KILBRIDE ENERGY MASTER PLAN

October 2023

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Glossary of Terms

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

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

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

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

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

Energy Savings - Energy in 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.

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

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

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

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

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

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

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

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

Small Area Plans - 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.

Ireland's Climate Action Plan 2023

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

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

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

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

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

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

Table 1 – Summary of the sectoral targets in the 2021 Climate Action Plan

Sector	Reduction	2018	2030
Electricity	80%	10.5 $MtCO_2eq$	3 $MtCO_2eq$
Transport	50%	12 $MtCO_2eq$	6 $MtCO_2eq$
Buildings (Commercial & Public)	45%	2 $MtCO_2eq$	1 $MtCO_2eq$
Buildings (Residential)	40%	7 $MtCO_2eq$	4 $MtCO_2eq$
Industry	35%	7 $MtCO_2eq$	4 $MtCO_2eq$
Agriculture	25%	23 $MtCO_2eq$	17.25 $MtCO_2eq$
Other	50%	2 $MtCO_2eq$	1 $MtCO_2eq$

Introduction to the Energy Master Plan

To assist in achieving the Kilbride 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 Kilbride Sustainable Energy Community.

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

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

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

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

The EMP report begins with a sectoral energy breakdown that will give a broad overview of each sector's (Residential, Non-Residential, Transport and Agriculture) energy consumption, energy cost and contribution to CO_2 emissions in the Kilbride 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.

The report concludes with a Register of Opportunities section, which contains a series of ideas and projects that the community can pursue 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 increases awareness in energy efficiency across the community. This process begins through the interactive community survey issued, meetings with the SEC committee, energy audits of public buildings and finally 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 a single Small Area Plans [1] which is defined by the Central Statistics Office (CSO) and shown below in Figure 1.

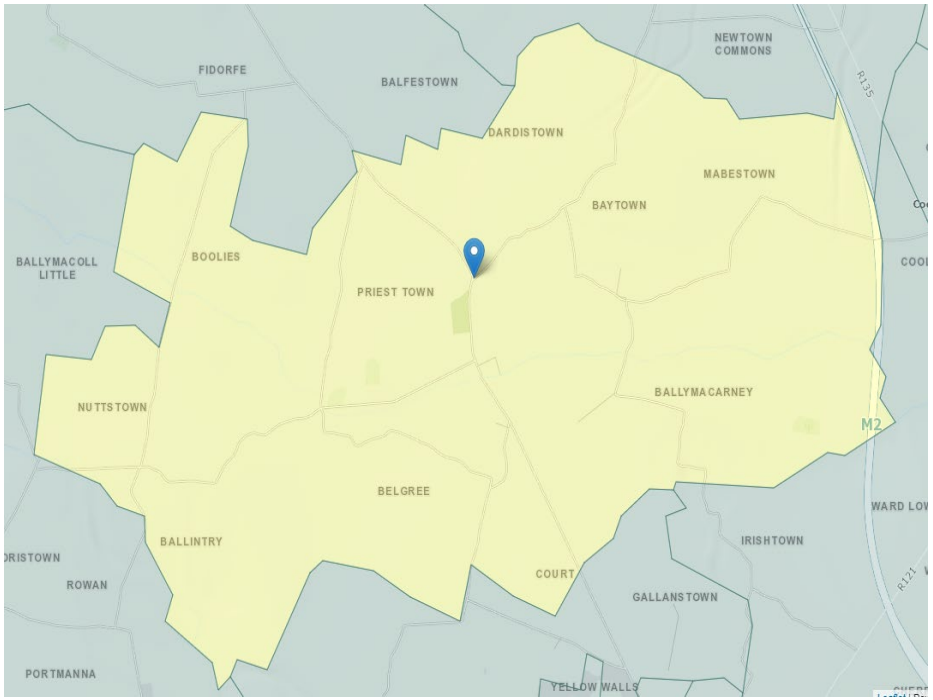


Figure 1 - The image depicts the area covered by Kilbride SEC. This was generated using the Small Areas as defined by the Central Statistics Office (CSO SAPMAP 2022).

[1]Small Areas are areas of population generally comprising between 80 and 120 dwellings created by The National Institute of Regional and Spatial Analysis (NIRSA) on behalf of the Ordnance Survey Ireland (OSi) in consultation with CSO.

Executive Summary

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

Table 2 – SEC Total Energy, CO_2 and Cost Analysis

	ELECTRICITY	FOSSIL FUELS	TRANSPORT	AGRICULTURE	TOTAL
ENERGY MWh	2,321	3,904	2,540	1,786	**10,552**
CO_2 EMISSIONS tCO_2	955	1,567	608	1,814	**4,944**
TOTAL ENERGY COST	€768,295	€381,764	€381,363	€294,589	**€1,826,010**

Apart from Agriculture, all of the data on this page was calculated using data from Central Statistics Office 2022 Census of Ireland (CSO, 2022), whilst the emissions and Energy Cost were calculated using SEAI Domestic and Commercial Fuel Cost Comparison (SEAI, 2023). Due to the sparseness of publicly available Agricultural data, the EMP relied on data supplied by Kilbride SEC.

The EMP breaks down the energy consumption and fuel mix within the community's catchment area into 4 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
4) Agriculture

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

Table 3 – Sectoral percentage energy consumption

Kilbride SEC Primary Energy Baseline (MWh)				
Sector	**Electricity**	**Fossil Fuel**	**Renewable**	**Total** (MWhr)
Residential	1,272	2,504	118	3,895
Non-residential	1,049	1,400	0	2,449
Transport	8	2,532	184	2,725
Agriculture	153	1,633	0	1,786
Total Energy	**2,482**	**8,070**	**303**	**10,855**

Our analysis of the energy consumption within the catchment area has identified that 39% of the energy demand relates to the residential sector, 23% in the non-residential sector, approximately 21% in the Transport sector and 17% in the Agriculture sector.

Residential sector

Background

The Residential sector is one of the largest emitting sectors in Ireland, accounting for 27.5% of CO_2 emissions and 26.8% of the energy used in Ireland as per 2021 estimates from SEAI. Therefore, if communities want to make progress towards individual targets, as well as contributing to the national target of reducing all CO_2 emissions 51% by 2030, it is vital this sector is given particular focus.

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

The momentum within the country has been to ensure that as many homes as possible upgrade their homes insulation ahead of 2030, with the Irish Government setting the ambitious target of 'retrofitting' [2] 500,000 homes to a B2 Building Energy Rating (BER) by 2030.

By retrofitting homes in a manner that focuses on enhancing their insulation, homeowners don't have to use as much energy on space heating within their home, which will naturally lead to emission reductions within the residential sector.

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

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

The BER is based upon the provision of space heating, water heating for domestic purposes, ventilation, and lighting. The BER does not include what are called point load consumption such as plugged-in electrical appliances [3]. Given that a BER is a reflection of a home's energy efficiency, a lower BER implies that homeowners are using more fuel to heat their homes. Given the continued rise in energy costs, a strong BER can alleviate homeowners from fuel poverty and prevent others from going into it.

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

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

Method

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

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

SEAI's corresponding prices and emission factors as of 2023 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 87.2% of the housing is owner occupied. With a 53% outright ownership, 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 rumoured to be 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 (CSO, 2022)

Occupancy type	No. of homes	% of homes
Owned with mortgage or loan	61	34.1%
Owned outright	95	53.1%
Rented from private landlord	10	5.6%
Rented from Local Authority	6	3.4%
Rented from voluntary/co-operative housing body	0	0.0%
Occupied free of rent	2	1.1%
Not stated	5	2.8%
Total	**179**	**100%**

Housing Type

Almost all of the housing stock in the catchment is classified as individual houses consisting of detached, semi-detached, terrace housing with a small percentage classified as flats or apartments. This is a positive sign for Kilbride 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.

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

Type of home	No. of homes
House/Bungalow	176
Flat/Apartment	3
Bed-Sit	0
Caravan/Mobile home	1
Not stated	0
Total	**180**

Housing Age

Within the catchment area there is a good mix of housing age types which will each require different energy efficiency measures to achieve a more energy efficient housing stock. As per Table 6, almost 21.8% of Kilbride's housing stock would be considered modern having been constructed after the year 2000.

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 65.4% 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 6 – Age profile of the Kilbride SEC housing stock (CSO, 2022)

Period	No. of homes	% of homes
Pre 1919	7	3.9%
1919 - 1945	17	9.5%
1946 - 1960	9	5.0%
1961 - 1970	12	6.7%
1971 - 1980	30	16.8%
1981 - 1990	42	23.5%
1991 - 2000	20	11.2%
2001 - 2010	17	9.5%
2011 – 2015	3	1.7%
2022 or later	19	10.6%
Not stated	3	1.7%
Total	**179**	**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.

Housing Fuel Mix

The residential fuel mix as illustrated on the following pages with 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 Kilbride SEC is linked to the type of fuel consumed within the community. Through using different fuel types, a community can significantly reduce the CO_2 footprint from the energy it consumes to heat its homes. The ideal situation for any community is to reduce the level of energy required to heat their homes through measures that enhance energy efficiency and to provide the remaining heat requirements from low or natural CO_2 producing fuel sources.

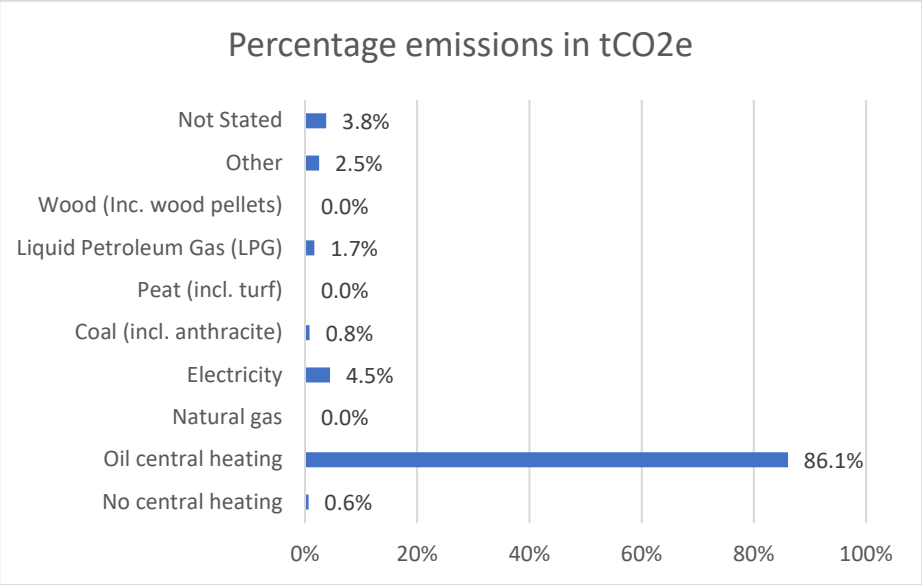


Figure 2 - Percentage emissions in tCO_2e (CSO, 2022; SEAI, 2022)

Within Kilbride SEC, the main fuel type consumed currently is oil which makes up 74% of the total thermal energy consumed. As per Figure 2, this fuel type makes up over 86% of the CO_2 emissions from the Residential sector. Whilst these findings do raise cause for concern, it also demonstrates the huge level of potential for the community to significantly reduce its carbon footprint.

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

Heating Type	No. of Units	Fuel	% of Total Thermal Energy	% of Total Emissions tCO_2e
No central heating	1	Oil[6]	1%	15,383
Oil central heating	133	Oil	74%	2,045,939
Natural gas	0	Natural Gas	0%	n/a
Electricity	24	Electricity	13%	369,192
Coal (incl. anthracite)	1	Coal	1%	15,383
Peat (incl. turf)	0	Peat	0%	n/a
Liquid Petroleum Gas (LPG)	3	LPG	2%	46,149
Wood (Inc. wood pellets)	7	Wood Pellets	4%	107,681
Other	4	Other	2%	61,532
Not Stated	6	Other	3%	92,298
Totals	**179**			

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

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

In addition to the Census data, an energy survey which gathered data from 30 respondents was carried out as part of the study fieldwork. The census poses a question around the primary heating source used by homeowners to heat their home, however this doesn't cover secondary and supplementary heating sources that many use for home heating.

The home energy survey data shows that 70% of homes are heated in some way by oil and 13.3% by natural gas, which is roughly in line with the census data. What is perhaps more interesting for the community is the fact that electricity (16.7%), coal (30%) and timber (43.3%) which score so low on the census form, appear to be popular secondary fuel choices to heat their home. These findings suggests that a sizeable proportion of homes within the community either have a wood burning or multi-fuel burning stove.

Indeed, it is these homes that use coal and turf as a supplementary heating source that the SEC could try to target in an effort to reduce the carbon emissions produced by the community. It's important to note that whilst the Census was filled in by all of the community, this survey was replied to by 30 individuals, with various response rates to the questions so it is not totally representative of the community. However, a question like this does reveal more about the SECs heating usage when placed alongside the Census results.

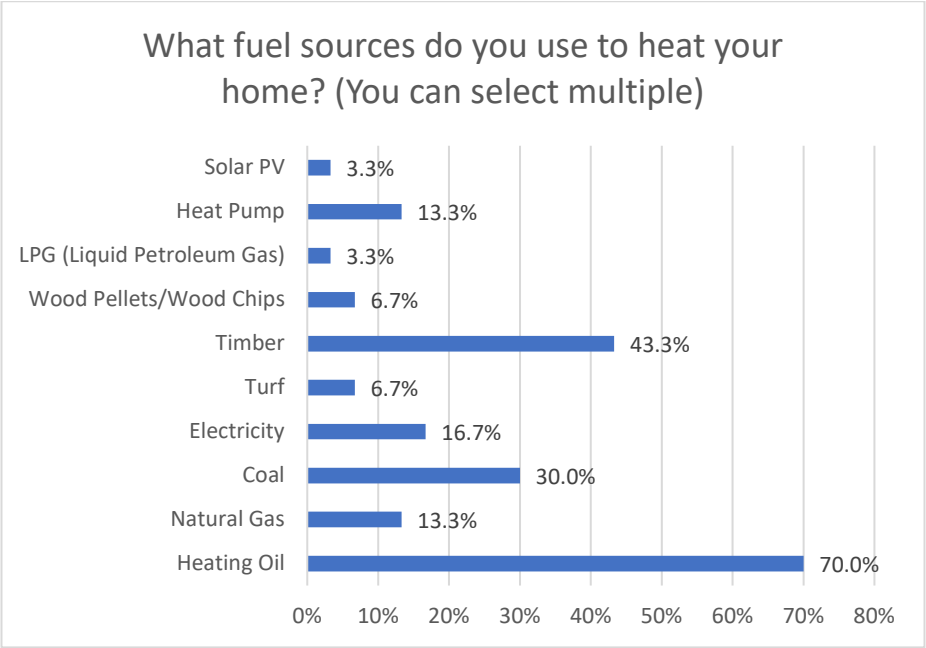


Figure 3 – SEC Energy Survey question asking respondents about the various sources they use to heat their home (Kilbride SEC Home Energy Survey, 2023)

The survey also asked respondents a separate question on whether they used any renewable energy sources in their homes. Solar Panels for heating and Heat Pumps came out on top with 14.3% of the share, with Solar Panels for electricity second with a share of 10.7%. Of course, Solar Panels for heating are likely to be used as a secondary source of heating, but there is a suggestion here that the amount of renewable heating has risen in the last 5 years.

