Kilmainhamwood ENERGY MASTER PLAN

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Contents

Kilmainhamwood profile

Kilmainhamwood is a village and townland in north County Meath, 16 kilometres from Kells. The village is built on the River Dee and is situated north of Whitewood Lake. Neighbouring parishes are Kingscourt to the north, Drumconrath to the east, Nobber to the southeast, Moynalty to the south and Bailieborough to the west. The character of the village is rural in form although with several more recent residential developments including a retirement village and convalescent home on the eastern approach road.

The population of Kilmainhamwood SEC is roughly estimated to be 569 persons as per 2016 census data. Kilmainhamwood has a Primary School, Community preschool, Creche, Retirement Village, Church, Cemetery, and GAA Club and grounds. It also benefits from an amenity path that follows the line of the river through the village and provides a valuable recreational walking route.

Kilmainhamwood is well located with respect to Bailieborough, Kingscourt, Nobber & Ardee which have established employment opportunities. Kilmainhamwood does not in itself contain any major industrial or commercial employers. The key role of Kilmainhamwood has been to provide for the everyday needs of the local community and hinterland. The extent of these services is governed by local demand and proximity to other population centres offering similar or alternative services.

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. To mitigate against this, we have provided a glossary of key terms used throughout this report and an explanation of their meaning. An additional excellent resource for understanding all terminology around energy and the environment is https://climatejargonbuster.ie/wp-content/uploads/2021/02/ClimateJargonBuster_A-Z_a.pdf

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.

Carbon Dioxide/ CO_2 - Carbon dioxide is a powerful greenhouse gas. It is naturally part of the air we breathe. However, human activities like the 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.

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

Energy Savings - Energy in whatever 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.

Greenhouse Gas Emissions (GHGs) - Gases that trap heat from the Earth's surface causing warming in the lower atmosphere and slowing down the loss of energy from Earth. The major greenhouse gases that cause climate change are carbon dioxide, methane and nitrous oxide.

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.

Megawatt hours (MWh) - A megawatt hour is equivalent to 1 million watts of electricity being used for an hour. 1 MWh is equivalent to 1,000 kWhs. For example, a megawatt hour could be 2 million watts (2 megawatts) of power being used for half an hour

Net zero emissions - This refers to achieving an overall balance between greenhouse gas emissions produced by human activity and greenhouse gas emissions taken out of the atmosphere

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.

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 the security of our electricity supply.

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 2021

- The Climate Action Plan (CAP) is a roadmap developed by the Irish government for taking decisive action to reduce Ireland's emissions by 51% of 2018's totals by 2030, and net zero by 2050. This roadmap sets out targets for achieving these goals and the ways to go about it. This is done sector by sector with a clear goal set out for each sector. Table 1 shows the proposed emissions reductions by sector to achieve the targets set out in this plan

- 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, including in 2022, 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 in some form or another to this EMP, of particular importance are the Electricity, Transport and the Built environment sectors, which feature prominently in the report

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

Sector	2018 Emissions (Megatonnes of CO2 equivalent)	2030 target Emissions (Megatonnes of CO2 equivalent)	% Reduction relative to 2018
Electricity	10.5	2 - 4	62-81%
Transport	12.0	6 - 7	42-50%
Built environment	9.0	4 -5	44-56%
Industry	8.5	5 -6	29-41%
Agriculture	23.0	16 - 18	22-30%
Land use, land use change, Forestry & Marine	4.8	2 - 3	37-58%
Unallocated Savings	N/A	4	N/A

- One of the standout targets for the Electricity sector which is particularly relevant for the Kilmainhamwood SEC is the target of increasing the amount of electricity generated by renewable sources to 80%. SECs 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 Electric Vehicles will cover 40% of car journeys by 2030. Conversely, public and active transport services will receive heavy investment, enabling an additional 500,000 daily journeys

- Perhaps the sector of most importance to the Kilmainhamwood SEC is the Built Environment. In the residential sector some of the most ambitious targets include:
  - Retrofitting 500,000 homes to a B2 equivalent BER standard
  - Installing 600,000 heat pumps in residential buildings

Energy Master Plan Summary

To assist in achieving the Kilmainhamwood 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 Kilmainhamwood 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 exemplary model in the transition to allow-carbonn community.

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

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

The EMP report begins with a sectoral energy breakdown that will give a broad overview of each sector's (Residential, Commercial, Transport) energy consumption, energy cost and contribution to CO_2 emissions in the Kilmainhamwood 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 many varying sources such as wind, solar etc.

Reviewing the natural resources available to the community, high level analysis is provided on various renewable energy technologies that the community could further pursue. 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.

Finally, the EMP will conclude 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.

Perhaps the primary benefit of the EMP is that it can be used as a roadmap for the SEC's progression towards sustainable energy and can be used to support applications for capital grants to upgrade existing housing and commercial building stock.

Additionally, the EMP can also be used as a mechanism to increase awareness in energy efficiency. This process begins through the interactive community survey issued, meetings with the SEC committee, the energy audits alongside the launch of the report at its conclusion.

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 2 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 Kilmainhamwood SEC. This was generated using the Small Areas as defined by the Central Statistics Office (CSO SAPMAP 2016).

[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 Kilmainhamwood SEC.

Table 2 – SEC Total Energy, CO_2 and Cost Analysis

	ELECTRICITY	FOSSIL FUELS	TRANSPORT	TOTAL
ENERGY MWh	2,298	3,356	1,848	7,502
CO2 EMISSIONS tCO2	736	859	469	2,063
ENERGY COST	€323,514	€443,956	€367,809	€1,135,280

As already mentioned, the EMP breaks down the energy consumption and fuel mix within the community's catchment area into 3[2] 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

[2] The agriculture sector was not included within this report due to the small number of farms within the catchment area of the SEC. It is recommended that a more detailed report on the Agriculture sector be carried out in the catchment area outside of the SEC to develop a more detailed analysis of energy consumption associated with farming.

The sectoral baseline energy usage analysis, which will be discussed in more detail in later sections, is summarized 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 prioritize areas for action by the Kilmainhamwood SEC.

Table 3 – Sectoral percentage energy consumption

Kilmainhamwood SEC Primary Energy Baseline (kWh)				
Sector	**Electricity**	**Fossil Fuel**	**Renewable**	**Total** (MW)
Residential	2,076,623	2,810,324	137,461	5,024
Non-residential	221,004	546,050		767
Transport	2,265	1,845,625	130,486	1,978
Total Energy	2,299,892	5,201,999	267,947	7,770

Our analysis of the energy consumption within the catchment area has identified that 65% of the energy demand relates to the residential sector, 10% for the commercial sector and approximately 25% relates to the Transport sector.

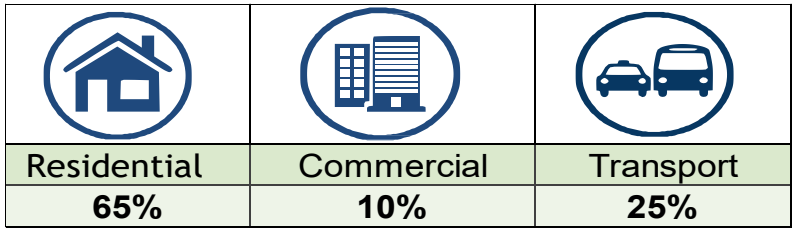


Figure 2 – Primary Energy percentage per sector

Residential sector

Background

The Residential sector is one of the largest emitting sectors in Ireland, accounting for 29% of CO_2 emissions and roughly a quarter of the energy used in Ireland as per 2020 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 close attention.

Whilst energy usage from the residential sector has increased by almost 19% from 2014 to 2020, emissions only subsequently increased by 1%. These figures can be explained by 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' [3] 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.

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

The residential section of this report will seek to analyse what retrofit measures may be suitable for properties in the Kilmainhamwood SEC based upon Housing age, occupancy, ownership and type.

Furthermore, the fuels used to heat homes within the Kilmainhamwood 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 community as each fuel type has its own associated CO_2 output. For example, coal and oil produces approximately 0.4kg and 0.3kg of CO_2 for every kilowatt hour of energy delivered, compared to just over 0.2kg for natural gas.

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. An excellent reference which provides a breakdown of all energy used in the home is the "SEAI Energy in the Residential Sector 2018 Report.

A breakdown of the communities BER ratings per Small Area Plan is provided, which helps identify those sectors of the community which require most investment in terms of improving their BER. Given that a BER is a reflection of a home's energy efficiency, a lower BER (e.g. G) will imply that homeowners are using more fuel to heat their homes, which is in direct contradiction with the 2030 target's set by the Government. A communities' BER is also closely linked to social deprivation and fuel poverty.

Given the continued rise in energy costs, a strong BER can alleviate homeowners from fuel poverty and prevent others from going into it.

Method

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

The residential housing stock is based on a baseline year of 2016 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 2021. Statistics for residential heating are based on national averages against primary heating type. This allows for future analysis against future census data.

