terrace**	**Mid Terrace**	**Apartment**
Ceiling insulation	€3,000	€3,000	€2,000	€1,500
Cavity Wall Insulation	€4,000	€3,000	€1,800	€1,500
External Wall Insulation	€2,000	€1,600	€1,200	€800
Internal Insulation	€4,500	€3,500	€2,000	€1,500
Rafter Insulation	€3,000	€3,000	€2,000	€1,500
Windows (Complete Upgrade)	€4,000	€3,000	€1,800	€1,500
Project Management	€2,000	€1,600	€1,200	€800
Solar PV - 0 to 2kWp	€900/kWp			
Solar PV - 2 to 4kWp	€300/kWp			

Your home or property needs to meet all of the following criteria to qualify for the One Stop Shop Service grant:

- The home must be your main residence and you must be the homeowner
- Your home must have been constructed and lived in before 2011 for insulation and heating controls grants
- Your home must have been constructed and lived in before 2021 for heat pumps and renewable energy systems grants
- Your property must have a B3 or lower energy efficiency rating and a minimum of a B2 upon completion of the upgrades
- Your property must not have received government grants in the past for the same home improvement

For more information and to get in contact with a One Stop Shop, please visit - https://www.seai.ie/grants/home-energy-grants/one-stop-shop/registered-providers/

Electric Vehicles

Privately bought EVs

A maximum grant of €5,000 is available for qualifying new electric vehicles when purchased privately. Approved EVs with a List Price of less than €14,000 will not receive a grant. As of the 1st of July 2021, there is a cap of €60,000 on the full price of all vehicles. The full price of the vehicle to the customer includes all optional extras, paint, and delivery for excludes any incentives such as grants or rebates.

List Price of Approved EV	Grant available
€14,000 to €15,000	€2,000
€15,000 to €16,000	€2,500
€16,000 to €17,000	€3,000
€17,000 to €18,000	€3,500
€18,000 to €19,000	€4,000
€19,000 to €20,000	€4,500
Greater than €20,000	€5,000

Commercially bought EVs

SEAI provides grant supports towards the purchase of new N1 category electric vehicles for business and public entities. N1 category vehicles are typically small goods carrying vans with a technically permissible maximum mass not exceeding 3500kg.
A maximum grant of €3,800 is available for qualifying N1 category EVs when purchased commercially. Approved EVs with a list price of less than €14,000 will not receive a grant. It should be noted that these grants apply to new vehicles only and cannot be claimed on secondhand vehicles.

The grant level depends on the list price of the vehicle. This is the full non-discounted price in the absence of VRT relief or grant support.

Vehicle Registration Tax

Electrical vehicles receive VRT relief separately to SEAI grant support as well as reduced motor tax.

Home Unit Charger

SEAI provide a grant up to the value of €600 towards the purchase and installation of a home charger unit.

Benefit in Kind

For commercial electric cars, Revenue provides an exemption for Benefit in Kind.[23]

Schools Grants

SEAI Communities Grant

Schools and Community Organisations can avail of up to 50% grant funding through the Community grant scheme. This scheme requires the grant application to be made by a diverse group of bodies within a community – including residential, private sector, public sector and not-for-profit/community organisations.

As a result, partnership is essential for a successful application. Schools should seek partnership with your energy supplier, local energy agency, or an experienced community coordinator. The grant scheme opens in November each year and applications must be made by end January the following year. It is unlikely that a school would be the lead applicant so schools should seek experienced coordinators and become part of their application.

Non-Domestic Microgen Grant

The Non-Domestic Microgen Grant (NDMG) provides financial assistance to help schools and other sectors to install solar PV panels to generate electricity on site. This grant is available to:

- Businesses
- The agricultural sector
- Public sector bodies
- Schools
- Community centres
- Non-profit societies

[23] https://www.seai.ie/technologies/electric-vehicles/

Grants are available for systems up to a maximum 1000kWp with potential savings of thousands of euro in annual electrical costs (depending on installation size and current utility rates). If a larger size system is installed, then the installation will not be considered eligible to claim the NDMG grant.