Housing BER Coverage

An analysis of the Building Energy Rating (BER) of the current residential housing stock within the catchment area was carried out. The average BER rating has been determined by analysing SEAIs BER database which was collected in 2023 and is compared against the 2022 CSO data on the number of houses in the Kilbride SEC which have had BER's carried out on them and should be reviewed in that context.

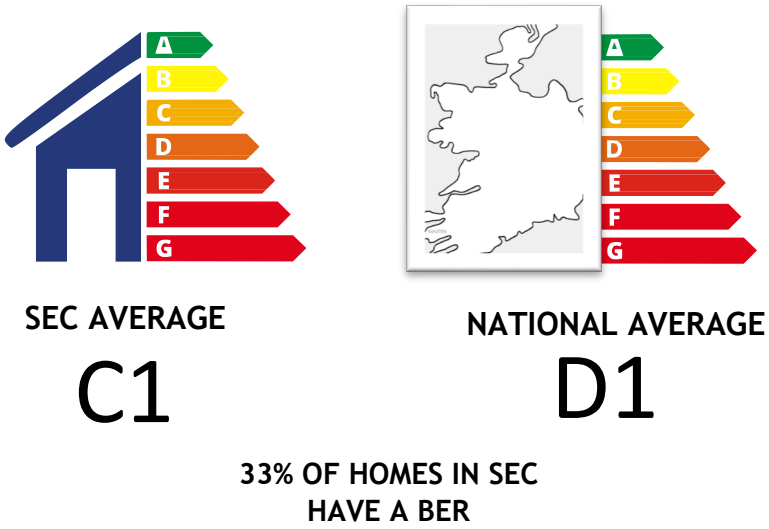


Figure 4 - Building Energy Rating information on catchment area [7] (SEAI, 2023)

Of the 179 homes registered within the Kilbride SEC catchment area, 33% of these homes have Building Energy Rating certificates.

From the cohort of homes in Kilbride that have had a BER carried out, the number of homes with a BER of B2 or greater is higher than the national average (25% vs 18%).

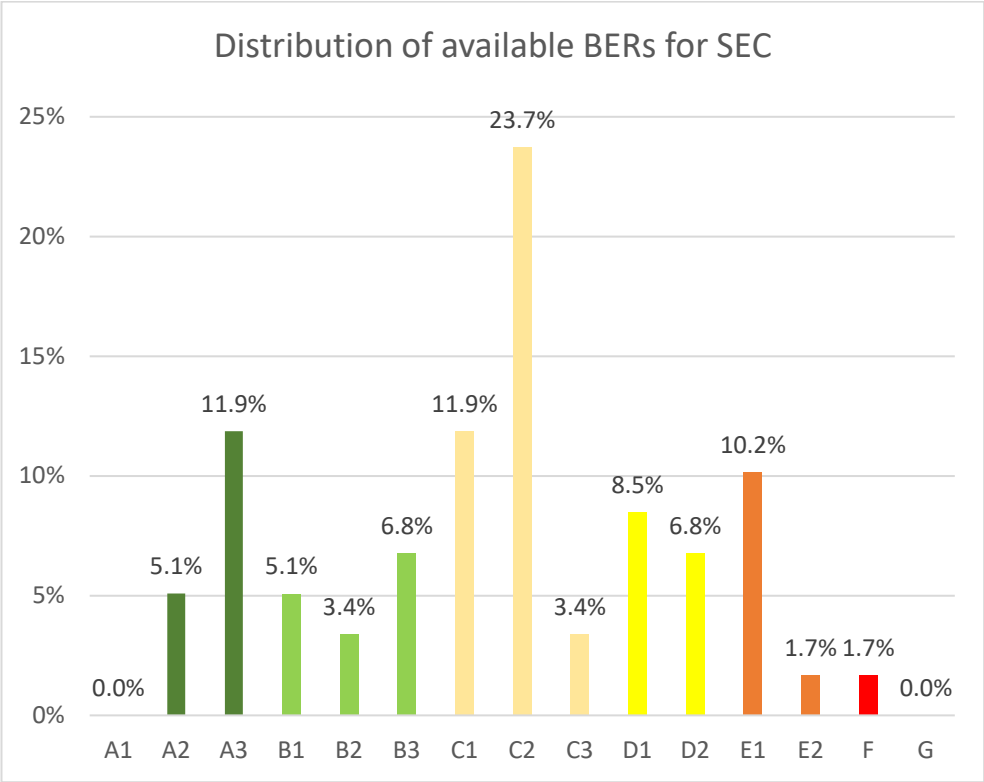


Figure 5 – Percentage breakdown of all available BERs in Kilbride SEC

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

When asked 'How efficient do you think your home is?' in the SEC survey, only 16.7% of respondents thought their home had poor or very poor efficiency, whilst 26.7% of respondents indicated that their home was very efficient or had excellent efficiency levels which is a positive indicator for the SEC going forward.

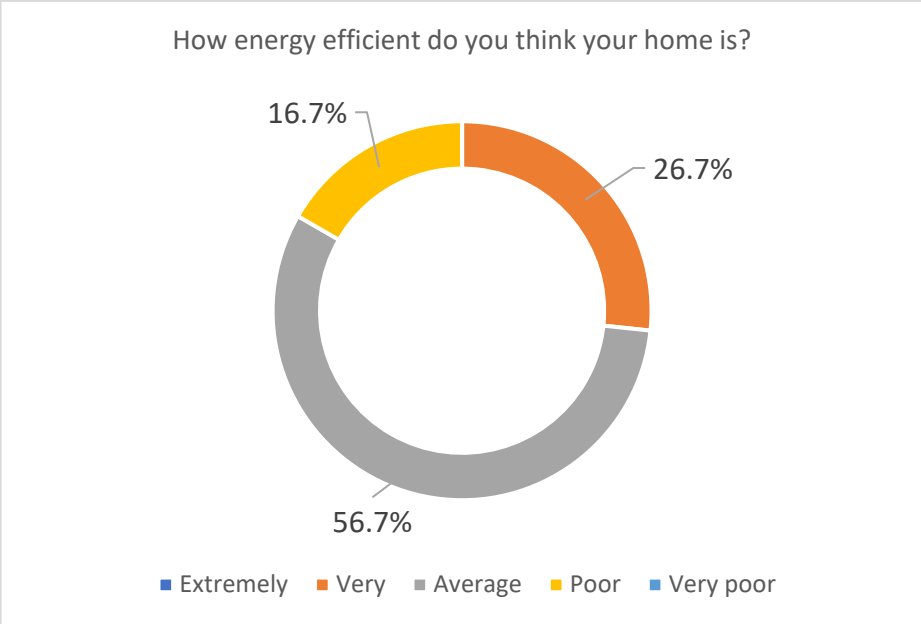


Figure 6 – SEC Survey results relating to how energy efficient respondents believe their home to be (30 responses) (Kilbride SEC Home Energy Survey, 2023)

If we work under the assumption that the BER data is reflective of all homes in Kilbride, this allows us to estimate that 75% of the housing stock in the Kilbride SEC are below the Irish Government's target BER B2. However, of that total, approximately 45.8% lies within a boundary of B3 – C3 which shows that a significant chunk of the housing stock can be brought up to this rating without deeply extensive retrofitting measures.

Residential Energy Baseline

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

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

	Electricity	Fossil Fuel	Renewable	Total
Total Primary Energy (kWh)	1,271,889	2,504,352	118,449	3,894,691
Total CO_2 (tonnes)	376	659	0	1,036
Total Spend (€)	€402,044	€253,261	€13,557	€668,862

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

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

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

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

Furthermore, the Warmer Homes Scheme [10] offers free energy upgrades for eligible homeowners who are most at risk of energy poverty. A budget allocation of €148 million has been provided for the scheme in 2023. 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.

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

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

Retrofit

Background

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' [11]. If properties are not insulated to an adequately high level, then this technology is not suitable as a primary heat source.

The government's climate actionn plan has set a Building Energy Rating (BER) of B2 as the target for the energy performance of retrofitted homes. This target is in line with current building regulations - 'Part L conservation of fuel and energy' [12], which specifies that buildings undergoing 'Major Renovations' [13] must achieve a BER B2 or 'Cost Optimal' level of energy performance.

Method

As part of the Energy Master Plan 3 residential properties were selected within the community for energy assessments using the Home Energy Assessment system. A Home Energy Assessment (HEA) is a detailed report on the energy performance of your home.

For homeowners considering multiple energy upgrades and applying for the One Stop Shop service, a HEA will provide both a BER rating and the required technical report detailing the energy upgrades needed to get your home to a B2 rating and better. It includes:

- Visual inspection of the dwelling
- BER assessment including certificate, advisory report and technical assessment
- Recommendations to achieve a 150 kWh/m2/year uplift
- Recommendations to achieve a 250 kWh/m2/year uplift
- Recommendations to achieve a minimum A3 rating
- Full costing of upgrade work

The audits were carried out in August 2023. The individual building information is redacted from the case studies for the privacy of the homeowners. The table illustrates the spread of buildings which were reviewed.

Table 9 – Residential Building Energy Rating and possible uplift

Building No.	Building Size m2	Existing BER Rating	Measures No.	Possible BER Uplift
1	154	D2	10	A2
2	156	C3	9	A2
3	273	C1	9	A1

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

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

[13] Major renovations refer to upgrades where more than 25% of the building envelope. Painting, re-plastering, rendering, re-slating, re-tiling, cavity wall insulation and insulation of ceiling are not considered major renovation works.

Below is an example of one of the Home Energy Assessment reports.
The rest can be found in Annex B of the Energy Master Plan.

Home Energy Upgrade Advisory Report

Start your journey to

Upgrade your home!

Detached house

Construction Year: 1970

Dwelling Floor Area: 153.72 m²

Your journey from BER D2 to BER A2

Your upgrades explained:

The upgrades specified below are calculated to meet One-Stop-Shop requirements, however each element can be selected individually should you wish to avail of SEAI's individual grants. To qualify for a One-Stop-Shop SEAI grant approval, your house will need to reach a 100 kWh per m² per year uplift as a result of the overall upgrades and reach a minimum BER rating of B2 or higher. Your home must have an existing BER rating of B3 or lower to qualify for One-Stop-Shop grants and be constructed before 2011 generally. The different measures advised show the cumulative impact of the applying improvements to your home.

Is dwelling one-stop shop ready?

100 kWh/m²/yr Uplift	✓
HLI below 2.0 W/K.m²	✓
Rating B2 or higher after upgrades	✓
Constructed before 2011	✓

Potential impact of the **recommended energy upgrades**

Energy Upgrade	% Saving	HLI	Uplift	Energy Value	CO_2	BER Rating
	%	W/K.m²	kWh/m²/yr	kWh/m²/yr	$KgCO_2/m^2/yr$	-
Current State	-	3.03	-	266.3	64.7	D2
Attic Insulation	3.2%	2.91	8.6	257.7	62.4	D1
All Flat ceiling areas - Add 150mm quilt insulation to existing 150mm quilt insulation laid perpendicular - U Value 0.13 W/m²K. Sloped ceiling areas - Add 50mm PIR to sloped ceiling areas - U Value 0.22 W/m²K.						
Walls	11.5%	2.50	39.3	227.0	54.4	D1
Heat loss external walls to have 100mm external insulation fitted U Value 0.27 W/m²K. Semi-exposed knee walls and cavity wall to unheated space to be fitted with 50mm PIR - U Value 0.27 W/m²K.						
Windows	6.1%	2.20	55.6	210.8	50.2	C3
Fit new energy efficient windows throughout to U Value 0.85 W/m²K or better						
Doors	1.5%	2.15	59.5	206.8	49.1	C3
Fit new energy efficient doors to U Value 1.2 W/m²K or better						
Chimney	0.6%	2.13	61.0	205.3	48.7	C3
Remove open fire and block up chimney. Ensure mechanical extract fans in wetrooms.						
Floor Insulation	8.7%	1.85	84.2	182.1	42.7	C2
Suspended ground floor area in main dwelling to be upgraded with 100mm mineral wool - U Value 0.25 W/m²K.						
Air Source Heat Pump	44.7%	1.85	203.2	63.1	11.6	A3
Install an Air to Water Heat Pump (Mitsubishi 8.0 kW unit used in this assessment) with time and temperature zone control. Heat Pump must be specified by Designer/Installer. Ensure low temperature radiators are installed throughout.						
Possible Additional Energy Upgrades						
Air Tightness	2.9%	1.60	210.9	55.4	10.0	A3
Improve Air permeability to approximately 5 m³/m²/hr or better by getting air test done and addressing all leakage areas and re test. Attics sealed						
Mechanical Ventilation	-0.3%	1.58	210.1	56.2	10.0	A3
Install a whole house extract mechanical ventilation system with rigid ducting and fans in all wet rooms. (Vent Axia Sentinal used in this assessment.)						
Solar PV	9.9%	1.58	236.5	29.8	6.7	A2
Add 8 No. PV Panels to South-East facing roof 2.32 kWp (assuming 360 watts per panel)						

Your retrofitted home's energy performance:

BER	Annual Estimated Space Heating Energy bill	% Savings	CO_2	HLI
A2	€610	88.8%	8.9 tonnes	1.58

Home Energy Upgrade Advisory Report

Start your journey to

Upgrade your home!