The SEAI Building Energy Rating (BER) Map shown in Figure 9 displays colour coded 'Small Areas' of the Kilmainhamwood SEC. The colour of a given small area represents the BER of the median geo-located dwelling 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.

SEAI's corresponding prices and emission factors as of 2020 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 70.5% of the housing is owner occupied. With a 45.4% outright ownership (no mortgage or loan), 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.

Equally, for rental properties, it is in landowners' best interests to upgrade the homes they own with retrofit measures in line with the projected minimum BER increases for rental properties that the Government are implementing from 2025.

However, given that landlords themselves will not reap the benefits of a warmer home and cheaper energy bills, a strong strategy of engagement and encouragement will be required for landlords until obligatory measures come into effect.

Table 4 – Percentage of homes owned outright by owner

Occupancy type	No. of homes	% of homes
Owned with mortgage or loan	52	25.1%
Owned outright	94	45.4%
Rented from private landlord	19	9.2%
Rented from Local Authority	20	9.7%
Rented from voluntary/co-operative housing body	15	7.2%
Occupied free of rent	7	3.4%
Not stated	0	0.0%
Total	**207**	**100%**

Housing Type

Almost all of the housing stock in the catchment is classified as detached, semi-detached or terraced housing with a small percentage classified as flats or apartments. Flats and apartments mainly consist of smaller developments or over the shop dwellings. This again is a positive sign for Kilmainhamwood SEC, as the options for retrofitting a home increase with detached, semi-detached and terraced housing as there is less chance of interfering with other properties.

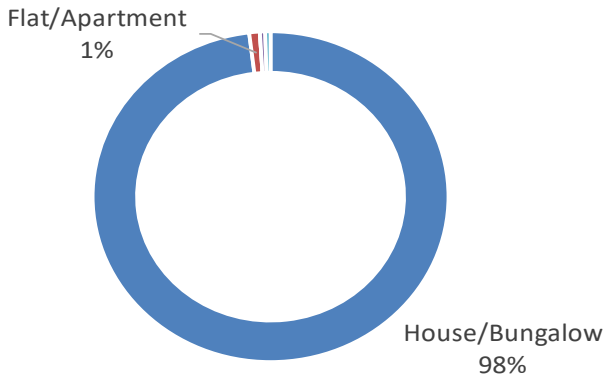


Figure 3 - Housing Stock type within SEC by percentage

Housing Age

Figure 4 illustrates the age spread of the residential housing stock in the catchment area. The age of the properties is displayed alongside a breakdown of the introduction of the buildings regulations which have had an incremental impact on the construction methodologies used. This information can be quite informative as it illustrates the type of interventions which may be suitable for the housing stock.

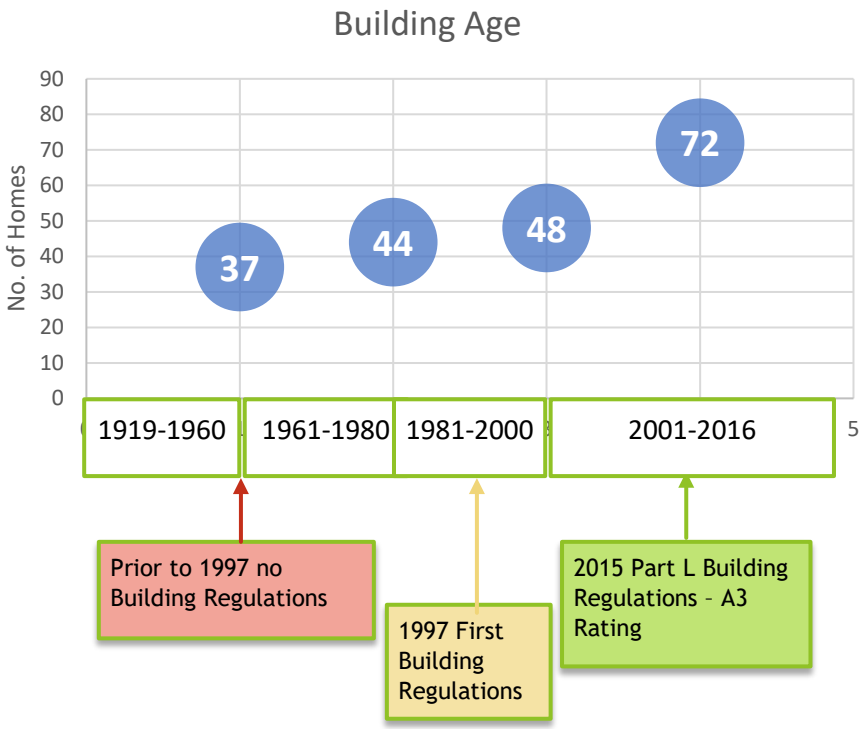


Figure 4 - Relationship between Dwelling Age and Irish Building Regulations

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. 34.7% of Kilmainhamwood'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.

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 46.3% of dwellings having been constructed from pre 1919 – 1990, this strongly indicates that a very large number of homes will present 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 5 – Age profile of the Kilmainhamwood SEC housing stock

Period	No. of homes	% of homes
Pre 1919	19	9.2%
1919 - 1945	11	5.3%
1946 - 1960	7	3.4%
1961 - 1970	15	7.2%
1971 - 1980	29	14.0%
1981 - 1990	15	7.2%
1991 - 2000	33	15.9%
2001 - 2010	69	33.3%
2011 or later	3	1.4%
Not stated	6	2.9%
Total	**207**	**100%**

[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.

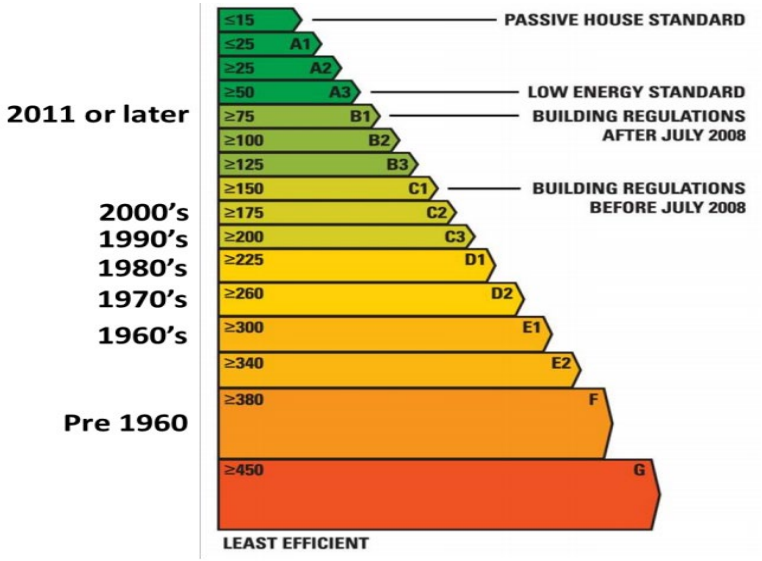


Figure 5 - Typical BER for house age type before upgrade works

Housing Fuel Mix

The residential fuel mix as illustrated in Table 6 provides a breakdown of the different types of fuel sources used in the community for the heating of residential properties. The CO_2 Emissions associated with Kilmainhamwood SEC is linked to the type of fuel consumed within the community. By using different less carbon intensive fuels, a community can significantly reduce the CO_2 footprint from the energy it consumes to heat its homes. The ideal situation is to reduce the level of energy required to heat homes through energy efficiency measures and to provide the remaining heat requirements from low or natural CO_2 producing fuel sources.

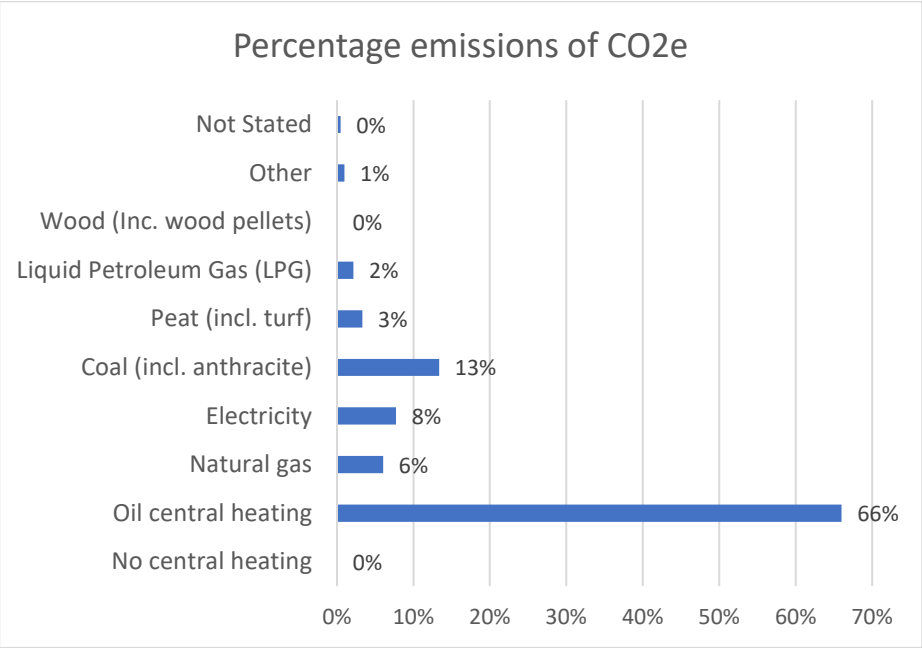


Figure 6 - Percentage emissions in tCO_2e

Within Kilmainhamwood SEC, the main fuel types are currently coal and oil which make up 75% of the total thermal energy consumed. Combined, these two fuel types make up 79% of the CO_2 emissions from the Residential sector. Oil is the primary source at 66% which is typical for a large proportion of houses built pre-2011. Whilst this finding does raise cause for concern, it also demonstrates the huge level of potential for the community to significantly reduce its carbon footprint.