Solar PV System	Grant Value
1kWp	€900
2kWp	€1,800
3kWp	€2,100
4kWp	€2,400
5kWp	€2,400
6kWp	€2,400
7kWp – 20kWp	€300/kWp
21kWp – 200kWp	€200/kWp
201kWp – 1000kWp (1MWp)	€150/kWp

The way the grant scheme is structured means that the amount available decreases as the kWp installed increases. For example:

Solar PV System	Grant Value
20kWp	€6,600
50kWp	€12,600
100kWp	€22,600
200kWp	€42,600
300kWp	€57,600

Business grants

Green Transition Fund

As part of Ireland's National Recovery and Resilience Plan and funded by the European Union, the Green Transition Fund will accelerate the decarbonisation of Irish enterprise.

It comprises two separate streams of funding, to support the different aspects of the decarbonisation journey for Irish enterprises. These are:

- **Climate Planning Fund for Business** – building company capability to develop plans for lower-carbon products, processes, and business models.
- **Enterprise Emissions Reduction Investment Fund**– supporting capital investment and Research, Development & Innovation in decarbonisation

Climate Planning Fund for Business

The Climate Planning Fund for Business (CPFB) is targeted at companies of different sizes and at different stages of engagement in their decarbonisation journey. It comprises a range of offers to reflect the different levels of engagement and preparedness of companies. The offers being provided under the CPFB will support companies to accelerate their awareness of decarbonisation opportunities, build capability and put in place sustainability plans.

Grant Offer	Support Available
Climate Action Voucher: Consultancy support to develop an initial sustainability/ decarbonisation/circular economy strategy and action plan.	€1,800 grant
GreenStart: Consultancy grant to support companies to introduce environmental best practice systems and structures, achieve cost and resource reduction targets and lay a foundation for future environmental improvement projects.	Grant rate of up to 80% of eligible costs up to a maximum grant of €5,000
GreenPlus: Support for training projects to develop a high level of environmental management capability, drive environmental efficiencies and achieve improved sustainability.	Grant rate of up to 50% of eligible costs up to a maximum grant of €50,000
Strategic Consultancy: Consultancy grant to assist large energy users develop a carbon reduction roadmap.	Grant rates of up to 50% of eligible costs. Typical maximum support of €35k

Enterprise Emissions Reduction Investment Fund

Companies are at different stages of awareness, engagement and planning for the investments required to transform the sustainability performance of their business through decarbonisation. The Enterprise Emissions Reduction Investment Fund is targeted at companies of different sizes and stages of engagement in their decarbonisation journey: to put in place energy monitoring systems, thereby establishing the carbon footprint of their enterprise; to make investments in decarbonising their manufacturing processes; and to support Research, Development and Innovation (RD&I) in low carbon products and processes.

Grant Offer	Support Available
Capital investment for Energy Monitoring & Tracking (EM & T) Systems: Supporting companies to put in place monitoring and targeting systems to begin accounting for the carbon footprint of their activities	Grant rate of up to 50% of eligible costs, up to a maximum support of €50,000
Capital investment for decarbonisation processes: Supporting investment in carbon reducing technologies in manufacturing combustion processes	Max. grant rate of 30-50%, dependent on company size, up to a maximum support of €1m
Innovation Vouchers: Providing assistance to SMEs to explore a business opportunity or problem with a registered knowledge provider in the areas of sustainability and decarbonisation	€5,000 per company

Exploring Innovation: Grant to support planning of research, development or innovation projects in the areas of sustainability and decarbonisation	Grant rate of up to 50% of eligible costs. Typical maximum support of €35k
Research & Development: Supporting the development of new or substantially improved products, services or processes, in the areas of sustainability and decarbonisation	Grant rates depend on project type and company size
Agile Innovation: Supporting the development of new or substantially improved products, services or processes, in the areas of sustainability and decarbonisation	Grant rate of up to 50% of eligible costs.

Support Scheme for Energy Audits

SEAI are currently running an energy audit scheme that offers SMEs a €2,000 voucher towards the cost of a high-quality energy audit [24]. These energy audits are suitable for businesses with an annual energy spend of over €10,000. These energy audits delve deeper than those contained within the report, analysing the sites suitability for various renewable technologies, the most significant users of energy in their business and their overall carbon footprint.

EXEED

SEAI provide grant support for projects which are following the EXEED Certified standard for Excellence in Energy Efficient Design. The EXEED grant scheme is designed for organisations who are planning an energy investment project. Grant support of up to €3,000,000 per project is available.