Detached house

Dwelling Floor Area: 153.72 m²

Your upgrades explained:

To ensure that your Heat Pump system is installed according to relevant guidelines and operates efficiently, your home will need certain upgrades to its fabric and ventilation elements to minimise heat loss.

Such upgrades allow it to operate at lower space heating distribution temperatures and to meet most or all the space and water heat demand. Additionally, as the size of your house is unique the Heat Pump selected must be specified by the installer and/or manufacturer.

This means that the BER rating of your house must reach a minimum '*Heat Loss Indicator'* or HLI. This should be less than or equal to 2.00 W/K.m². This is usually explained in a Technical Assessment report specific to your home.

Package of your energy upgrades to save money make your home comfortable and protect the environment

Recommended Energy Upgrade	Building Element Qualities	% Uplift	One Stop Shop Grants	SEAI Individual Grants
	-	%	€	€
Attic Insulation	114.51 m²	3.2%	€1,500	€1,500
Walls	159.71 m²	11.5%	€8,000	€8,000
Windows	20.58 m²	6.1%	€4,000	-
Doors	5.62 m²	1.5%	€1,600	-
Chimney	1 No.	0.6%	-	-
Floor Insulation	109.34 m²	8.7%	€3,500	-
Air Source Heat Pump	Item	44.7%	€8,500	€6,500
Air Tightness	Item	2.9%	€1,000	-
Mechanical Ventilation	Item	-0.3%	€1,500	-
Solar PV	2	9.9%	€1,800	€1,800
After all upgrades		88.8%	€31,400	€17,800

Notes:

1. While in some cases, a Heat Pump system can be installed with a HLI between 2.0 and 2.3 provided certain conditions are met, which your home energy advisor will advise you

2. A grant for this type of upgrade is available at the time of publication of this report. Grant availability is subject to eligibility criteria, and should be checked to see if the works to your own home meet the eligibility criteria. Eligibility criteria are subject to change

3. An additional €1,000-2,000 may be available through SEAI grants if the designer installer of the Heat Pump system recommends new radiators.

Grants Available?

subject to availability, terms and conditions

Health and Social benefits of retrofitting

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

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

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

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

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

The gap to target

Currently there is a labour and skills shortage in the construction sector, which means that retrofit targets are unlikely to be achieved under current conditions. The Government have begun the process of establishing 'Retrofit Centres of Excellence' where trainees can come to learn the skills that will allow them to become employable within this sector. The original and biggest of the four centres is based in Mount Lucas, Co. Offaly as part of the Laois and Offaly Education Training Board. The SEC and wider Kilbride committee should try to promote the courses and training offered at the ETB so that contractors based in their area have the appropriate skillset to carry out retrofits in their own communities.

Energy in Transport

Background

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

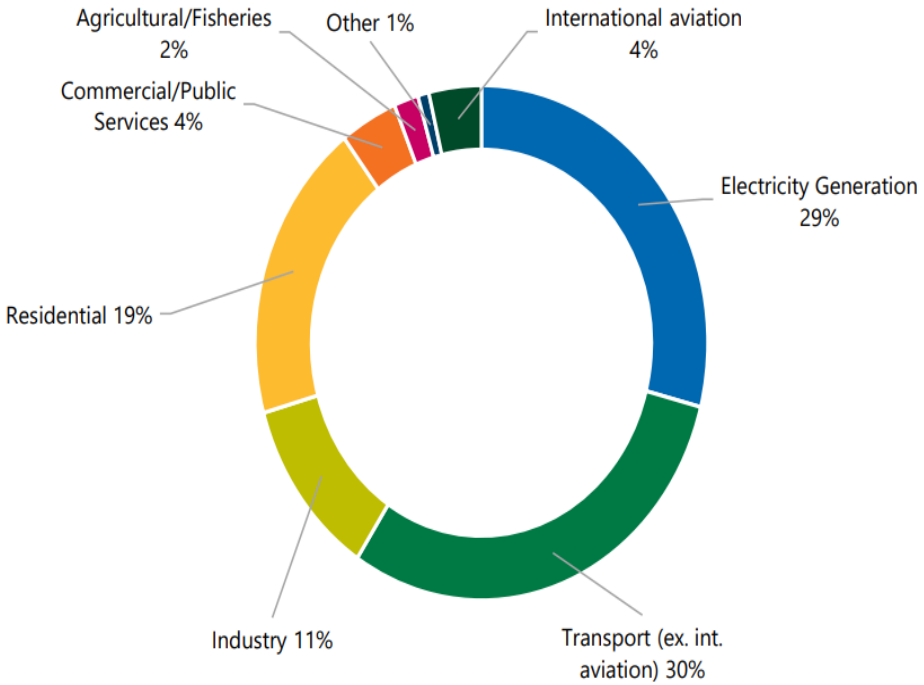


Figure 6 – Percentage share of Energy Related CO_2 by sector for 2020 in Ireland (SEAI, 2022)

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

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

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

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

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

The impact of the COVID-19 pandemic, with the introduction of 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 Kilbride SEC has been carried out based on data from the Central Statistics Office (CSO). SEAI's corresponding energy usage, prices and emission factors for various forms of transport as of 2023 were applied to calculate the total spend and CO_2 emissions for various sources of fuel for vehicles in the catchment area.

Results and Analysis

Commuting to work

Commuting to work by private car is the primary method of transport in the Kilbride SEC with 68.1% of workers either driving or being driven by car. According to the 2022 Census, Kilbride lags behind national averages in public transport usage for commuting to work. In general, public transport and walking/cycling have higher modal shares in larger urban areas, and as settlement size reduces so too does their modal share.

Table 10 – Primary forms of transport used to commute to work (CSO, 2022)

Commuting to work	No. of people	% of total
On foot	5	2.0%
Bicycle	1	0.4%
Bus	8	3.2%
Train, DART or LUAS	4	1.6%
Motorcycle/scooter	1	0.4%
Car driver	161	64.9%
Car passenger	8	3.2%
Other (inc. van & lorry)	26	10.5%
Work from home	26	10.5%
Not stated	8	3.2%
Total	**248**	**100%**

Therefore, one reason for the reliance on private transport in Ireland and by extension Kilbride is the large rural population. Indeed, Eurostats' figures reveal that 42% of Irish people still live in rural areas, so the case of Kilbride is quite a common one across the island.

What is not so common is the fact there is no bus service operating in Kilbride whatsoever. It is understood during conversations with the SEC that if the SECs residents wish to use public transport, they would first have to travel to the stop, normally via car to the likes of Coolquay or Ward Cross which are just under 5km away.

This sort of distance would generally be suitable for cycling, with a trip estimated to only take as little as 12 minutes. However, the roads around Kilbride and it's surrounding areas are narrow and windy – meaning many people don't feel safe enough to cycle which compounds the issue.

Reducing car journeys through remote working

The impact of COVID-19 on the nature of transport in Kilbride cannot be understated and the profile will have changed significantly in the last two years, with a greater shift to home-based working and education, thus leading to a reduction in car usage. NUIG in conjunction with the Whitaker Institute [14] released data in April 2022 from 8,428 respondents on their experience of Remote Working. At the time of data collection, 52% of respondents were working in a hybrid model (sometimes remotely, sometimes onsite), with 40% working fully remotely.

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

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

Perhaps most striking, over 27% of respondents indicated that they worked from home 5 days a week. Interestingly, since the 2016 census, the percentage of Kilbride residents who reported working from home regularly has doubled, from 4.9% in 2016 to 10.5% in 2022 which has almost certainly been as a result of COVID-19. Unfortunately, data on the amount of days worked at home by Kilbride residents is not available, but we can see that 37% of residents in the SEC work at least one day from home per week.

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

[14] http://whitakerinstitute.ie/wp-content/uploads/2014/02/Remote-Working-Survey-Report-2022-final-updated.pdf

Commuting to school or college

Naturally we would expect the car to dominate the uptake for primary school children, so this slightly skews the results, but it is almost identical to the national average. However, there is still a lower rate of active transport amongst the student population in the community, with the SEC's rate over 14% lower than the national average. Perhaps surprisingly, given the lower rate for public transport for commuting to work, there is a higher usage of public transport amongst children going to school and those attending college than the national average.

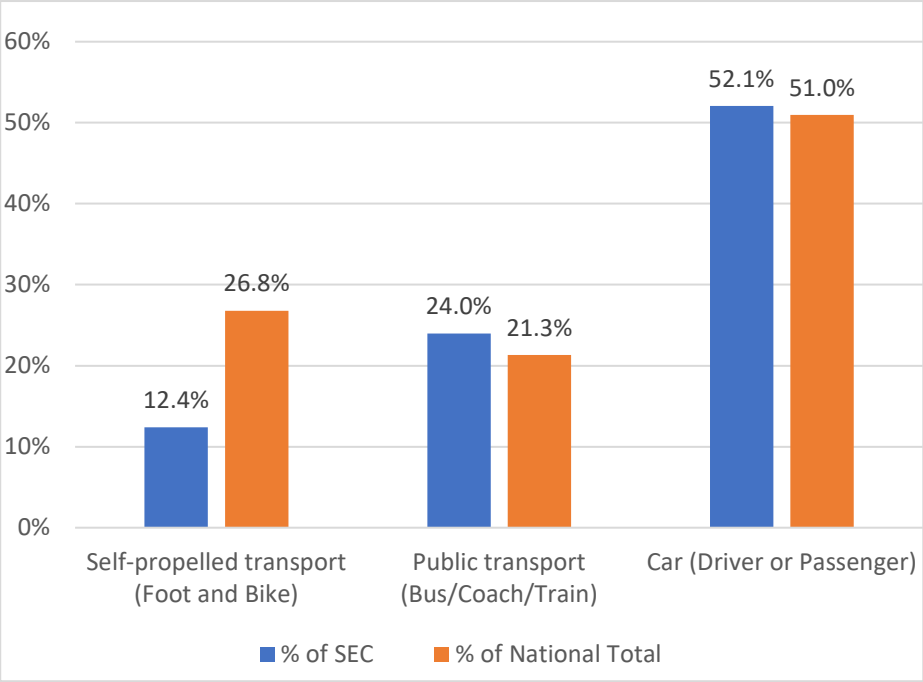


Figure 7 – Primary forms of transport for primary, secondary and college students (CSO,2022)

The results from here ties into the unsafe nature of the roads that were referenced earlier in the report. To increase this rate the SEC could look to seek funding or grants in order to improve the active travel infrastructure in their community so that walkways and cycle paths are safer for students.

For example, The Safe Routes to School (SRTS) Programme launched in 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.

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

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

Energy consumption from transport

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

Table 11 – Means of commuting in the SEC (CSO, 2022)

Commuting to work	No. of people	% of total
On foot	15	4.1%
Bicycle	6	1.6%
Bus	32	8.7%
Train	9	2.4%
Motorcycle/scooter	7	1.9%
Car driver	224	60.7%
Car passenger	8	2.2%
Van	22	6.0%
Other	4	1.1%
Work from home	26	7.0%
Not stated	16	4.3%
Total	**369**	**100%**

Based on the information on vehicle ownership within the catchment area, it is possible to calculate the energy consumption and carbon footprint for the transport sector.

A national stock breakdown has been used to calculate energy consumption and emissions (56.9% diesel, 42.7% petrol, 0.4% Battery Electric Vehicle (BEV)) based on national average km travelled.

Table 12 – Private Vehicle Transport Energy and CO_2 impacts (CSO,2022; CODEMA, 2019)

		National average annual km	kWh/km (TPER)	gCO_2/km
	Petrol	12,113	0.73	167
Car	**Diesel**	19,681	0.70	167
	BEV	12,958	0.38	65
Motorcycle		2,741	0.41	94
Van		22,137	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 13 below.

Table 13 - SEC Transport Energy, CO_2 and Spend (CSO, 2022; SEAI, 2022)

	Electricity	Fossil Fuel	Renewable	Total
Total Primary Energy (kWh)	7,928	2,532,448	184,385	2,724,760
Total CO_2 (tonnes)	1.36	608	0	609
Total Spend (€)	€1,808	€379,900	€583	€382,290

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

Switch to electrical vehicles

An analysis of the impact of changing 20% of the existing private vehicle fleet to battery electric vehicles and reducing work-associated commutes by 20% is detailed in Table 14. It indicates that a CO_2 reduction of 62 tonnes and a reduction in energy spend of approximately €69,264 per annum. These are savings which can be recirculated around in the local economy, creating a more economically sustainable community.

Table 14 - SEC Transport Energy, CO_2 and Spend with 20% reduction in commutes and 20% increase in EVs (CSO, 2022; SEAI, 2022)

	Electricity	Fossil Fuel	Renewable	Total
Total Primary Energy (kWh)	166,482	2,425,735	188,111	2,780,328
Total CO_2 (tonnes)	28	519	0	547
Total Spend (€)	€37,958	€274,473	€595	€313,026

A significant increase in the availability of long-range electrical vehicles (EV) has made this mode of transport more suitable for rural environments. Electric vehicles will become the dominant mode of privately owner vehicles in the next 10-15 years. 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.

Table 15 - Comparison of CO_2 impacts and fuel costs based on 250km per week (SEAI, 2022; Bonkers.com, 2022)

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

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

Households with 2 vehicles should consider purchasing a smaller electric vehicle 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 towards electrical vehicles, details of which can be found in the Annex A at the end of the report.

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

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

Table 16 – Avoid–Shift–Improve Transport model

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

Car dependency

Car ownership

In order to meet the Transport reduction targets set by the Irish Government, the number of car journeys will need to decrease substantially. Naturally this means moving away from the traditional fossil fuelled car and towards alternative forms of transport that have a lower carbon intensity.

Based on census data we know that there are 361 cars between the 411 people who are legally of age to drive in the Kilbride SEC (17 and over). 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 Kilbride operate diesel powered vehicles, then the annual average CO_2 emissions per driver in Kilbride is 2.94 tonnes. (Based off the County Meath average annual km driven [18]). There were 179 homes in Kilbride as per the 2022 census, meaning there are 1.85 cars available for every home in Kilbride, with 74% of homes owning more than one car.