Table 6 - Residential Fuel Mix[6]

Heating Type	Number of units	Fuel	% of Total Thermal Energy	Thermal TFC (kWh)	Emissions tCO_2e
No central heating	0	Oil[5]	0%	-	0.0
Oil central heating	134	Oil	65%	1,860,590	491.0
Natural gas	16	Natural Gas	8%	222,160	44.9
Electricity	14	Electricity	7%	194,390	57.5
Coal (incl. anthracite)	21	Coal	10%	291,585	99.3
Peat (incl. turf)	5	Peat	2%	69,425	24.7
(LPG) Liquid Petroleum Gas	5	LPG	2%	69,425	15.9
Wood (Inc. wood pellets)	9	Wood Pellets	4%	124,965	0.0
Other	2	Other	1%	27,770	7.1
Not Stated	1	Other	0%	13,885	3.6
Totals	**207**				**744**

Housing BER Coverage

An analysis of the Building Energy Rating (BER) of the current residential housing stock within the Kilmainhamwood SEC was carried out. The average BER rating has been determined, however this figure is based upon a limited number of buildings which have had BER's carried out on them and should be reviewed in that context.

[5] 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.

[6] 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.

By analysing the BER data files for all the small areas in the Kilmainhamwood SEC region, the following information was observed:

Of the 207 homes registered within the catchment of the Kilmainhamwood SEC region, 37% of these homes have BER certificates. The number of dwellings in Kilmainhamwood with a BER of B or greater is lower than the national average (3% vs 11%), also lying below the national average for its overall BER.

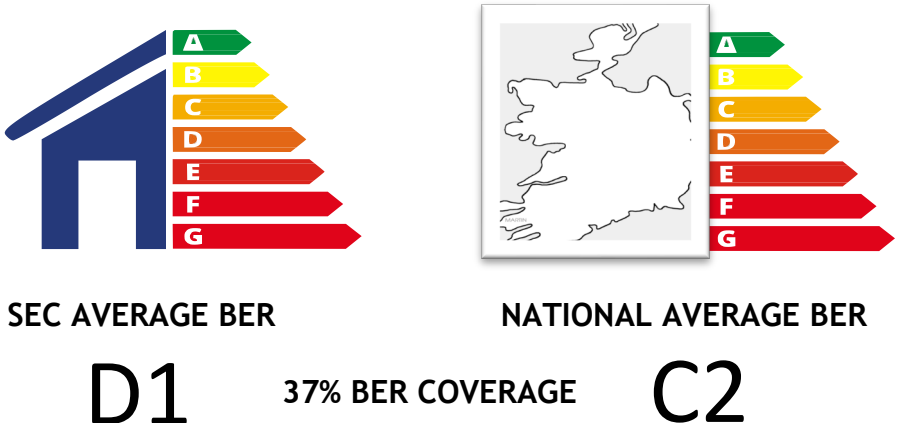


Figure 7 - Building Energy Rating information on catchment[7]

The data in Figure 8 indicates that BERs for a large volume of Kilmainhamwood SEC's residential building stock ranges from a C1 to an D2, 50.5% collectively, with such dwellings requiring between 150-300 kWh/m2/yr. of energy.[8]

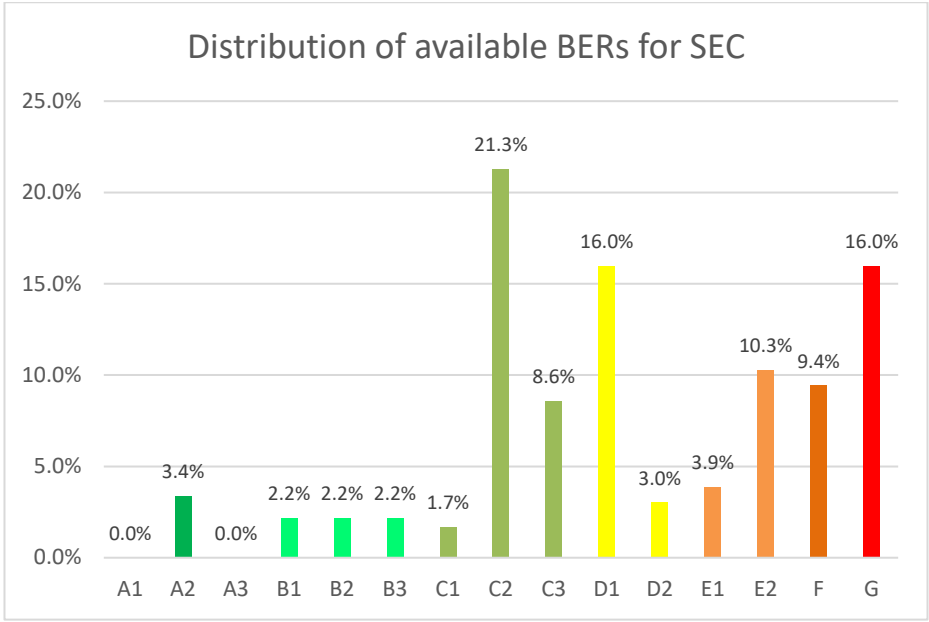


Figure 8 – Distribution of available BERs for Kilmainhamwood SEC

The chart above indicates that 92.2% of the housing stock in the Kilmainhamwood SEC lie below the Irish Government's target BER B2. However, of that total, approximately 33.8% lies within a boundary of B3 – C3 which shows that a significant amount of the housing stock can be brought up to this rating without deeply extensive retrofitting measures.

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.

[7] A more detail analysis of BER data and actual performance was carried out by SEAI in the following research document 'Heating and Cooling in Ireland Today 2021' http://wwww.seai.ie/publications/heating -and-cooling-in-ireland-today.pdf

[8] Please note that the SEC average BER is based upon 42% of the building stock within the catchment area which currently has a Building Energy Rating (BER) associated with it

The map below of the Kilmainhamwood SEC illustrates the median BER's which have been recorded in each Small Area Plan. It should be noted that this information is based on a limited number of BER data and is presented in an illustrated format to allow for comparison in future reports.

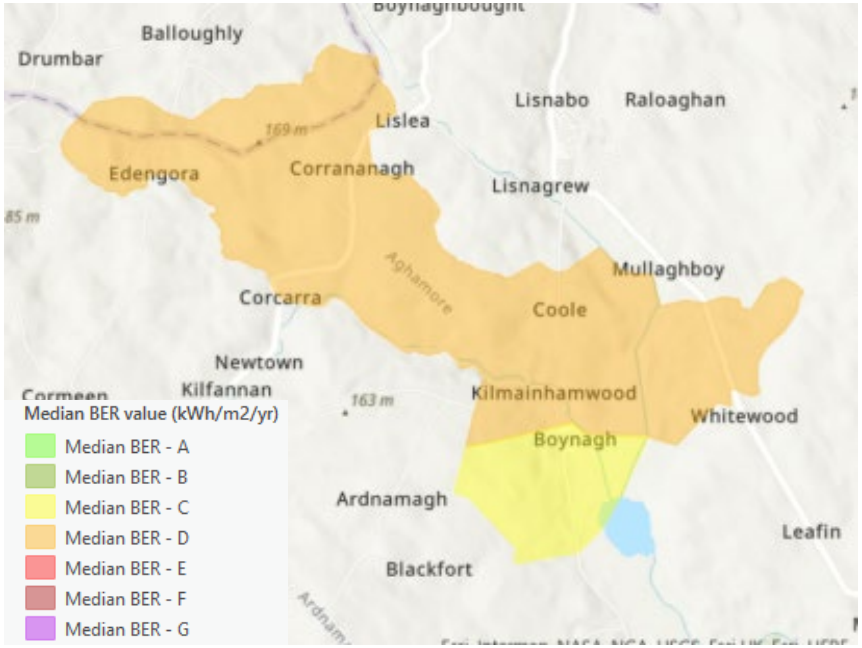


Figure 9 - Map of Median BER in the Kilmainhamwood SEC Catchment Area

Residential Energy Baseline

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

Table 7 - Residential Energy, CO_2 and Spend

	Electricity	Fossil Fuel	Renewable	Total
Total Primary Energy (kWh)	2,076,623	2,810,324	137,462	5,024,408
Total CO_2 (tonnes)	614	755	0	1,369
Total Spend (€)	€285,524	€359,864	€11,872	€657,260

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 in the Appendices. 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 new 'National Retrofitting Scheme'[9] has meant home upgrades are more achievable for homeowners than ever before.