The EXEED standard encourages innovation in design projects to help future-proof the investment, by

- optimising energy performance,
- reducing operational energy costs and carbon emissions,
- improving competitiveness and
- demonstrating commitment to sustainability, which could also bring a reputational boost.

This scheme is open to all organisations planning an investment in an energy project. This includes:

- new design projects
- major renovation and major energy upgrades of existing buildings and assets

[24] https://www.seai.ie/business-and-public-sector/small-and-medium-business/supports/energy-audits/

Expenditure type	Large company	Medium sized company	Small company
Pre-investment professional services to implement EXCEED processes • Design-stage processes set out in EXCEED Certified standard • Strategic input from an independent Energy Efficient Design Expert • To identify the Investment opportunities which will deliver optimum energy performance	Up to 50% grant	Up to 60% grant	Up to 70% grant
Eligible expenditure to implement EXCEED processes • Incremental capital costs compared to counterfactual investment • Professional services associated with implementation	Up to 30% grant	Up to 40% grant	Up to 50% grant

SSRH (Support Scheme for Renewable Heating)

There are two different financial supports available if a business wants to switch to renewable heat. The financial supports include:

- Operational support for a biomass and biogas heating systems
- An installation grant for a commercial heat pump.

SSRH is open to commercial, industrial, agricultural, district heating, public sector and other non-domestic heat users. Applicants must be able to show:

- Conversion from fossil fuels
- Eligible heat use (space heating or process)
- Compliance with eco-design standards
- Heating system design according to building regulations and other relevant regulations
- Qualified designers who are competent to carry out works
- That recipients of payments meet tax clearance requirements

Heat pump installation grant

An installation grant of up to 30% for investment in renewable heating systems using:

- Air source heat pumps
- Ground source heat pumps
- Water source heat pumps

Before you apply It is recommended that you consult an expert who can guide you through your switch to renewable heating.

Accelerated Capital Allowance (ACA)

The Accelerated Capital Allowance (ACA) is a tax incentive scheme that promotes investment in energy efficient products & equipment. The ACA is based on the long-standing 'Wear and Tear Allowance' for investment in capital plant and machinery, whereby capital depreciation can be compensated through a reduction in an organisation's tax liability.

The ACA scheme allows a sole trader, farmer or company that pays corporation tax or income tax on trading or professional income in Ireland to deduct the full cost of the equipment from their profits in the year of purchase. As a result, the business's taxable profits are reduced by the value of qualifying capital expenditure. By contrast, the Wear and Tear Allowance provides for the same tax reduction, but this is spread evenly over an eight-year period.

Eligibility for ACA

Companies, sole traders and farmers that operate and pay corporation tax or income tax on trading or professional income in Ireland can avail of the ACA scheme.

Equipment use

The equipment purchased must be new and bought for use in a trade. It cannot be leased, let or hired to any person, body or organisation.

Time period

ACA can be claimed for the accounting period in which the equipment was first provided, as long as the equipment is included on the published list at some stage during that accounting period.

Eligible costs and minimum expenditure

ACA is available for costs directly related to providing the equipment. Expenditure on the technology must be equal to or exceed the minimum amounts for the relevant class of technology. Find the minimum amounts on the categories and criteria for Triple E page.

How to claim the ACA

1. Decide on the equipment you require.
2. Ensure the equipment model is eligible for ACA by checking the Triple E product register before making purchase.
3. Claim the ACA through your company's return of income form (CT1). There is now a field for ACA on the form alongside the standard capital allowances entry field.

Financial supports for companies purchasing EVs

There are 2 grants available for N1 category vehicles depending on their size. Small to medium vans are classified as N1S for the purpose of the grant. N1S are typically small goods carrying vans with a technically permissible maximum mass not exceeding 3500kg. Large panel vans, classified as N1L for the purpose of the grant must have technically permissible maximum laden mass of exactly 3500kg.

A maximum grant of €3,800 is available for qualifying EV N1S and €7,600 for an N1L category when purchased commercially. Approved EVs with a list price of less than €14,000 will not receive a grant. It should be noted that these grants apply to new vehicles only and cannot be claimed on second hand vehicles