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

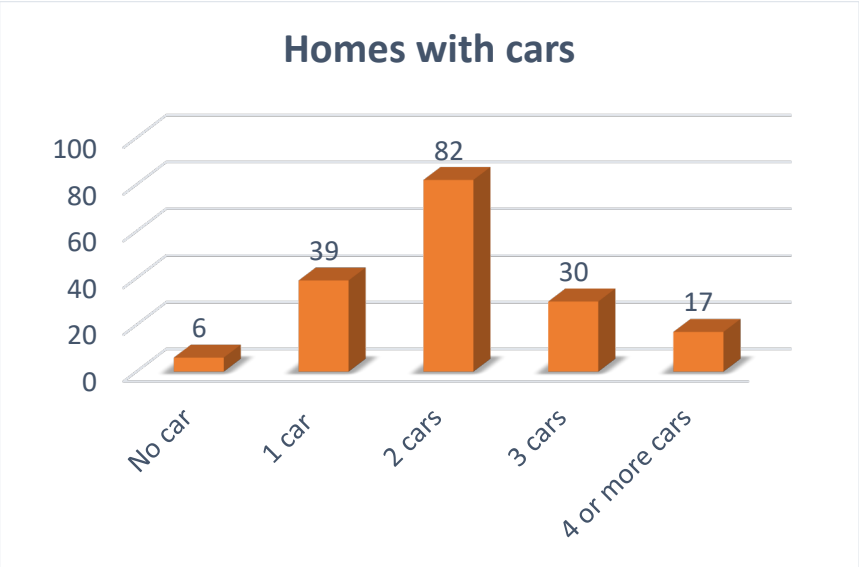


Figure 8 – Bar chart evidencing number of cars each home owns in SEC (CSO, 2022)

Commuting and car usage

It is extremely difficult to accurately calculate the mean car mileage for the Kilbride 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 361 cars in circulation within the Kilbride SEC. From that total 224 cars are used for commuting to work, school or college. This means that there are approximately 137 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.

The findings in the Census data are reaffirmed by the SEC Energy Survey, which indicates that there is a significant number of drivers in the community who are travelling under the County Average for private cars per year, with 36.7% of respondents stating that they drive under 10,000 km per year. This reaffirms the previous point that a there are sections of the community who drive such little distances annually, that they could replace their car with a different mode of transport.

Table 17 - If you do you have a motor vehicle, how many kilometres do you estimate that you drive annually? (30 responses) (Kilbride SEC Home Energy Survey, 2023)

Distance travelled by private car	% of total
5,000	10%
10,000	26.7%
15,000	40%
20,000	13.3%
25,000	10%

Figure 9 also gives a rough indicator as to the final destination for many commuters, with 10-25 kilometres taking many individuals to the Dublin City area. 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.

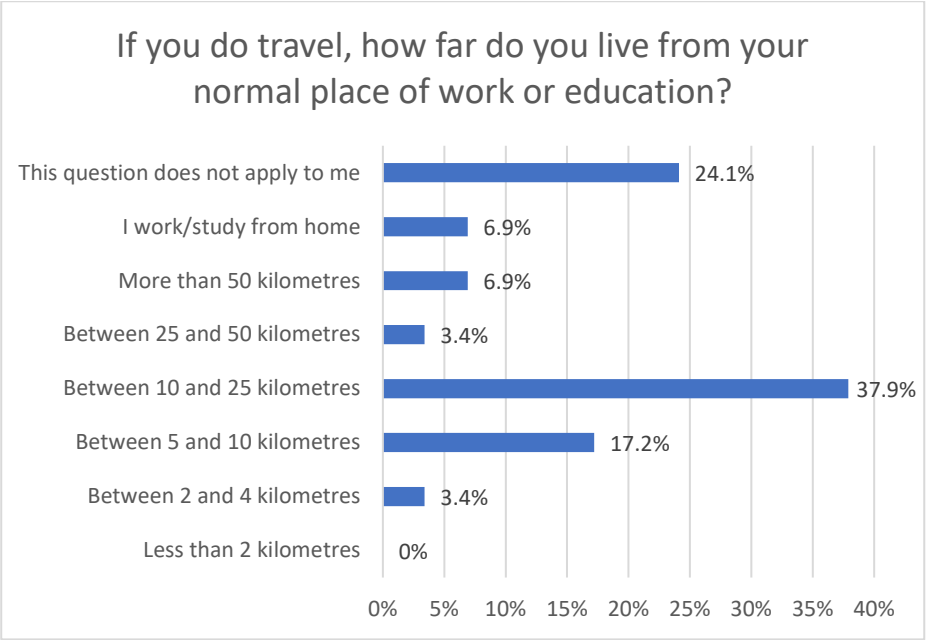


Figure 9 – SEC Energy Survey question asking respondents how far in kilometres do they live from their normal place of work or education (30responses) (Kilbride SEC Home Energy Survey, 2023)

The lack of public transport services

Only 8.7% of respondents out of 369 indicated that they use the bus regularly to commute to education or work. As touched upon earlier on in the report, there is currently no public transport that runs through the SEC, which explains the lack of bus/train usage. Addressing this will take a tremendous effort from local representatives, but with a well-structured strategy it is possible for a bus service to be added to Kilbride.

Community Engagement and Support

- Encourage community members to sign petitions and create a collective voice in favour of the initiative. Researching the area within the EMP has highlighted that there has long been calls for at least one bus stop in Kilbride so it should not be a significant challenge to drum up support

Research and Data Collection

- Collect data that demonstrates the need for a public transport service, such as the number of residents without private transport, the distance to the nearest bus stop or train station, and any commuting difficulties faced by residents. This EMP refers to some of these points so these can be leveraged.

Identify Relevant Stakeholders

- Identify and engage with relevant stakeholders from an early stage, including local government councillors/TDs, transportation authority's such as Local Link and regional representatives, to gain their support and involvement in the initiative.

Build Alliances and Partnerships

- Collaborate with local businesses, community groups, and other organisations that could benefit from improved transportation links to create a stronger lobbying coalition.
- Form alliances with any neighbouring villages that may share similar transportation needs.

Develop a Comprehensive Proposal

- Create a detailed proposal outlining the specific routes, schedules, and potential stops for the bus service. Include a comprehensive cost analysis and potential sources of funding for the project.

Public Relations and Media Outreach

- Use local media outlets, including newspapers, radio stations, and social media platforms, to raise awareness about the need for a public transport service in the village.
- Share success stories of other communities that have successfully implemented similar initiatives.

Meeting with Decision-Makers

- Request meetings with local government officials, transport providers, and relevant authorities to present the proposal and discuss the benefits of establishing a bus route for the village.

Continuous Follow-up and Persistence

- Considering that Kilbride to date has not had a bus stop despite the local desire to have one, it's vital to continuously follow up with the key stakeholders previously identified to ensure that the proposal remains a priority on their agenda. Persistence is key to overcome the decades of neglect.

An analysis of the roads leading to and from the Kilbride SEC has identified that they are not suitable for a typical Bus Eireann sized bus. Therefore, to be able to connect on to those services that go onwards to either Dublin or Navan, a smaller bus is required similar to those operated under Local Link.

There may be an opportunity to run a shuttle bus service between those areas outside of Ratoath along the road from Raytown to Kilbride and direct it to the Newtown Cross bus stop which is on the 103 route (Navan to Dublin). A connection from Kilbride to Newtown Cross would only take approximately 5-7 minutes and would cater for the individuals in the surrounding area who also face the same issues.

The blue circle in Figure 10 indicates those areas outside of the Ratoath sphere of transport links and the blue line indicates the road the shuttle bus could take from Kilbride to Newtown Cross. A service like this could probably only operate during peak periods Monday – Friday but ultimately this is when it would be of most benefit to the community.

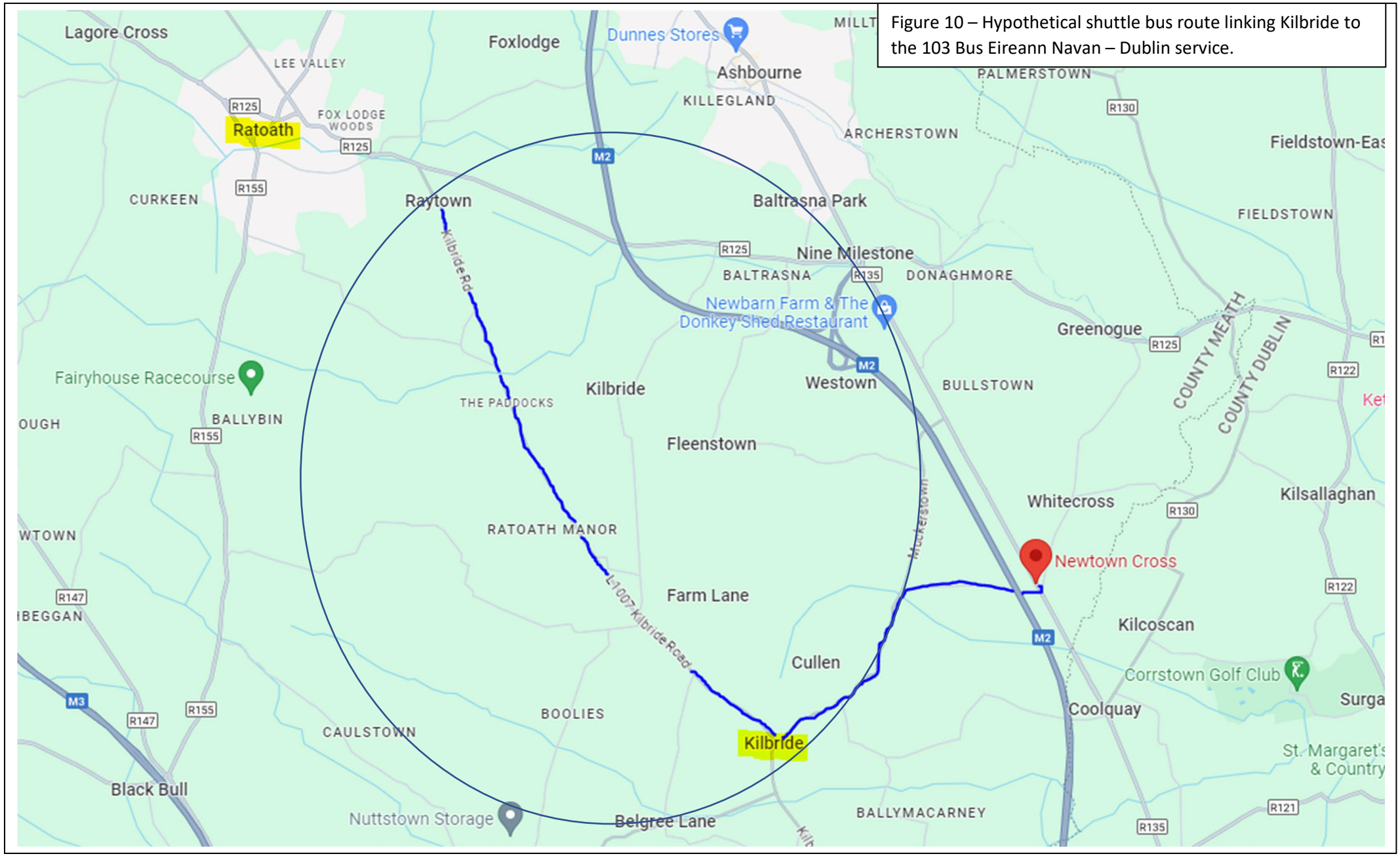


Figure 10 – Hypothetical shuttle bus route linking Kilbride to the 103 Bus Eireann Navan – Dublin service.

Non-residential sector

Background

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

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

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

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

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

- The Climate Planning Fund for Business, will give businesses a €1,800 grant to devise a personalised plan to identify how best to eliminate their reliance on fossil fuels and up to €50,000 matched funding to go towards specific capacity building
- The Enterprise Emissions Reduction Investment Fund will offer up to €1 million for manufacturing businesses to upgrade their processes. With funding to invest in energy monitoring and tracking, carbon neutral heating processes, smart metering and research and development

Method

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

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

Table 18 – An example of the CIBSE energy values applied to a typical office. These are multiplied by the area (m^2) of each Office Building in the SEC, the data for which is obtained from the Valuations Office

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

As part of the energy master plan for Kilbride, two premises were audited an Ashrae level 1 standard to identify any opportunities within these premises for energy efficiency measures. The recommendations within the reports are based on utility data, a site audit, and related engineering calculations.

The site audit consisted of a walk-through of the facility and review of the electrical and mechanical systems and equipment. It is recommended that the organisations 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 detailed in the following list and a detailed report was provided to each of the property owners the results of which are located within the supplementary document to this report:

1. An Energy Audit of SME (Small/Medium Enterprise)
2. An Energy Audit of a School

Results and Analysis

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

Table 19 - SEC Non-Residential Energy, CO_2 and Spend (CIBSE, 2012)

Electricity consumption (MW·h)	Thermal Energy consumption (MW·h)	Electricity emissions (tCO_2)	Thermal Energy emissions (tCO_2)	Total emissions (tCO_2)	Total Energy Spend (€)
1049	**1400**	**578**	**907**	**1486**	**€494,753**

Support for SMEs

Aside from the recommendations contained within the EMP and supplementary non-residential audits, businesses can utilise the ClimateToolKit [19] website launched by the government to help businesses get started in taking climate action.

This online tool allows SMEs to input some simple information and get an estimate of their carbon footprint and a personalised action plan to reduce it. Each tailored action plan includes straight-forward, practical instructions and highlights the relevant help that is available from Government, through agencies such as Enterprise Ireland, the Local Enterprise Offices and SEAI.

SEAI have also launched a free, online, learning platform called the 'SEAI Energy Academy' which is designed to help businesses increase their energy efficiency and reduce their energy related costs. It delivers short, interactive, animated modules on a wide array of topic areas including business and office energy efficiency.
Furthermore, SEAI are currently running an energy audit scheme that offers SMEs a €2,000 voucher towards the cost of a high-quality energy audit [20].