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

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 Kilmainhamwood SEC.

Furthermore, the Warmer Homes Scheme offers free energy upgrades for eligible homeowners who are most at risk of energy poverty. A budget allocation of €109 million has been provided for this scheme this year. 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.

Please see the Appendix section for a Summary of these grants

Retrofit Case Studies

Background

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. SEAI define these dwellings as being 'heat pump ready' [10]. 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'[11], which specifies that buildings undergoing 'Major Renovations'[12] must achieve a BER B2 or 'Cost Optimal' level of energy performance.

Method

As part of the Energy Master Plan 6 residential properties were selected within the community for energy assessments using the Building Energy Rating system.

The audits were carried out in August 2022. 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 at least A3. The individual building information has been redacted from the following case studies for the privacy of the homeowners. The following table illustrates the spread of buildings which were reviewed.

Table 8 – Residential Building Energy Rating and possible uplift.

Building No.	Building Size m2	Existing BER Rating	Measures No.	Possible BER Uplift
1	50	D2	9	A1
2	91	C2	9	A1
3	59	D1	9	A1
4	113	C1	9	A1
5	268	C2	9	A2
6	272	B3	9	B1

Below is an example of what the BER Audit reports will look like. The rest can be found in the supplementary Appendix section of the Energy Master Plan.

[10] 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

[11] https://assets.gov.ie/180475/e532a9c5-3ec6-4a4c-8309-02f8a653e2d8.pdf

[12] 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		**1 story dwelling with four bedrooms**								
			M2									**C1**
		Total Building Area:	**113.19**									
		Element	BER Rating	Energy Value	Co2 Emissions	Energy Savings	Total Annual Space Heating	Space Heating in Kw/hour	Heat Loss Indicator	Space Heating costs per year	Carbon Emissions	
				(kWh/m2/yr)	KgCO2/m2/yr)		kWh/yr		(HLI) w/km2			
		Dwelling Current Condition	**C1**	**170.58**	**44.32**	**-**	**12,315**	**6.41**	**2.05**	€1,970.40		
		Element	BER Rating	Energy Value	Co2 Emissions	% Energy Saving	Total Annual Space Heating	Energy Requirement per hour for space Heating	Heat Loss Indicator	Space Heating Cost per year	Overall Carbon Emission KgCo2/Year	Kwh/m2/year Uplift
				(kWh/m2/yr)	KgCO2/m2/yr)	%	kWh/yr	Kwh/Hour	(HLI)	€	KgCO2/year	
1	**Ventilation**	Instal mechanical extract ventilation system to dwelling :example https://www.vent-axia.com/range/centralised-mechanical-extract-ventilation-mev	C1	174.91	45.49	**2.54**	12,761	**6.65**	2.1	€2,041.76	5,149	-4.33
2	**Roof Insulation**	All Flat ceiling areas - Add 100mm quilt insulation to existing 200 mm quilt insulation laid perpendicular to existing U Value 0.13 w/m2k	C1	169.74	44.10	**3.03**	12,229	**6.37**	2.03	€1,956.64	4,992	0.84
4	**Windows and Doors**	Fit new energy efficient windows and doors thoughout to U Value 0.8 w/m2k or better	C1	152.65	39.49	**10.02**	10,471	**5.45**	1.75	€1,675.36	4,470	17.93
5	**Chimneys**	Remove gas effect fire and block up chimney. Ensure mechanical extract fans in wetrooms.	B3	131.75	32.04	**12.25**	8,320	**4.33**	1.70	€1,331.20	3,627	38.83
6	**Airtightness**	Improve Air permeability to approximately 6 m3/m2/hr or better by getting air test done and addressing all leakage areas and re test.	B3	129.18	31.4	**1.51**	8,055	**4.20**	1.66	€1,288.80	3,554	41.40
8	**Air Source Heat Pump**	*Install an Air to Water Heat Pump (Mitsubishi 8.0 Kw unit used in this assesment) with time and temperature zone control in place of existing Storage Radiators.	A2	45.24	8.9	**49.21**	1,458	**0.76**	1.66	€393.66	1,007	125.34
9	**Photovoltaic**	Add 8 No. PV Panels to South facing roof 2.47Kwp (assuming 360 watts per panel)	A1	-0.22	-0.04	**26.65**	1,458	**0.76**	1.66	€393.66	- 5	170.80
	* The Heat pump used in this Assessment is a Mitsubishi 8.0 Kw - The Heap Pump installed MUST be specified by the Installer and/or Manufacturer.											**A1**
											Carbon Dioxide Savings per year - Tonnes	0.05

Energy in Transport

Background

Transport in Ireland is currently deeply dependent on imported fossil fuels. Emissions from transport powered by fossil fuels were by far the largest source of energy-related CO_2 in 2020, as they were responsible for 40% of the total and it is the only sector where CO_2 emissions have grown since the end of the recession in 2012. Road transport specifically accounts for 96% of all greenhouse gases associated with transport, so a shift to more sustainable forms of transport is critical.

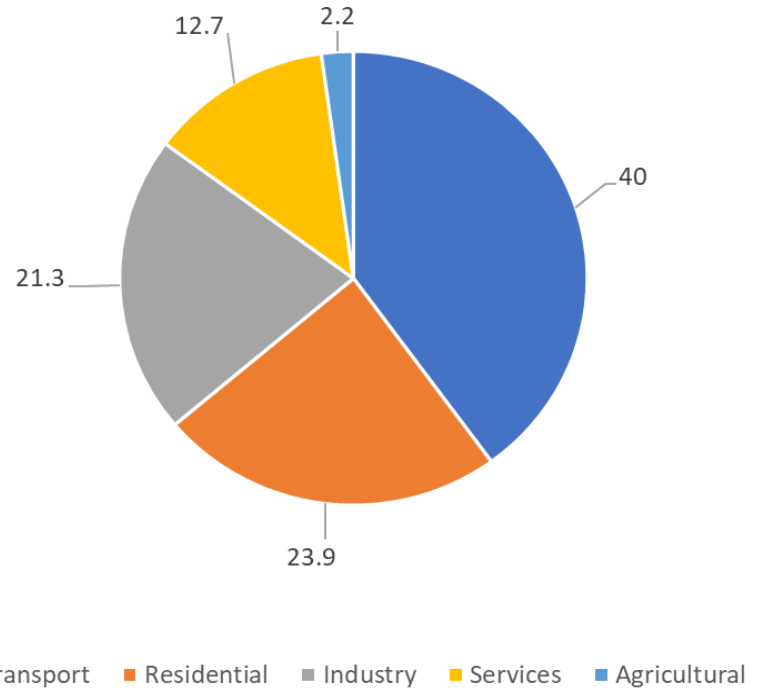


Figure 10 – Percentage share of Energy Related CO_2 by sector for 2020 in Ireland

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, appropriate public transport links serving the needs of 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:

- Provide an additional 500,000 daily public and active transport journeys
- Electrify 845,000 passenger cars
- 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 encouraged over the private car and the final stage of electrification of the fleet.

Ireland's rapidly growing economy in recent years has brought with it urban sprawl and low-density development which has locked in unsustainable travel patterns and a reliance on private cars bringing with it entrenched behavioural patterns that will not be easy to overcome.

The impact of the COVID-19 pandemic, with the introduction of severe travel restrictions and greater remote working practices is estimated to have resulted in a reduction of approximately 16% of transport emissions (excluding aviation) in 2020 compared to 2019 levels. The pandemic has shown that large scale behaviour change is achievable and that new patterns of mobility and working can play a part in the transition to a more sustainable transport system.

Method

An analysis of the means of transport for workers and students as well as the transport fuel mix in the catchment area of Kilmainhamwood 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 2020 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 Kilmainhamwood SEC with 65% of workers either driving or being driven by car.