These energy audits are suitable for businesses with an annual energy spend of over €10,000. These energy audits delve deeper than those contained within the report, analysing the sites suitability for various renewable technologies, the most significant users of energy in their business and their overall carbon footprint.

A highly detailed audit like this gives business owners the confidence to take appropriate steps to improve both their energy efficiency and reduce their annual energy bills. The non-residential audits identified several opportunities within the premises and Kilbride SEC which can be developed into energy efficiency projects. The standout projects for both premises were broadly similar, with an emphasis placed on renewable electricity generation which would enable a transition away from oil to electrified heating:

Please refer to the following pages for the recommended actions from the audit.

[19] climatetoolkit4business.gov.ie

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

5.Recommended Actions

Your auditor has identified the top actions you should you take to improve the energy efficiency of your site and save on your energy costs. These actions are listed in Table 5.a. below.

Description	Energy savings (kWh per year)	Type of energy saved	Cost savings (€ / year)	Emissions reduction (t CO2e per year)	Estimated cost of action (€)	Payback period (yrs)	Potential supports	Comments / additional info
Energy Management	1837	Oil & Electric	€ 907.52	0.6	€ 1,000.00	1.10	SEAI	Assume 5% reduction in energy consumption
Improve Seals on Windows and Doors	139	Oil	€ 15.28	0.0	€ 500.00	32.72	Own funds	Assume 3% reduction in thermal energy consumption
Installation of Electric Panel Heaters	4631	Oil	€ 509.41	1.2	€ 12,000.00	23.56	SEAI/Community contribution Fund	Assuming total electrical heating load is met by Solar Panels
Installation of Solar PV panels	32020	Elect	€ 15,689.80	9.6	€ 60,000.00	3.82	SEAI/Community contribution Fund	Cost saving based on current avg cost per kWh (incl all charges &Vat)
Total	38627		€17,122	11.3	€73,500	4.29		

Table 5.a. Recommended Energy Efficiency Measures

5.Recommended Actions

Your auditor has identified the top actions you should you take to improve the energy efficiency of your site and save on your energy costs. These actions are listed in **Table 5.a**. below.

Description	Energy savings (kWh per year)	Type of energy saved	Cost savings (€ / year)	Emissions reduction (t CO2e per year)	Estimated cost of action (€)	Payback period (yrs)	Potential supports	Comments / additional info
Energy Management	5,665	Oil & Electric	€674.35	1.7	€1,000	1.48	SEAI	Assume 5% reduction in energy consumption
Solar PV	21,650	Electric	€4,221	6.5	€70,000	16.58	SEAI/Dept of Education	Additional cost and emissions savings provided to space heating below
Replacement of T5 Tubes with LED T5 tubes	7,634	Electric	€1,832	2.3	€3,124	1.71	Own funds	
Electric Heating panel installation	50,171	Oil	€11,440	22.9	€50,000	4.37	SEAI/Dept	Energy Reduction is based on utilisation factor of 0.6 for heaters. Cost and emissions reduction are based on Solar PV providing all electric heating
Total	85,120		€18,168.24	33.4	€124,124	6.83		

Agriculture

The Irish agriculture sector is broad, but in terms of energy demand much of it is concentrated in the dairy sub-sector. Other sub-sectors such as tillage, beef, poultry and pork have associated environmental impacts, but the energy demand is typically fairly low as the results in the following pages will also reaffirm. However, across the board the cost of electrical energy has increased dramatically since 2020 and awareness of energy consumption in farms is becoming a topical issue.

Background

Kilbride and its surrounding townlands are home to a variety of agricultural activities and the landscape is characterised by a mix of pasture and arable land, with tillage farming being the most common type of farming activity according to hectares used.

The agriculture sector in Kilbride and surrounding areas is supported by a range of organisations and initiatives, including the Teagasc advisory service, which provides support and advice to farmers on a range of issues, including farm management, energy use, animal health, and soil fertility. Overall, the agriculture sector in Kilbride and County Meath plays an important role in the local economy, providing employment and contributing to the production of high-quality food products for both domestic and international markets.

As per correspondence with the Kilbride SEC, there is 2,931 acres of farmland in the SEC and surrounding area. Some of these farms are commercial owner-occupied farms and the remainder are made up of owner-occupied part-time farms and also farms which are rented to commercial farmers from outside the area. Farm size varies and for the purposes of this report farms are divided into 4 categories – Tillage, Beef, Dairy and Sheep.

Method

It has not been possible to quantify energy consumption within farm categories that have a mixture of livestock and/or crops, as varying factors such as farm size or herd size would lead to inaccuracies. Therefore, to estimate energy consumption on farms within the SEC, the most relevant farm animals and products have been quantified separately based upon the amount of acreage in the SEC that is used for tillage, dairy and beef farms (sheep and cows). Equine farms have been excluded from this study to the lack of data available on their energy usage.

The Agricultural Development and Advisory Service (ADAS), one of the leading independent environmental and agricultural consultancies in the UK, carried out energy audits on approximately 1000 farms between 1993-1995 within the UK. The figures from these audits have since been used as benchmarks for energy use on farms for various European projects and more recently in Energy Master Plans, including the County Monaghan Energy Master Plan. It is this set of data that guides the agriculture calculations within this report.

The energy data from ADAS is split into the following farm types: dairy, beef and sheep, pig and broilers. Energy consumption for each farm type includes electricity consumed for farm operations and diesel fuel used for farm vehicles. SEAI conversion factors have been used to convert litres of fuel into energy consumption in kWh. Energy spend for each farm type has been calculated by using SEAI figures for the price of electricity and the average price of diesel for 2023. Associated carbon emissions have been calculated using SEAI figures for carbon intensity of electricity and diesel in Ireland for 2023.

The calculations set out in Table 20 are based on a number of assumptions and a collection of data specific to the Kilbride SEC. Firstly, from the data that was provided by the SEC, it can be seen that the area of land used for agricultural purposes is divided into tillage, dairy and beef farms (sheep and cows).

However, the data that was supplied did not detail the number of animals on each of the farms or the 'actual' area that was harvested on the tillage farms. Therefore, assumptions based on data from agricultural research were made about the number of animals and crops harvested based on the amount of farm area available.

Table 20 – The amount of acreage dedicated to each type of farm in the SEC

Townland	Acres	Tillage	Beef	Dairy	Sheep
Total SEC area	2,931	1,991	567	200	29
% Activity SEC area	100	67	19	6.8	0.99

Dairy

A Teagasc study which analysed the daily and seasonal trends of electricity and water use on pasture-based automatic milking dairy farms studied 7 farms in detail. In the data collection it was evidenced that on average, there were approx. 2.42 dairy cows for every hectare of farm area. In Kilbride there was estimated to be 200 acres reserved for dairy farming. Therefore, if we follow this logic:

200 acres = 80 hectares
80 * 2.42 = 194 cows

Beef

Calculations were based on a relatively conservative rate of one beef cow per two acres of land. With 567 acres of land dedicated to beef cattle farming it was hypothesised that there were 283 cows.

It is important to note that the ADAS data for carbon intensity does not deal with the methane emissions released by the animals during their lifetime, it only examines the emissions that arise as a result of the agricultural activities. To calculate the emissions that come directly from the animal itself, data from Teagasc for both beef and dairy cows was leveraged. The Teagasc data was presented in grams of methane, which is then converted to CO_2 and multiplied by the average weight for a beef or dairy cow.

Sheep

As a rough guide, Teagasc indicate that 10 ewes per hectare is appropriate in terms of space requirements. There are approx. 12 hectares of farmland in the Kilbride SEC, which using the logic above should roughly translate to 120 sheep.

Data on emissions came from Teagasc. Similar to cows, the data on sheep was converted from methane to CO_2 and multiplied by the average weight for a beef or dairy cow.

Tillage

Data for Tillage was extremely hard to come by. It is also difficult to make assumptions about how much of the area was actually filled with tillage crops that are harvested and what methods are used for their collection and drying. For the purposes of the EMP, the reports calculations work off the assumption that the entirety of the tillage farms are worked on, which is likely to be an overestimation in some respects, but generally at least 75% of land reserved for tillage will be harvested.

Results and Analysis

Table 21 – Agricultural sector Energy, CO_2 and Spend

Total energy used (kWh)	Total cost	Total emissions (t/CO_2)
1,786,068	€294,589	1,814

Overall, the agriculture sector in Kilbride accounts for approximately 17% of energy usage in the SEC, which is a significant total that outlines the importance of the sector to the local communities economy and reflects it's relatively rural nature despite being situated within the Dublin commuter zone.

Table 22 – Agricultural sector Electrical energy consumption, CO_2 and Spend

	No. of animals	Electricity used per animal (kWh)	Electricity used (kWh)	Cost	Emissions (t/CO_2)
Dairy Farm	194	354	68,676	€28,844	23
Beef farm (cows)	283	50	14,150	€5,943	5
Beef farm (sheep)	120	36	4,320	€1,814	1
	No of hectares	**Electricity used per hectare (kWh)**	**Electricity used (kWh)**	**Cost**	**Emissions (t/CO_2)**
Tillage	806	82	66,092	€27,759	22
			Total electricity used (kWh)	**Total Cost**	**Total Emissions**
			153,238	€64,360	51

The dairy farm uses the highest amount of electricity (68,676 kWh), followed by the tillage farms with 66,092 kWh, the beef farm (cows) and then beef farm (sheep) with the lowest usage of 4,320 kWh. It is widely known that dairy farms are the most energy intensive type of agriculture in an Irish context, with the higher electricity consumption due to various factors, including milking machines, cooling systems, and other equipment required for dairy production.

Naturally the trend is repeated with emissions and costs, as the dairy farm incurs the highest cost (€28,844) and emissions (23 t/CO2) related to electricity usage, almost five times more per variable than the beef farm (cows) has a cost of €5,943 and emissions of 5 t/CO2. Even when looking at tillage activity which utilizes 66,092 kWh of electricity, it uses a relatively low amount of electricity per hectare of farm land.

Based on electricity usage per acre, tillage has the lowest energy consumption (about 33.25 kWh/acre), followed by beef farming (cows) and sheep farming with approximately 24.98 kWh/acre and 148.97 kWh/acre respectively.

Dairy farming has the highest electricity usage per acre (343.38 kWh/acre), reflecting the energy-intensive nature of dairy operations. When comparing emissions per acre, sheep farming has the lowest emissions impact, followed by beef farming (cows), tillage, and dairy farming. This shows that sheep farming, despite its relatively small acreage, has a relatively lower emissions footprint. Dairy farming, despite occupying a smaller percentage of the total area, contributes significantly to both electricity usage and emissions due to its high energy demands.

Opportunities for reducing energy consumption

The first step is to reduce energy wastage i.e., fix hot water leaks, insulate hot water piping and refrigerant gas piping, using lights only when necessary and make use of night rate electricity. Applying these good management practices will reduce energy costs without any capital expenditure. The benefits of reducing electricity consumption are twofold as reducing production cost is obvious, but additionally a significant portion of electricity generated in Ireland is from fossil fuels, 298g of CO_2 is produced for every kWh of electricity used. Hence reducing electricity consumption will also reduce the sectoral carbon footprint. Further advice is available from Teagasc Advisory Services under the Teagasc Climate Action. [21]

Milk cooling

Milk cooling is one of the largest consumer of energy on Irish dairy farms. The cooling of milk immediately after milking is vital to maintaining high milk quality levels. On a typical Irish dairy farm, the cooling process is completed in two stages: pre-cooling and refrigeration. It is understood from research that a significant percentage of plate heat exchangers (PHE) on dairy farms aren't operating at their full cooling effectiveness.

This is mainly due to the improper milk to water flow ratios being employed. PHE manufactures recommend milk to water flow ratios of between 1:2.5 and 1:3 depending on the model.

[21] https://www.teagasc.ie/publications/2023/tresearch-spring-2023.php

If a PHE is sized correctly in relation to the power of the milk pump and the correct ratio of water is supplied, then the power consumed during the refrigeration stage can be dramatically reduced. Again, advice on this point for individual farms is available from Teagasc but typical savings from efficient operation of cooling systems could be of the order of 50% [22].

Table 23 – Comparison of electricity and oil to power plate heat exchangers for milk cooling

Heating Method	Power Consumed (kWh)	Time (Hrs)	System Efficiency	Useable Water (amount of water drawn between 60-80 degrees Celsius)	Kg of CO_2 produced
Electricity	48.24	16.5	79%	411 litres	15.9
Oil	45.5	1.75	84%	415 litres	12.7

Water heating

The heating of water is a substantial energy input in the operation of a modern dairy farm. Studies from Teagasc have highlighted the energy consumption associated with water heating on modern dairy farms. One particular study presented the results of a water heating trial in Moorepark, which compared the efficiency and cost of electrical water heating versus oil-fired boilers. The study found that electricity used for water heating could add up to 2 kWh per cow per week and that the use of night rate electricity is crucial for reducing costs.

The oil-fired system was found to be more efficient and cost-effective, with a shorter recovery time and lower CO_2 emissions. However, the initial capital investment for the oil-fired system is higher than for electrical heating. The study emphasises the importance of considering both initial purchase cost and ongoing running costs when choosing a water heating system for dairy farms.

A more sustainable method of reducing the electricity consumption from water heating would be the installation of Solar thermal panels. A solar water heating system absorbs as much heat as possible from the sun's radiation in order to pump hot water through a heat exchanger so that the water is pre-heated. It's estimated that a solar thermal system can meet on average 40% of water heating load. Solar heating systems have a long life with low maintenance – many work reliably for at least 20 to 25 years [23]. On dairy farms with high hot water demand, the system can pay for itself two or three times over during its working life. Furthermore, solar thermal systems can avail of grant aid of up to 60% for young farmers.

However, there are some drawbacks which need to be taken into account. The initial capital outlay is higher than that for other systems, with no grant aid available other than the Young Farmers scheme. Also, the Solar thermal system will not replace the water heating system, as the solar tank should only be used as a buffer tank, with its primary role to 'pre heat' the final temperature water tank.

[22] https://www.seai.ie/community-energy/schools/post-primary-school/ag-science/

[23] https://www.teagasc.ie/publications/2020/hot-water-heating-options-for-the-milking-parlour.php

Milking

Conventional vacuum systems incorporate a vacuum pump operating at a fixed speed, a vacuum regulator and a load. To maintain a set vacuum level, the vacuum pump must remove air from the milking system at the same rate as air is being admitted. Since the air admitted is dynamic and the pump out rate is constant, a vacuum regulator is necessary to regulate the difference between the pump capacity and the air load. The typical vacuum regulator is a mechanical device that adjusts the rate of air admission into the system.

The vacuum regulator provides airflow into the system so that the sum of the air admitted by the milking system plus the air admitted through the regulator exactly matches the fixed airflow at the vacuum pump. Introduction of variable speed drive (VSD) technology for controlling vacuum in a milking system adjusts the rate of air removal by changing the speed of the vacuum pump motor. This can contribute to reduction in energy use of up to 25%, while still producing equivalent vacuum stability.

Understand your energy use

A certified energy audit may dig deeper into the energy profile of the farm. Since 2021, the Sustainable Energy Authority of Ireland (SEAI) has administered a program referred to as the 'Support Scheme for Energy Audits' (SSEA). The SSEA is designed to enable small and medium-sized enterprises, including farms, to engage the services of an energy auditor for the purpose of conducting an in-depth assessment of their business's energy usage.

Successful applicants receive a voucher valued at €2,000, which typically covers all expenses associated with the audit. Jack pursued the SSEA and PlanEnergy were then appointed as auditors.

The energy audit involves a comprehensive and methodical examination of the company's energy consumption patterns, with a focus on identifying suitable enhancements that often lead to immediate cost reductions. PlanEnergys' auditor then compiled a detailed report outlining their findings, complete with recommendations for the most efficient methods to reduce energy expenditures.

Change energy supplier and rate

Switching energy suppliers is one of the quickest ways of reducing costs. If they don't already do so, farmers should compare online to check the deals available from alternative suppliers.

Table 24 – Comparison of today's electricity prices (October 2023) against those paid in Jan-Apr 2022 and Apr-July 2022

	Today's rates	Audits rates Jan-Apr	Audit rates Apr-July
Day cost of electricity	44.51 cent p/kWh	25.88 cent p/kWh	33.26 cent p/kWh
Night cost of electricity	23.39 cent p/kWh	12.79 cent p/kWh	16.44 cent p/kWh

The table above highlights the importance of regularly changing electricity supplier, choosing a night rate electricity plan and carrying out energy intensive tasks in those hours when a night rate applies – normally 11pm/midnight to 7am.

Lighting

Replacing a 500-watt halogen flood light with a 150 LED lamp will save €128 a year. It also lasts 100 times longer. Furthermore, natural lighting can make a very big contribution to dairy buildings, both in cubicle housing and for parlours and other areas. Providing 10-15% roof light area will be enough to provide between 100 lux and 500 lux through natural lighting, depending on the time of the year.

The key to sustaining this is to maintain the cleanliness of the roof lights. Transparent wall sections are also effective. Naturally lit buildings need to be well ventilated to counteract the effects of heat build-up from solar gain. fitting a timer switch or sensor can result in lights only being used when needed.

Ventilation

Better controls, more efficient air movement and less reliance on mechanical systems. These can all help to save money on ventilation costs. Make sure that fans and ducts are regularly maintained and kept clean to maximise efficiency. In pig farms, a 40% improvement in energy efficiency can be achieved. This is through more effective controls and routine maintenance of the ventilation system. This can result in saving €4/finished pig/year in an integrated unit.

Guidance for investment

It is important for dairy farmers to carefully consider their options before investing in more energy-efficient equipment for several reasons. Firstly, energy-efficient equipment can be expensive to purchase, install, and maintain. Thus, dairy farmers must weigh the benefits of lower energy consumption and cost savings against the initial investment and ongoing maintenance costs. Secondly, different equipment types and models have varying energy-saving potentials. Therefore, farmers must evaluate the energy efficiency of each equipment type or model they are considering and choose the one that best suits their needs and budget.

Finally, dairy farmers should consider whether there are any available financial incentives, grants, or tax credits for investing in energy-efficient equipment. By considering all of these factors, dairy farmers can make an informed decision about whether or not to invest in more energy-efficient equipment and select the equipment that best meets their needs. One such tool which considers all of the above is the Dairy Energy Decision Support Tool (DEDST).

Dairy Energy Decision Support Tool

This is an online software tool designed to help dairy farmers and industry professionals make informed decisions about energy use on their farms. It was developed by researchers at the Munster Technological University and is funded by the Irish Department of Agriculture, Food and the Marine.

The DEDST tool allows users to input data related to their farm's energy consumption and costs, including electricity, heating, and water. This data is used to provide users with a comprehensive analysis of their farm's energy use, costs, and carbon footprint. The tool also provides recommendations for reducing energy consumption, costs, and emissions.

To use the DEDST tool, users must input various data related to their farm, including the number of cows, milk yield, and the type and age of equipment used. They must also provide data related to their energy consumption, such as electricity bills and heating oil consumption. In addition, users can provide data related to their farm's water use and manure management practices, which can impact energy consumption and emissions.

Once the necessary data has been input, the DEDST tool analyses the information to provide users with a detailed report of their farm's energy use and carbon footprint. This report includes information on energy consumption and costs by category, such as lighting, milk cooling, and water heating. It also includes an estimate of the farm's greenhouse gas emissions and recommendations for reducing energy consumption and emissions.

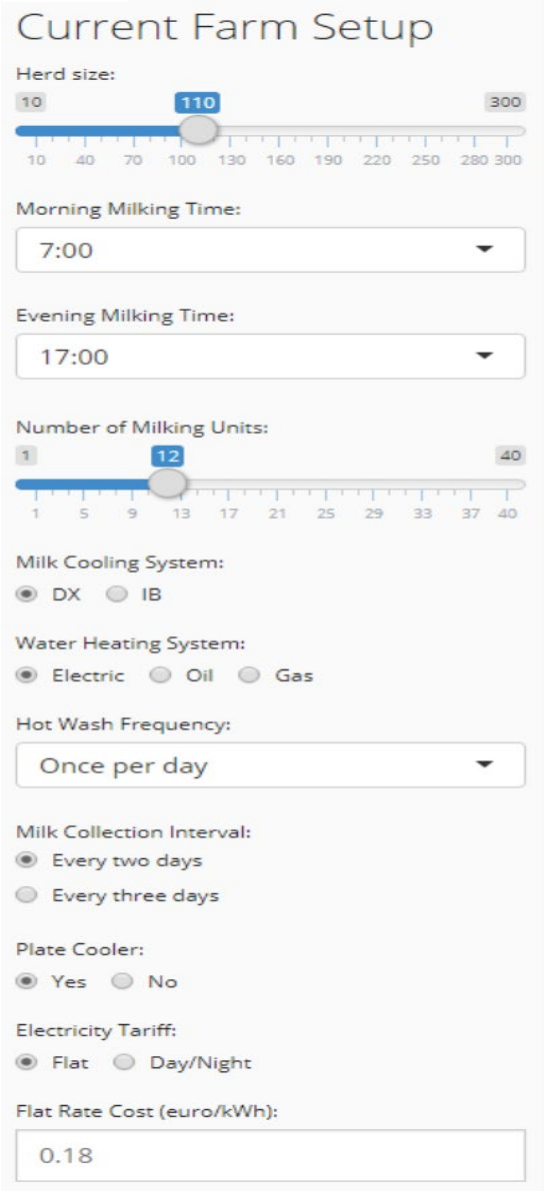
The DEDST tool provides users with customised recommendations for reducing energy consumption, costs, and emissions based on the specific data provided by the user, and may include actions such as upgrading equipment, implementing energy-efficient lighting, or optimising milk cooling systems. The tool also provides information on available grants and funding programs that may be available to help offset the costs of these improvements.

By providing users with a comprehensive analysis of their farm's energy use and emissions, as well as customized recommendations for improvement, the tool can help reduce energy costs, improve profitability, and reduce environmental impact. In addition, the DEDST tool can help dairy farmers meet regulatory requirements related to energy use and emissions.

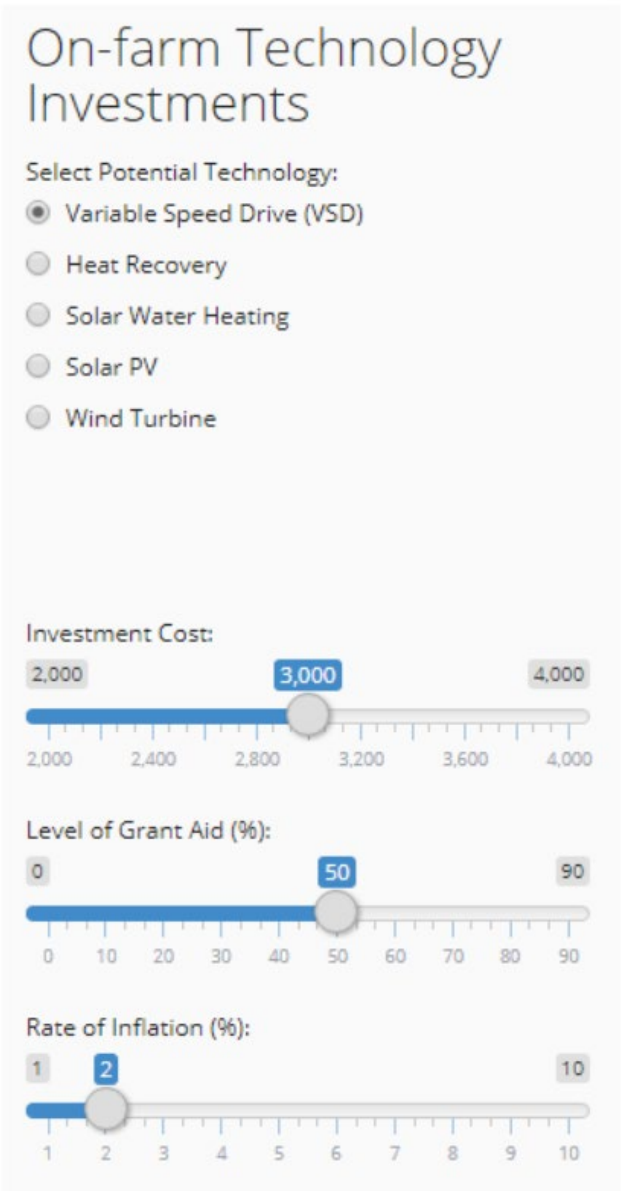
Overall, the Dairy Energy Decision Support Tool developed by the Munster Technological University is an important resource for dairy farmers and industry professionals who are seeking to improve their energy efficiency and environmental sustainability.

A list of grant streams for farmers have been included in Annex A at the end of this report that could used to support an investment decision made after using DEDST. The following pages show a hypothetical scenario of how the DEDST tool could be used to guide a decision about whether to invest in Variable Speed Drive equipment for a farmer.

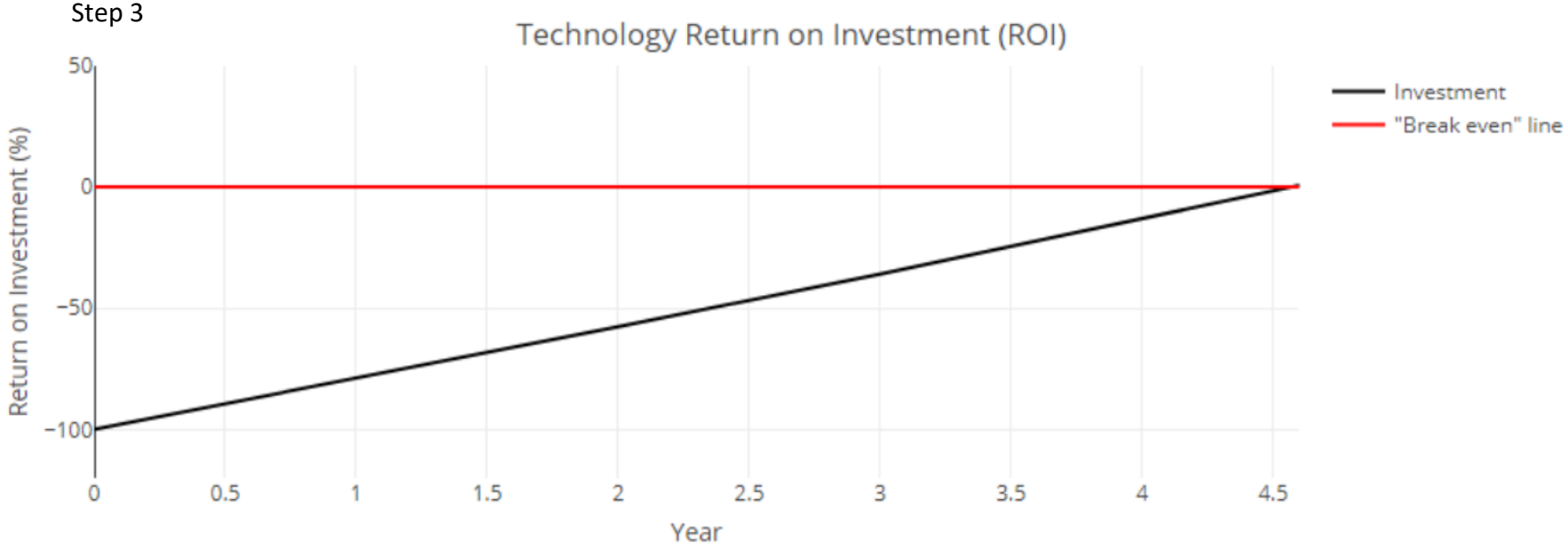
Step 1

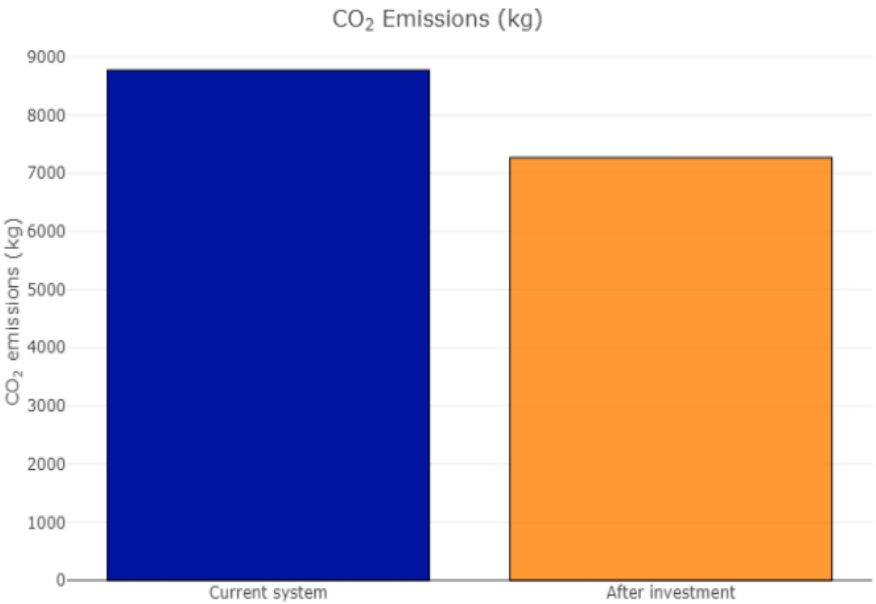

Current Farm Setup
Herd size:
10
110
300
10 40 70 100 130 160 190 220 250 280 300
Morning Milking Time:
7:00
Evening Milking Time:
17:00
Number of Milking Units:
1
12
40
1 5 9 13 17 21 25 29 33 37 40
Milk Cooling System:
DX IB
Water Heating System:
Electric Oil Gas
Hot Wash Frequency:
Once per day
Milk Collection Interval:
Every two days
Every three days
Plate Cooler:
Yes No
Electricity Tariff:
Flat Day/Night
Flat Rate Cost (euro/kWh):
0.18