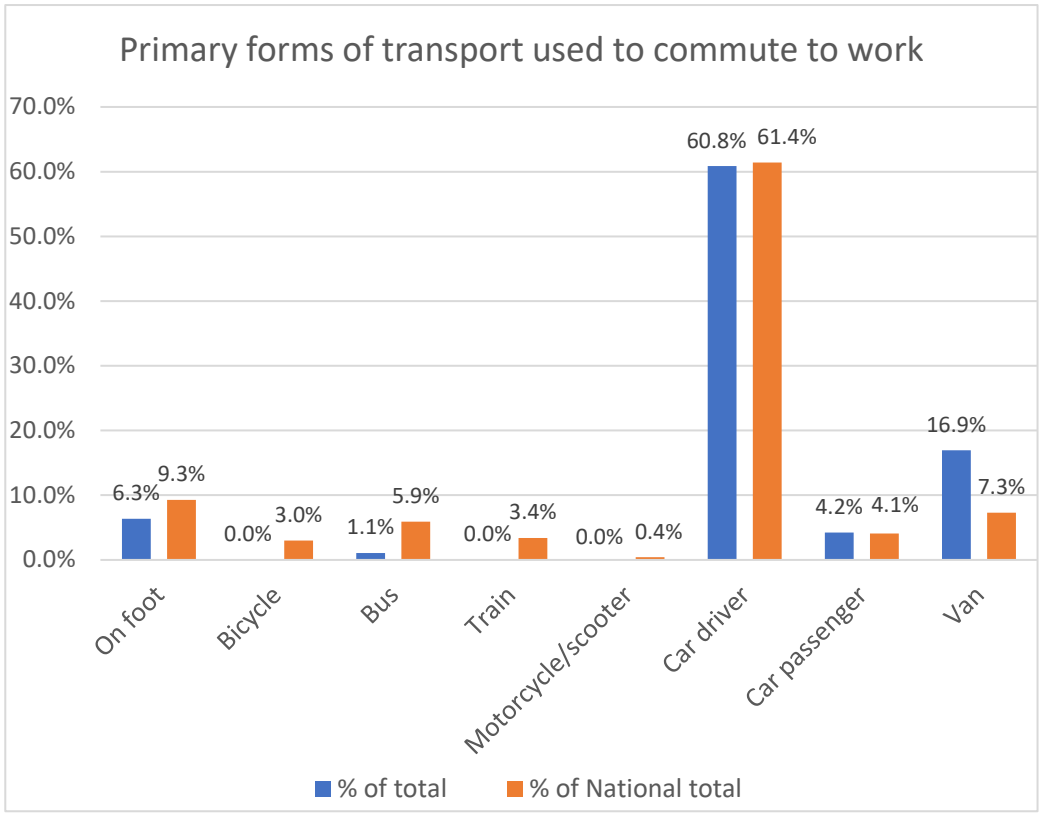


Figure 11 – Primary forms of transport used to commute to work

Kilmainhamwood lags behind national averages in both active and public transport usage for commuting to work. To tackle these low levels and shift more commuters away from driving traditional fossil fueled cars, the Kilmainhamwood SEC could try to encourage commuters who travel within a 15km radius of the town to utilize bus services to the surrounding area.

Reducing reliance on the private car is difficult, particularly in a low density, dispersed population such as Ireland's. Sustainable transport is among the greatest challenges for semi-urban regions, particularly in a town like Kilmainhamwood which currently does not have a railway station.

Services such as LocalLink operate successful services to isolated and vulnerable people within the community, as well as offering an alternative means of transport within the region. Ensuring consistent and reliable operation of such services can help in increasing the number of Kilmainhamwood residents who will use it. It is also important to circulate the operation of such services through as many means as possible social media, local newsagents etc.

COVID-19 and commuting to work

The impact of COVID-19 on the nature of transport in Kilmainhamwood 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.

The CSO have released information compiled during the COVID-19 pandemic. In April 2020 (as part of the Q2 Labour Force Survey) out of 47% of the population who had their employment impacted by COVID-19, just over a third (34%) started working from home. A more recent CSO study indicated that 80% of those in employment have worked remotely at some point since the start of the pandemic.

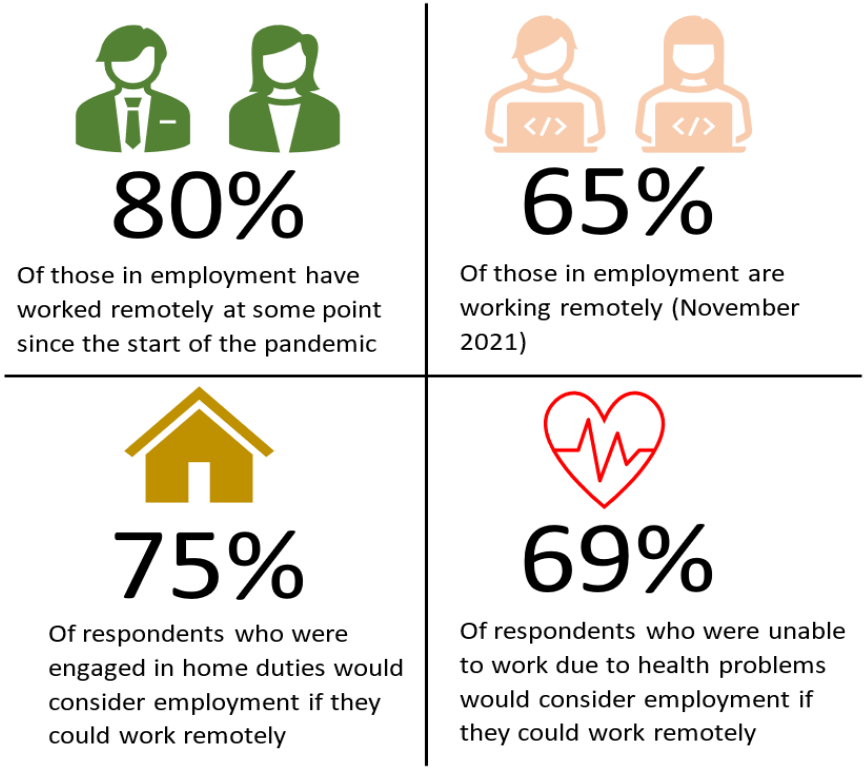
Reducing car journeys through remote working

The recent enforced changes have created 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%.

Kilmainhamwood SEC could explore the potential for smart remote working hubs within existing community building infrastructure or as additions onto community buildings with childcare and after school facilities. It can also be used as an opportunity to give derelict buildings within the community a new lease of life.

The Building Block [13] in Sligo town is an excellent example of this, which is a shared working space that prior to its development in 2017, had been unused for 10 years. Key elements which will be required to make this successful are comfortable buildings with high-speed broadband and shared canteen facilities.

[13] https://tinyurl.com/9d756vrx



Compared to days when they are in their workplace, when those aged 45-54 years' work remotely:

Figure 12 – 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. However, the community's low usage of public transport continues amongst the student population, with the Kilmainhamwood SEC's usage over 21% lower than the national average.

This may be seen as 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 and TDs if they can prove there is demand for increased bus services to and from schools.

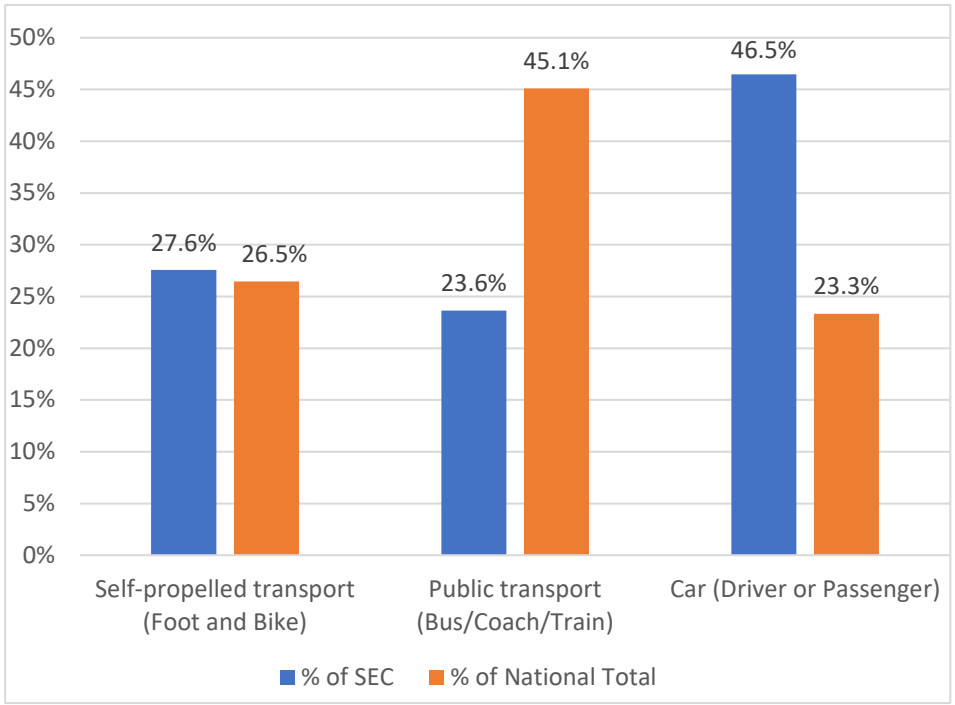


Figure 13 – Primary forms of transport for primary, secondary and college students

Kilmainhamwood has a respectable level of students who either walk or cycle to school, sitting above the national average. To increase this rate further, Kilmainhamwood 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 March 2021 and was 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.

It is a parent/guardian/community-led initiative whereby several parents and volunteers lead groups of cycling students to one or more schools. Cycle Buses have a specific route with stops along the way where students can join. Whilst this began as in cities, it has since spread to smaller towns such as Skibbereen, Strandhill and Cootehill. 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'.