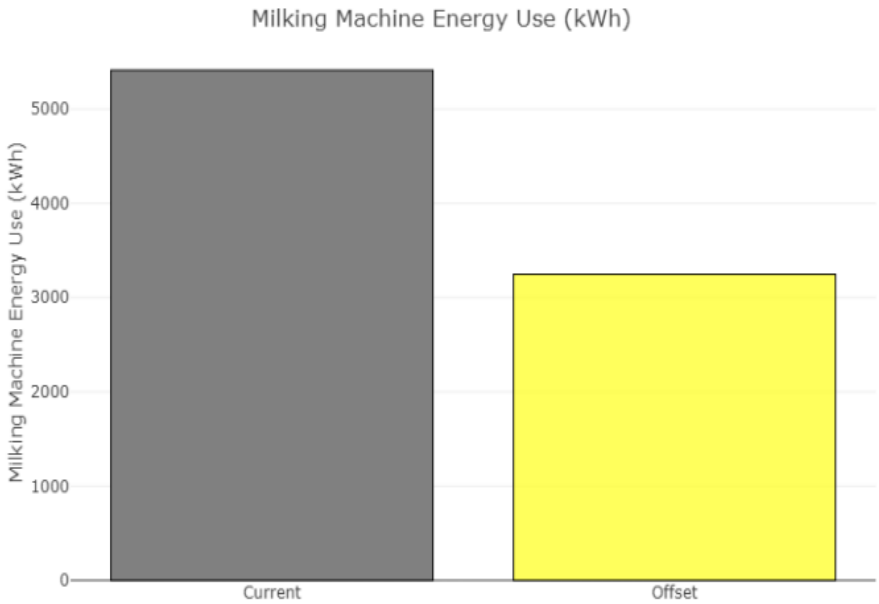
Step 2


On-farm Technology Investments
Select Potential Technology:
Variable Speed Drive (VSD)
Heat Recovery
Solar Water Heating
Solar PV
Wind Turbine
Investment Cost:
2,000
3,000
4,000
2,000 2,400 2,800 3,200 3,600 4,000
Level of Grant Aid (%):
0
50
90
0 10 20 30 40 50 60 70 80 90
Rate of Inflation (%):
1
2
10
1 2 3 4 5 6 7 8 9 10

Step 3


Technology Return on Investment (ROI)
Return on Investment (%)
50
0
−50
−100
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
Year
Investment
"Break even" line


CO_2 Emissions (kg)
CO_2 emissions (kg)
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Current system
After investment


Milking Machine Energy Use (kWh)
Milking Machine Energy Use (kWh)
5000
4000
3000
2000
1000
0
Current
Offset

Solar PV on farms

Soaring electricity bills and rising uncertainty over energy supplies have left farmers seeking alternative ways to power their farms, including Solar PV. Farms are in many ways, best placed to take advantage of Solar PV due to their access to space and high energy costs.

The lifting of the planning permission required for Solar PV installations on agricultural sites now means that the rooftop limit for Solar PV installations is 300 square metres (around 50-55 kWp), a significant increase from the previous limit of 50 square metres. This increase means that farmers could hypothetically cover all of their electricity costs through a Solar PV system. If for whatever reason the roof of the farm is not suitable for Solar PV, farmers can erect 17kW ground mounted systems without the need for planning permission.

TAMS 3

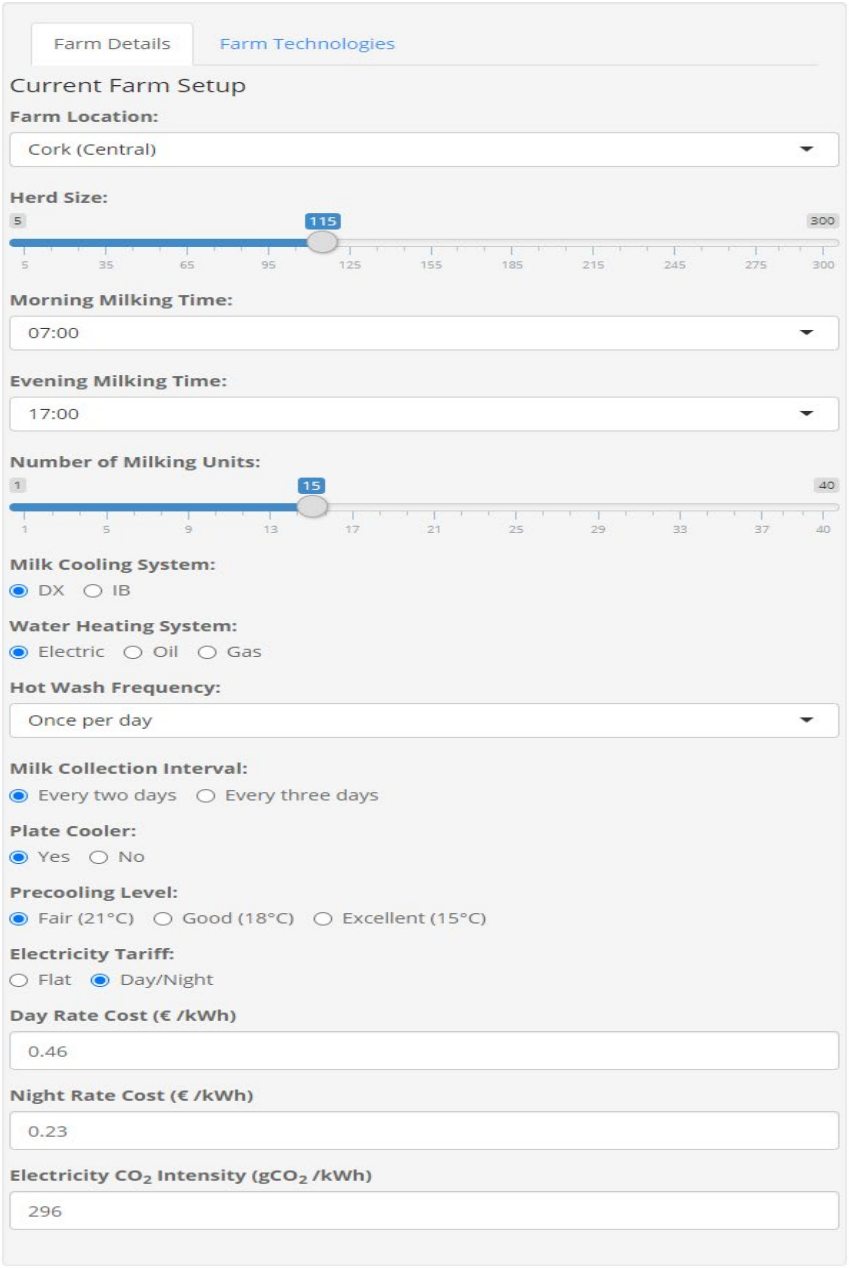
In early 2023, the department for Agriculture, Food and the Marine, announced the opening of applications for solar panels under new Targeted Agricultural Modernisation Scheme (TAMS 3). TAMS provides funding for capital investments on farms and will be in place for five years with a budget of €370 million.

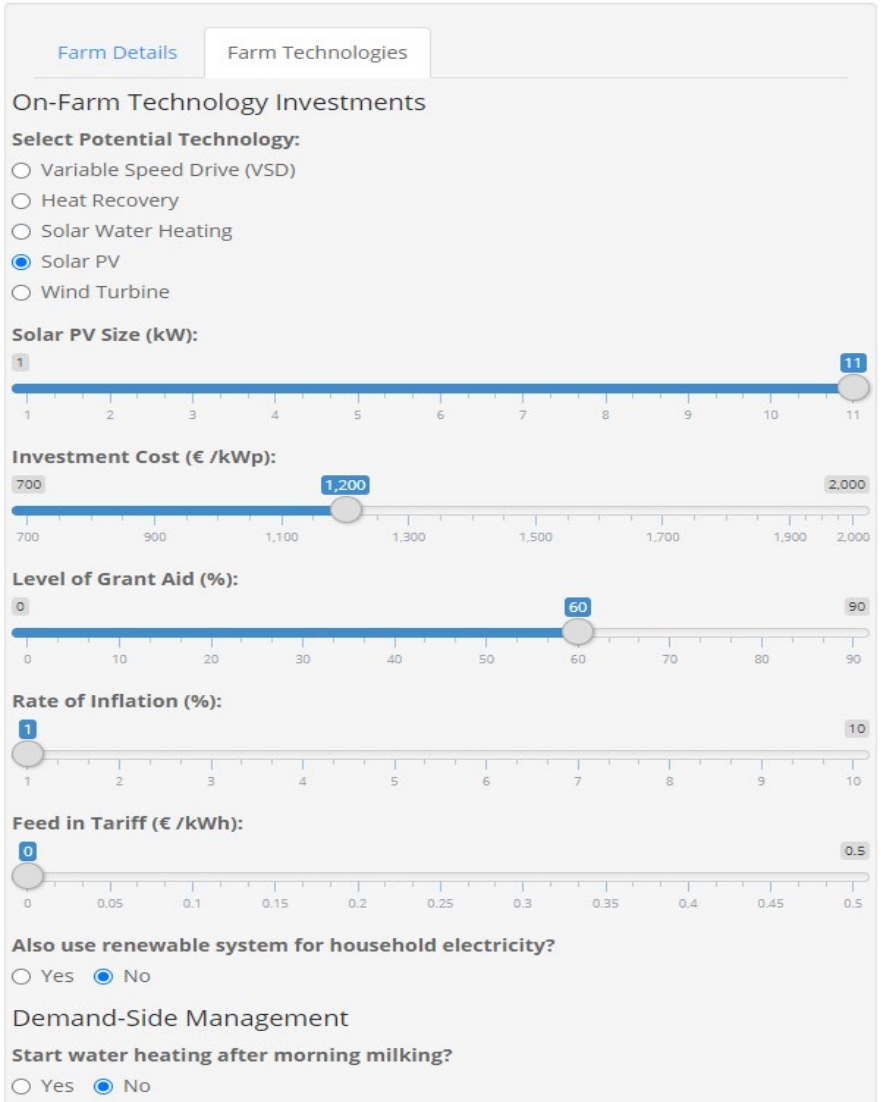
In order to encourage the purchase of solar investments, the solar scheme will be ring fenced with its own investment ceiling of €90,000 and will be grant aided at the enhanced rate of 60%.

Furthermore, under TAMS 3 the investment ceilings have been reset which means every farmer who applied under TAMS II can also apply under TAMS 3. In addition to the higher grant rates, the size of Solar PV systems eligible for grant funding has increased from 11kW to 62kW. Farmers may also include the energy demand of one dwelling house per holding in the sizing of the solar panel array, which will greatly benefit farm families during the current energy crisis.

Batteries are also covered under the grant and can be included in the system, however all Solar PV systems can only be installed and commissioned by Department accepted installers. At the time of writing, it is unknown if farmers who purchase Solar PV systems through TAMs are able to export electricity back to the grid for a set tariff in the same way a residence might be able to. However, there is a significant cost difference between the electricity purchased from the grid, compared to the lower amount individuals receive for selling back to the grid, so it is suggested that farmers store excess Solar PV energy or ensure their system is accurately designed to solely meet the energy needs of the farm.

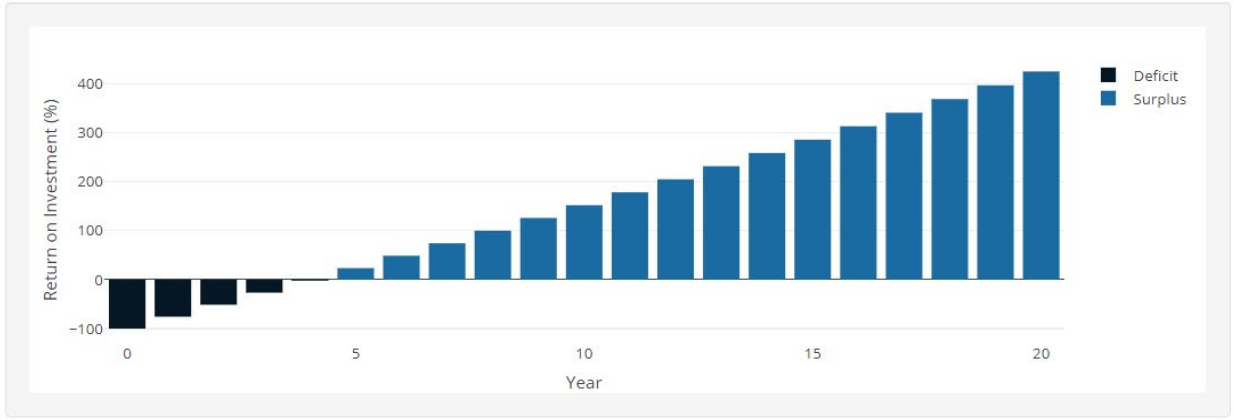
The following pages show a hypothetical scenario of how the DEDST tool could be used to guide a decision about whether to invest in a 11kWp Solar PV array for a farmer, taking into account the 60% grant stream from TAMs.