Energy consumption from transport

An analysis of transport related energy consumption was carried out for the Kilmainhamwood SEC catchment area. The analysis was based upon a statistical analysis of vehicle ownership in the catchment area along with the types of vehicles used and their associated carbon emissions.[14] As already referenced, the Census data shows that the majority of commutes within the Kilmainhamwood SEC catchment area is by car or van.

Table 8 – Means of commuting in the SEC

Commuting to work	No. of people	% of total
Private transport	147	77.8%
Passenger	8	4.2%
Public transport	2	1.1%
Walking, cycling	12	6.3%
Work from home	15	7.9%
Other or not stated	5	2.6%
Total	189	100%

Based on the information for vehicle ownership within the Kilmainhamwood SEC, 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.

[14] 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).

Table 9 – Private Vehicle Transport Energy and CO_2 impacts

		National average annual km	kWh/km (TPER)	gCO_2/km
Car	**Petrol**	12,113	0.73	167
	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 10 below.

Table 10 - Kilmainhamwood SEC Transport Energy, CO_2 and Spend

	Electricity	Fossil Fuels	Renewable	Total
Total Primary Energy (kWh)	2,265	1,845,625	130,486	1,978,376
Total CO2 (tonnes)	0.39	469	0	469
Total Spend (€)	€421	€367,388	€24,270	€392,080

Switch to electrical vehicles

An analysis of the impact of changing 40% of the existing private vehicle fleet to battery electric vehicles is detailed in Table 11.

It indicates that if this transition where to occur, it would bring about a CO_2 reduction of 93 tonnes and a reduction in energy spend of approximately €65,552 per annum.

These are savings which can be recirculated around in the local economy, creating a more economically sustainable community. If the Kilmainhamwood SEC is struggling to avoid using cars or shift its residents to active or public transport, then a transition to electric vehicles shows that it can have a significant impact on reducing emissions, showing alignment with the Climate Action Plan's targets

Table 11 - Kilmainhamwood SEC Transport Energy, CO_2 and Spend with 40% Electric Vehicles

	Electricity	Fossil Fuel	Renewable	Total
Total Primary Energy (kWh)	226,506	1,326,588	109,146	1,662,239
Total CO_2 (tonnes)	39	337	0	376
Total Spend (€)	€42,130	€264,097	€20,301	€326,528

A significant increase in the availability of long-range electrical vehicles (EV) has made this mode of transport more suitable for environments outside of large urban centres. Electric vehicles will become the dominant mode of privately owner vehicles in the coming decade. The key benefit for the user is the reduced operational costs associated with fuel to power the car.

The following fuel costs for the EV are based upon home charging with night rate electricity in 2022 [15] :

Table 12 - Comparison of CO_2 impacts and fuel costs based on 250km per week

Vehicle	Weekly fuel cost	Weekly gCO_2
Electric e.g. BMW LEAF	€5.15	13,800
Petrol equivalent	€33.70	31,000
Diesel equivalent	€26.11	29,500

The Kilmainhamwood SEC should consider a public EV awareness event to promote the suitability of electrical vehicles for suburban environments. This event should also discuss the supports available from SEAI for electric vehicles purchase, benefit in kind and home charging points.

Whilst the one-off purchase cost can be more expensive than a fossil fuelled 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 [16]

Although it is a significant investment to purchase an EV, households with 2 vehicles should be encouraged to look at the possibility of having a smaller electric car 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 in the Appendices.

Whilst we anticipate the accelerated growth of a 'second-hand' market to grow in the next five years, given the lower economic status of a chunk of the Kilmainhamwood SEC's residents, for the meantime the Kilmainhamwood SEC should focus on implementing the 'Avoid-Shift-Improve' or ASI model for transport within the community.

Table 13 – 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.

[15] https://www.esb.ie/our-business/ecars/ecars-cost-calculator

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

Transitioning away from Cars

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 could help alleviate any reliance on EVs.

There are 273 cars between the 440 people who are legally of age to drive in the Kilmainhamwood SEC (17 and over). This means there are 62 cars per 100 people in Kilmainhamwood. 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 Kilmainhamwood operate diesel powered vehicles, then the annual average CO_2 emissions per driver in Kilmainhamwood is 2.94 tonnes. (Based off the County Meath average annual km driven in 2019 [17]). Given the unpredictable and skewed transport data as a result of COVD-19 over the last two years, it is more beneficial for the SEC to use the conservative estimate of the 2019 data.

There were 207 homes in Kilmainhamwood as per the 2016 census, meaning there are 1.31 cars available for every home in Kilmainhamwood, with 38.6% of homes owning more than one car and 11% owning 3 cars or more. The SEC could appeal to those home owners with more than two cars to replace one with an e-bike.

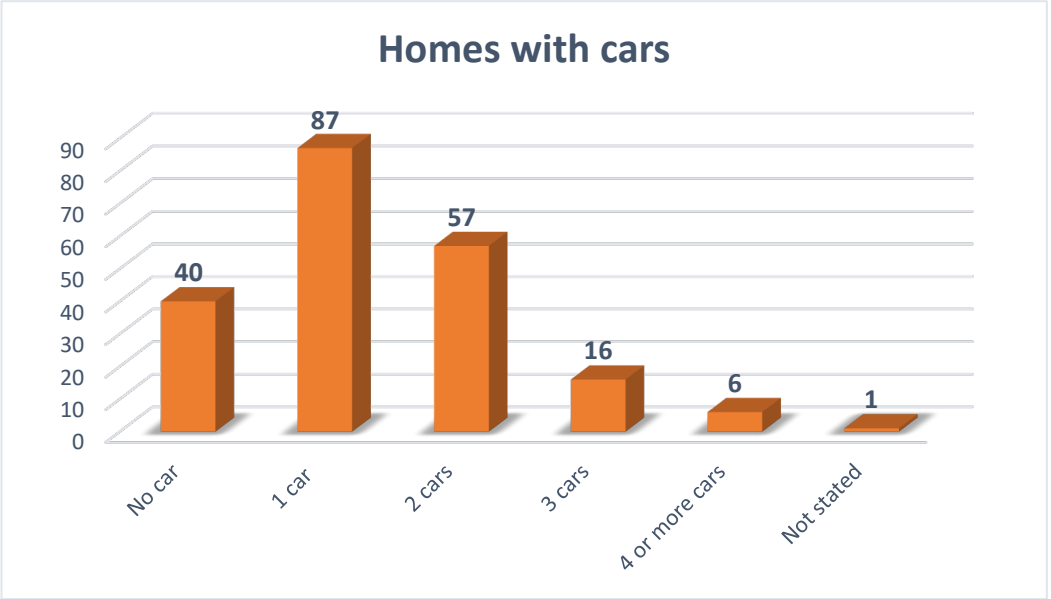


Figure 16 – Bar chart evidencing the number of cars each home in the SEC owns

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 would result in a reduction of 2.78 tonnes of CO_2 emissions annually per driver (based on earlier assumption of 2.94 tonnes of CO_2 per driver).

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

If all of the 3 or more car households (23 homes) made this swap and we assume that all cars are diesel powered and every car owner was driving the Co Meath average, the SEC would save roughly 68 tonnes of CO_2. For context this equates to 14% of Kilmainhamwood SEC transport emissions. This may be seen as difficult transition to make, but if we look at the average commute times for work, school and college in Kilmainhamwood, the commute times lends itself to a reduction in cars given the significant amount of the SECs population which have a commute time under 15 minutes (45.2%).

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. 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.

Table 15 – Commute time for residents in the Kilmainhamwood SEC to education or work

Commuting time	No. of people	% of total
Under 15 mins	136	45.2%
1/4 hour - under 1/2 hour	61	20.3%
1/2 hour - under 3/4 hour	27	9.0%
3/4 hour - under 1 hour	14	4.7%
1 hour - under 1 1/2 hours	28	9.3%
1 1/2 hours and over	22	7.3%
Not stated	13	4.3%
Total	**301**	**100.0%**

Commuting and car usage

It is extremely difficult to accurately calculate the mean car mileage for the Kilmainhamwood 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 on their journey.

There are 273 cars in circulation within the Kilmainhamwood SEC. From that total 153 cars are used for commuting to work, with 5 students driving to school or college via car, meaning 158 cars are used to commute for education or work purposes.
This means that there are approximately 115 cars that are not regularly used for commuting purposes, which are more likely to drive a below average amount of distance annually. The SEC could target those individuals who are not commuting for work or education in an effort to encourage them to use alternative means of transport that are less CO_2 intensive.

Promotion of public transport services

It is noted in feedback from local representatives that the bus network around Kilmainhamwood is disjointed and lacks direct routes to many of the most popular destinations in the surrounding area. To address this, the SEC and other community groups should lobby Meath County Council and/or contact local bus service providers and prove that sufficient demand is there to add more direct and frequent routes.

Ultimately, whilst the census results were recorded in 2016 and the percentage of bus users could have risen, the SEC should try to investigate why the number of bus users is so low.

Whilst it will be difficult for Kilmainhamwood SEC to have any meaningful impact on the fuel choice used by the likes of Bus Eireann, they can campaign their Local Link services to begin the decarbonisation of the bus fleet. For example, Laois County Council along with TFI Local Link Laois Offaly has launched its first electric bus that will operate across both counties. Kilmainhamwood SEC could lobby Kilkenny County Council to replicate this initiative over the coming years and should be able to justify this given the population of Kilmainhamwood and surrounding towns.

Car Sharing/Pooling

Car sharing within a suburban environment can be complex due to the distribution of homes, however many people are likely to be travelling to the same locations on a regular basis, such as on school runs. Car sharing or pooling can reduce the number of vehicle journeys and reduce the cost for both the driver and its occupancy by sharing costs. Although car sharing/pooling does require planning, it does have benefits that include reduced driving and car maintenance costs, suitability for longer distance commutes and daily school runs.

Commercial/Business

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.

Since this financial crisis, Ireland's economy has shifted from one influenced by the construction sector, to one which is more influenced by SMEs. There are an estimated 234,000 SMEs in Ireland, meaning there is significant potential to reduce emissions within this sub-sector.

Many of the avenues that the commercial/business 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 simple 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 commercial/business energy consumption within the Kilmainhamwood SEC catchment area was carried out using various data sources including the 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 industrial and commercial 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 the "CIBSE TM46 Energy Benchmarks and Energy Consumption Guide" and were applied to the floor area data available.

As part of the energy master plan for Kilmainhamwood, three non-domestic premises were audited to Ashrae level 1 to identify any opportunities within these premises for energy efficiency upgrades. 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. It is recommended that the organizations implement the measures identified in their reports to contribute towards the energy consumption reduction goals as set out in the Climate Action Plan.

The premises which were audited are listed below and a detailed report was provided to each of the property owners, the results of which are located within the Appendices:

- Kilmainhamwood Day Care Centre
- KC Childcare
- Kilmainhamwood GAA
- Kilmainhamwood National School

Results and Analysis

Below is an overview of the estimated total energy usage, emissions and spend from the Commercial/Business sector within the Kilmainhamwood SEC. This helps the Kilmainhamwood SEC get an idea of just how much their commercial 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 14 - Kilmainhamwood SEC Non-Domestic Energy, CO_2 and Spend

Electricity typical benchmark (MW·h)	Fossil-thermal typical benchmark (MW·h)	Illustrative electricity typical benchmark (tCO2)	Illustrative fossil-thermal typical benchmark (tCO2)	Illustrative total typical benchmark (tCO2)	Illustrative total Energy Spend (€)
221	546	122	104	225	€122,082

Support for SMEs

Aside from the recommendations contained within the EMP and supplementary non-domestic audits, businesses can utilize the recently created ClimateToolKit [18] 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 [19]. 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.

The non-domestic audits identified several opportunities within the premises and Kilmainhamwood SEC which can be developed into energy efficiency projects. The projects are detailed within the Register of Opportunities document which accompanies this report and the full reports are included in the Appendices. The standout projects are:

- **Kilmainhamwood Day Care Centre**
  - All lighting across the site should be upgraded to energy efficient LED light fittings
- **KC Childcare & Kilmainhamwood National School**
  - Install Energy trackers throughout the building to monitor energy use throughout the building
- **Kilmainhamwood GAA**
  - Insulate all exposed heating and hot water pipework

[18] climatetoolkit4business.gov.ie

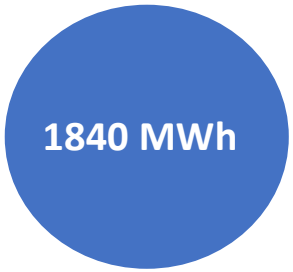
[19] https://www.seai.ie/business-and-public-sector/small-and-medium-business/supports/energy-audits/

Renewable Energy

Renewable energy comes from renewable resources like wind energy, solar energy, or biomass. The Irish Government has a target of producing 80% of the country's electricity from renewables by 2030.

Where a 20% reduction in electricity consumption could be achieved in the SEC by energy efficiency measures, there would remain a residual demand in the Kilmainhamwood SEC of 1,840 MWh. In order to offset this residual demand, a 1 MW Wind turbine or a 2 MW solar farm would be required to service the Kilmainhamwood SEC.

Residual Energy Demand



A community led Renewable Electricity Support Scheme (RESS) project which has an upper limit of 5MW would be capable of providing a significant amount of the residual energy demand for the community.

A detailed set of calculations on the generator size and the arrangements to use the energy locally would need to be carried out under a more detailed scoping study. Initial calculations indicate that that a wind turbine or solar photovoltaic farm correctly sized and installed with the capacity described above could generate sufficient electricity to meet this demand. A battery or other storage solution may also form part of such an initiative.

Residential Solar PV energy reductions

In order to evaluate the practical potential for Solar PV in the Kilmainhamwood SEC, we have estimated the total roof area that might be suitable for PV installations. Our analysis has assumed that 12m2 of the total roof space for every home in the Callan SEC will be suitable for Solar PV.

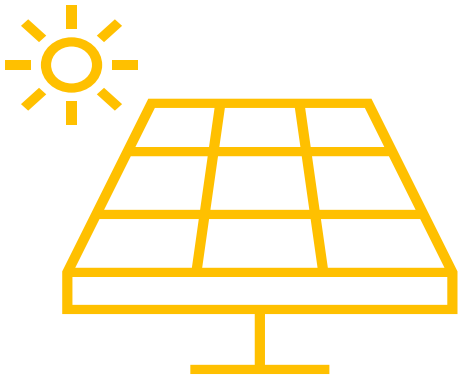
We have also assumed optimal roof orientation, with a 30-degree tilt on a South facing roof, with only mild overshading. We have been unable to include community and commercial buildings within our analysis due to absence of data on the roof area of the buildings.

At the time of writing the planning regulations state that residential Solar PV installations are permitted to be no more than $12m^2$ or 50% of the total roof space.

It has recently been announced that this planning law to be scrapped to allow homeowners to install Solar PV systems that exceed the aforementioned sizes without planning permission. This would apply to 98% of homes in the country, with special zones around airports to be excluded. However, it is unknown as to when this will come into effect, so PlanEnergy have taken a conservative view and based calculations on the planning regulation that is currently in place.

Using these assumptions, if every home in the Kilmainhamwood SEC were to install a 2kWp Solar PV structure, thereby not requiring planning permission, theoretically the community would produce 280,000 kWh of Solar Power, reducing its annual electricity consumption by roughly 15% (After 20% energy reduction through energy efficiency measures).

Of course, this total would be much higher if we worked under the incoming change Planning Permission for Solar PV or we were able to include the Commercial/Public buildings, but this gives the SEC a good overview of what they could potentially achieve.



284,000 kWh of Residential Solar PV

Renewable Electricity Support Scheme

The Government of Ireland has put in place a scheme called the Renewable Electricity Support Scheme (RESS)[20] 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 are incentivized to replace the use of fossil fuels in our economy. Communities are incentivized 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

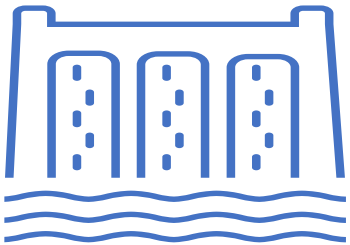
[20] https://www.dccae.gov.ie/en-ie/energy/topics/Renewable-Energy/electricity/renewable-electricity-supports/ress/Pages/default.aspx

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/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

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.

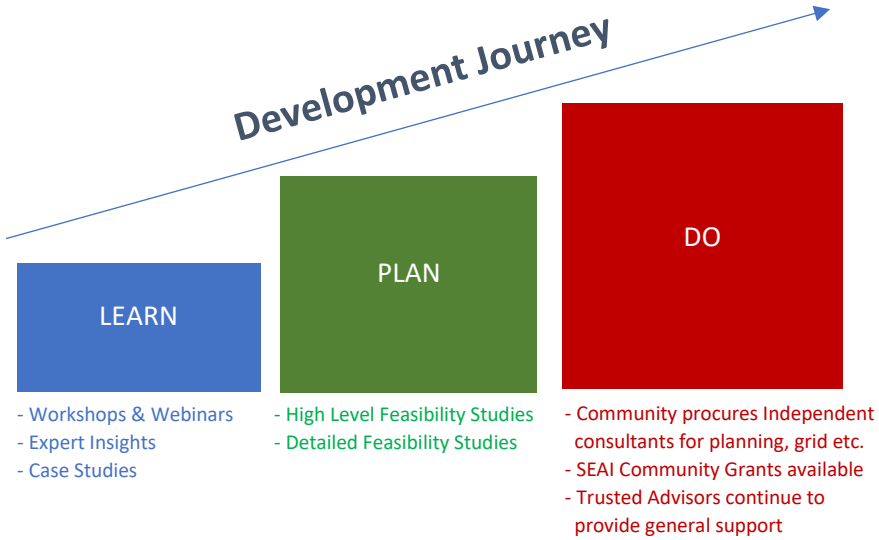
One of the key community provisions as part of RESS is the Community Enabling Framework which provides end-to-end support to create a community energy sector in Ireland that can flourish sustainably over time and one that will deliver meaningful impact to communities nationwide. SEAI have been appointed 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[21]. Toolkits include: onshore wind, solar PV, the planning process and grid connection. There are several more in development. The Toolkits provids 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.

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

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 id the undertaking of a public engagement event to ensure that the generation project is socialised within the community.

Sustainable Energy Roadmap

The Sustainability Energy Roadmap is one of the key outputs of the Energy Master Plan as it outlines to the community the scale of the challenge faced in moving the community from their baseline to achieving 2030 reduction targets. The following analysis provides a general path for the Kilmainhamwood SEC to reach its targets for energy reduction and renewable energy generation within the next ten years.

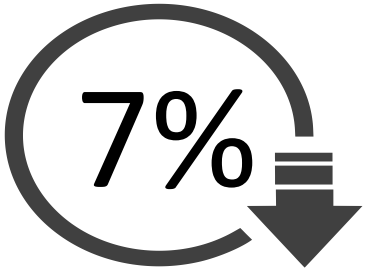
These targets have been broken down in each of the sectors detailed in the table below.

Table 15:- 3% Annual reduction in the Carbon Footprint for Kilmainhamwood SEC

Community CO2	
tCO2	**1,922**
% Annual CO2 Reduction	7%
Year	**tCO2**
2022	1,787
2023	1,662
2024	1,546
2025	1,438
2026	1,337
2027	1,243
2028	1,156
2029	1,075
2030	1,000
2031	930
2032	865

Table 16 - Kilmainhamwood SEC Plan to 2030

	Number of Projects	**Primary Energy Savings (kWh)**	**CO_2 Savings (tonnes)**
Community owned wind project in MW	1MW	1,839,914	544
Residential Housing Upgrades to B1 Medium Heat Pump	60	554,400	373
Electrical Vehicle (EV) Ownership	40% Change	316,137	93
Reduction in Car Journeys though remote working & EV Ownership	40% Change	664,896	150
Total		**3,375,346**	**1,161**



Annual Reduction in the carbon footprint for Kilmainhamwood SEC

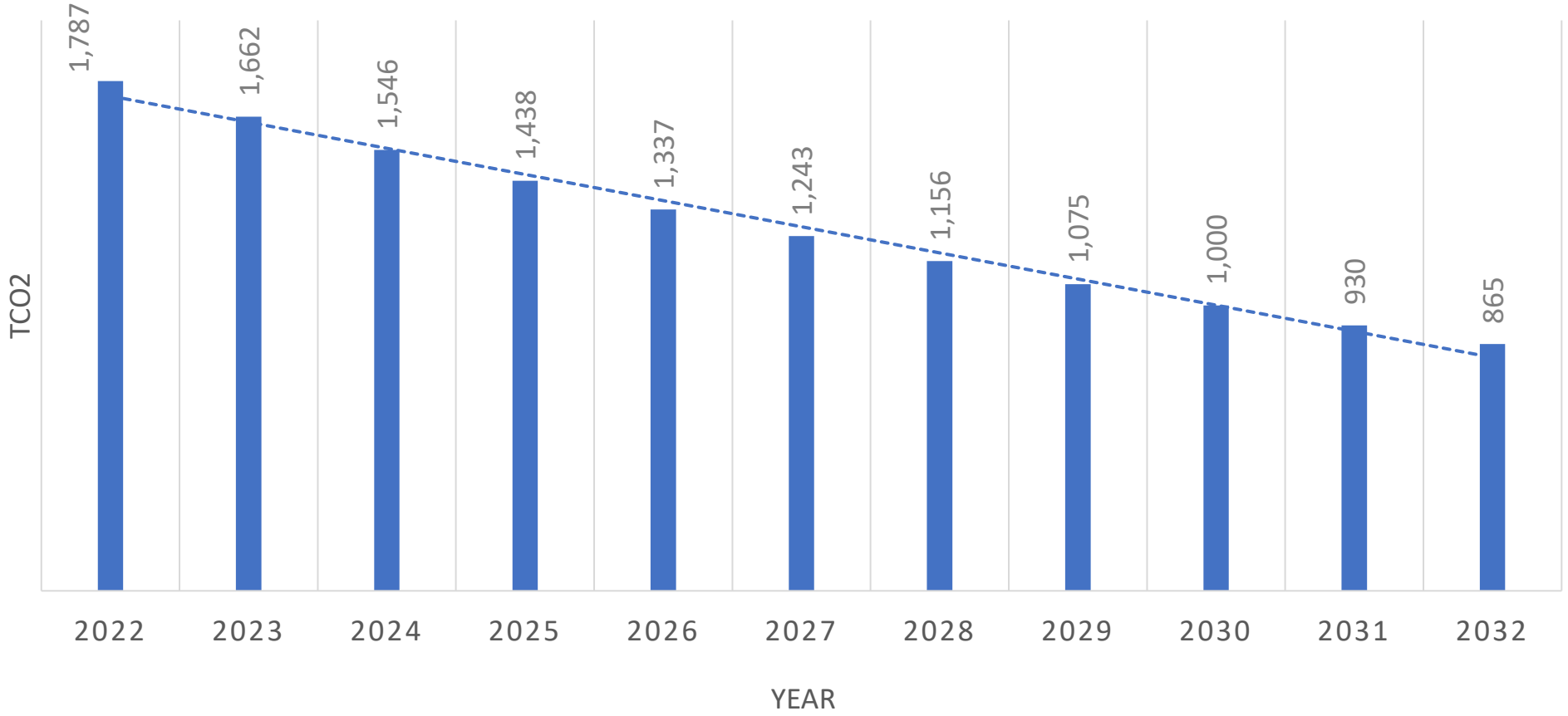


Figure 14 – The reduction in tonnes of CO_2 annually if the Kilmainhamwood SEC reduces its Carbon footprint by 3%

Register of Opportunities

The Register of Opportunities (RoO)[22] section developed for Kilmainhamwood SEC is divided into two separate documents. Firstly, as a 'RoO toolkit' which provides the SEC with a detailed list of projects that they can pursue in the immediate and medium term future. These projects are then divided into three categories - Behavior, Energy Efficiency and Renewable Energy projects.

The purpose of the toolkit is very much to act as a detailed project planning tool, providing a description of the actions a SEC needs to take from start to finish to successful pursue a Behavioral, Energy Efficiency or Renewable Energy project.

The RoO toolkit is a live document used to identify, evaluate, and plan your energy projects. The Sustainable Energy Community owns this document and is responsible for using, editing and improving the content in order to match its ambitions.

As part of the scope of works for the Energy Master Plan for Kilmainhamwood SEC, a number of non-domestic audits were carried out on commercial and public buildings selected within the community.

Supplementary to the RoO toolkit is a spreadsheet which focuses specifically on the opportunities which arose from those non-domestic audits. This RoO document goes slightly more in-depth, outlining suggestions from Plan Energy as to what we believe would be sound investments for the SEC to make and includes their potential cost, CO_2 and energy savings based on conservative estimates.

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 communities carbon footprint?

Standout projects from the non-domestic audits are listed below:

- 6kWp Solar PV system at Kilmainhamwood National School
- 6kWp Solar PV system at Kilmainhamwood Nursing Home
- Community EV Charging Points
- Feasibility study for a Renewable Energy Support Scheme (RESS) community power project in the Kilmainhamwood SEC

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

[22] *Each of the projects are detailed within the RoO spreadsheet, which is a live document attached as Appendix B.*

Action Plan for Kilmainhamwood 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.

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.

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[4] SEAI, "Conversion Factors,", Available: https://www.seai.ie/data-and-insights/seai-statistics/conversion-factors/

[5] SEAI, "Public Sector Energy Monitoring & Reporting System," 2017, Available: https://www.seai.ie/energy-in-business/monitoring-and-reporting/FAQs.

[6] CSO, “2011 Census - Agriculture.” Central Statistics Office 2012

[7] NSAI, SR54 Code of Practise for the Energy Efficiency Retrofit of Buildings

Appendix A: Grant Streams

Better Energy Communities

Better Energy Communities is the national retrofit initiative which provides capital grants for energy efficiency projects in Irish communities. The BEC programme with grant support of up to €28 million for 2021 aims to deliver energy savings to homeowners, communities, and private sector organisations. Projects must be community orientated with a focus on cross-sectoral approach.

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

BEC 2022 Funding Levels

The level of funding and processes associated with Better Energy Communities Grants has been changing over the past number of years and is constantly evolving. It is recommended that prospective fund applicants check for the latest processes and funding levels at the time of enquiry. The latest information available at the time of publication of this document can be accessed at: https://www.seai.ie/grants/community-grants/project-criteria-and-funding/Communities-Grant-Guidelines-2022.pdf.

As a rough guide in the past residential funding has generally ranged from up to 35% in private and rented homes, with up to 80% in fuel poor homes.

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 1993. 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	€1,500	€1,300	€1,200	€800
Cavity Wall Insulation	€1,700	€1,200	€800	€700
External Wall Insulation	€8,000	€6,000	€3,500	€3000
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

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]

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