Farm Details
Farm Technologies
Current Farm Setup
Farm Location:
Cork (Central)
Herd Size:
5
115
300
5 35 65 95 125 155 185 215 245 275 300
Morning Milking Time:
07:00
Evening Milking Time:
17:00
Number of Milking Units:
1
15
40
1 5 9 13 17 21 25 29 33 37 40
Milk Cooling System:
DX IB
Water Heating System:
Electric Oil Gas
Hot Wash Frequency:
Once per day
Milk Collection Interval:
Every two days Every three days
Plate Cooler:
Yes No
Precooling Level:
Fair (21°C) Good (18°C) Excellent (15°C)
Electricity Tariff:
Flat Day/Night
Day Rate Cost (€ /kWh)
0.46
Night Rate Cost (€ /kWh)
0.23
Electricity CO_2 Intensity (gCO_2 /kWh)
296


Farm Details
Farm Technologies
On-Farm Technology Investments
Select Potential Technology:
Variable Speed Drive (VSD)
Heat Recovery
Solar Water Heating
Solar PV
Wind Turbine
Solar PV Size (kW):
1
11
1 2 3 4 5 6 7 8 9 10 11
Investment Cost (€ /kWp):
700
1,200
2,000
700 900 1,100 1,300 1,500 1,700 1,900 2,000
Level of Grant Aid (%):
0
60
90
0 10 20 30 40 50 60 70 80 90
Rate of Inflation (%):
1
10
1 2 3 4 5 6 7 8 9 10
Feed in Tariff (€ /kWh):
0
0.5
0 0.05 0.1 0.15 0.2 0.25 0.3 0.35 0.4 0.45 0.5
Also use renewable system for household electricity?
Yes No
Demand-Side Management
Start water heating after morning milking?
Yes No

Kilbride SEC Energy Master Plan

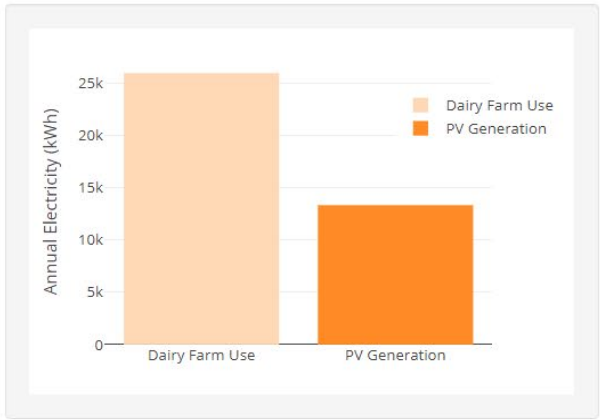
Monetary

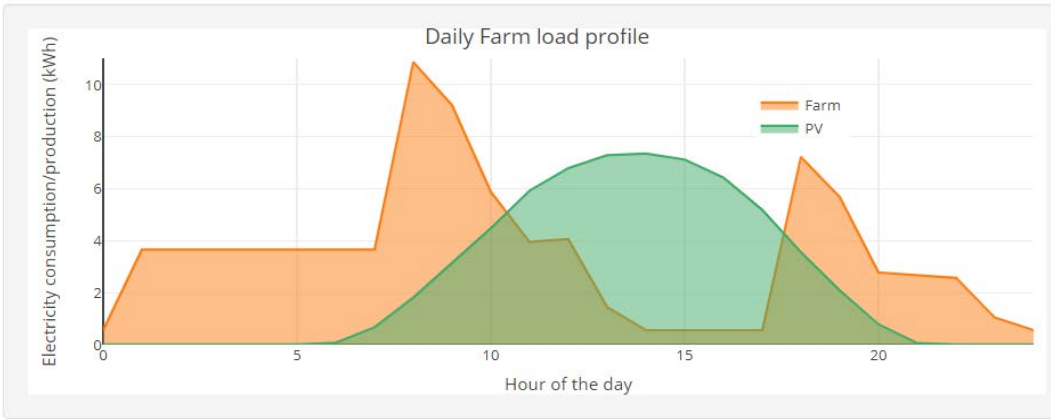


4.1
years payback

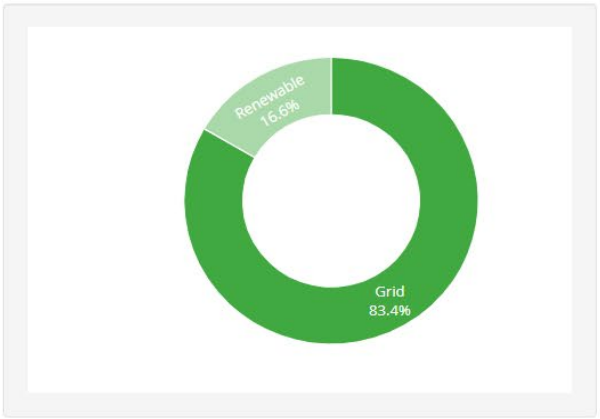
€5,280
net investment cost

Electricity





Environmental



78,821
kg's of carbon saved over 20 years

€67
per tonne of CO_2 reduction

Table 25 – Agricultural sector tractor fuel energy consumption, CO_2 and Spend

	No. of animals	Litres used per animal	Total used (litres)	Energy (kWh)	Cost	Emissions (t/CO2)
Dairy Farm	194	67	12,998	129,980	€18,327	34
Beef farm (cows)	283	15	4,245	42,450	€5,985	11
Beef farm (sheep)	120	8	960	9,600	€1,354	3
	No. of hectares	**Litres used per hectare**	**Total used (litres)**	**Energy (kWh)**	**Cost**	**Emissions (t/CO2)**
Tillage	806	180	145,080	1,450,800	€204,563	383

Total electricity used (kWh)	Total Cost	Total Emissions (t/CO2)
1,632,830	€230,229	431

Among the farming activities, tillage consumes the most fuel for tractors. This high fuel consumption is attributed to the use of heavy machinery in large-scale land cultivation. Dairy farming, despite having the highest number of animals and using significant amounts of fuel (12,998 litres), contributes less to energy usage compared to tillage. Overall, these insights show the significant influence of acreage and farming practices on energy consumption, costs, and emissions.

Crop drying and storage is the largest single item of direct fuel usage in cereal production. A high-temperature drier will consume 55 litres of fuel oil for each hectare of crop that is harvested/dried. To bring moisture from 20% to 15% typically takes about six litres of fuel (diesel) for each tonne of grain to be dried.

The improvements in management and equipment necessary to reduce the use of energy during drying and storage of crops, will lead to significant savings in cost and improved quality and value of the produce stored. Measures leading to reduction in energy may not always be cost effective because of the substantial capital investment required, but often they can be justified due to the additional benefit of improved produce quality and reduced weight loss.

Simple measures such as ensuring all controls (especially humidity) are set correctly can cut energy use by a quarter:

- grain can be efficiently stored by using on floor or bin drying systems, which use ambient air to remove the initial moisture and only then add heat to further extract moisture below 18% moisture content
- ensure equipment is well maintained, ventilation fans are the appropriate size and moisture measurements are accurate
- adding recirculation to existing crossflow driers can save up to 30% of energy usage

Table 26 – Agricultural sector CO2 emissions from animals

	No. of animals	gCO_2eq per day per avg. adult animal	Total gCO_2eq per year per avg. adult animal	Total tCO_2eq per year for herd
Dairy Farm	194	9,240	3,372,600	654
Beef farm (cows)	283	6,440	2,350,600	665
Beef farm (sheep)	120	294	107,310	13
				Total tCO2eq per year for all animals
				1,332

The technical term for methane released via ruminant animals' digestive processes is "enteric methane." Enteric methane is a type of greenhouse gas produced in the stomachs of ruminant animals, such as cattle, sheep, and pigs, during the process of digestion.

In Ireland, the agricultural sector, including enteric methane emissions from ruminant livestock, is a major contributor to overall greenhouse gas emissions. The Irish government recognizes the need to address these emissions and has initiatives in place to reduce methane emissions from livestock, such as implementing sustainable agricultural practices and research into dietary changes to mitigate methane production.

The results in the Kilbride SEC generally align with the common understanding that enteric methane emissions are influenced by factors such as animal type, size, diet, and management practices.

Dairy farms and beef farms with cows generally contribute more to total emissions due to their larger number of animals and higher emissions per animal compared to sheep. Beef cows generally tend to have slightly lower methane emissions compared to dairy cows due to their different feeding and growth patterns. Sheep typically have lower methane emissions compared to cows due to their different digestive processes and smaller size.

In an Irish context, addressing methane emissions from ruminant animals is crucial for the country's climate goals, and continued efforts to reduce these emissions through sustainable practices, research, and policy are important.

Renewable Electricity

Wind Development in the SEC

Meath County Council has signalled that it supports wind development. However, the LCA that Kilbride lies in (The Ward Lowlands), is described as having 'low potential' for wind development as per the Meath County Development Plan. Despite this, as Ireland scales up its renewable generation capacity in the coming years it would not be a major surprise if areas such as Kilbride were granted permission to set up wind turbines, so the SEC should continue to monitor the situation closely.

Proximity to substations

The use of energy is supported and influenced by the presence of specific energy infrastructure in the local area. In terms of electricity supply, Figure 11 evidences the 38kV sub stations that are within 5km of Kilbride SEC, which is generally seen as the limit on distance for any non-utility (major development) scale developments. Unfortunately, there are currently no substations present in the Kilbride SEC.

However, there is one just outside the 5km buffer, which the SEC could in theory use if they found a site in close proximity to it. Furthermore, a smaller scale project, one up to 0.5MW could connect to the Medium or Low Voltage network without the need for a direct connection to a substation, however a high level feasibility study would be required to confirm if this is possible.

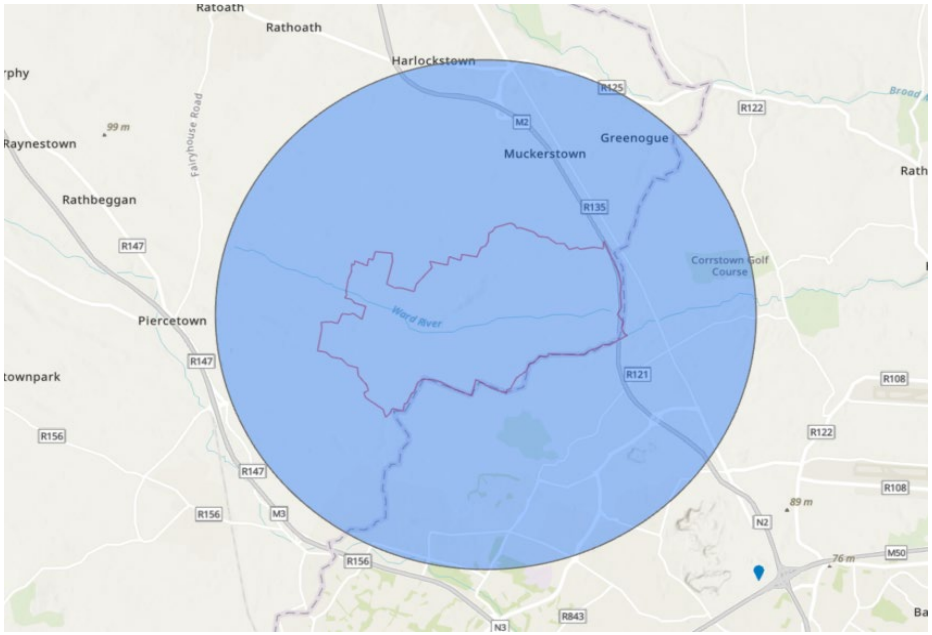


Figure 11 – Kilbride SECs proximity to existing sub stations (5km buffer). Blue points denote substations.

Residential Solar PV energy reductions

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

In order to evaluate the practical potential for Solar PV in the Kilbride SEC, we have assumed that at least 33% of homes in the SEC (58) will be suitable for Solar PV. We have also assumed optimal roof orientation, with a 30-degree tilt on a South facing roof, with only mild overshading. We have been unable to include community and commercial buildings within our analysis due to absence of data on the roof area of the buildings.

Table 27 – Overview of the Solar PV potential in the SEC if 33% of homes installed Solar PV

Solar PV system	Potential output (MWh per year)	Percentage of residential electricity demand this would cover
2 kWp	115,420	3.4 %
3 kWp	173,130	5.1 %
4 kWp	230,840	6.8 %
5 kWp	288,550	8.5 %

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

Renewable Electricity Support Scheme

The Government of Ireland has put in place a scheme called the Renewable Electricity Support Scheme (RESS)[24] which aims to deliver increased community involvement in renewable energy projects. This scheme provides financial support for renewable electricity projects of over 0.5 MW in size in the Republic of Ireland.

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

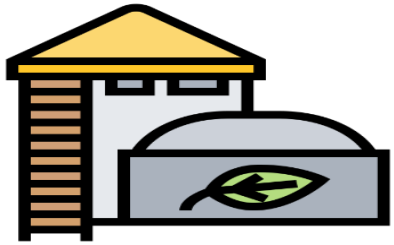
Support schemes like RESS, in place all over the world, are a way of ensuring that renewable energy technologies replace the use of fossil fuels in our economy. Communities are incentivised to invest in renewable technologies by Governments who contract to buy electricity at a guaranteed price for the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

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

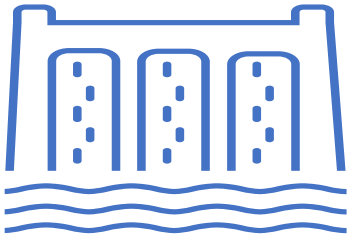
[24] https://www.dccae.gov.ie/en-ie/energy/topics/Renewable-Energy/electricity/renewable-electricity-supports/ress/Pages/default.aspx

Onshore wind turbines/solar thermal/solar PV technology

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



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



Hydroelectric

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

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

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.

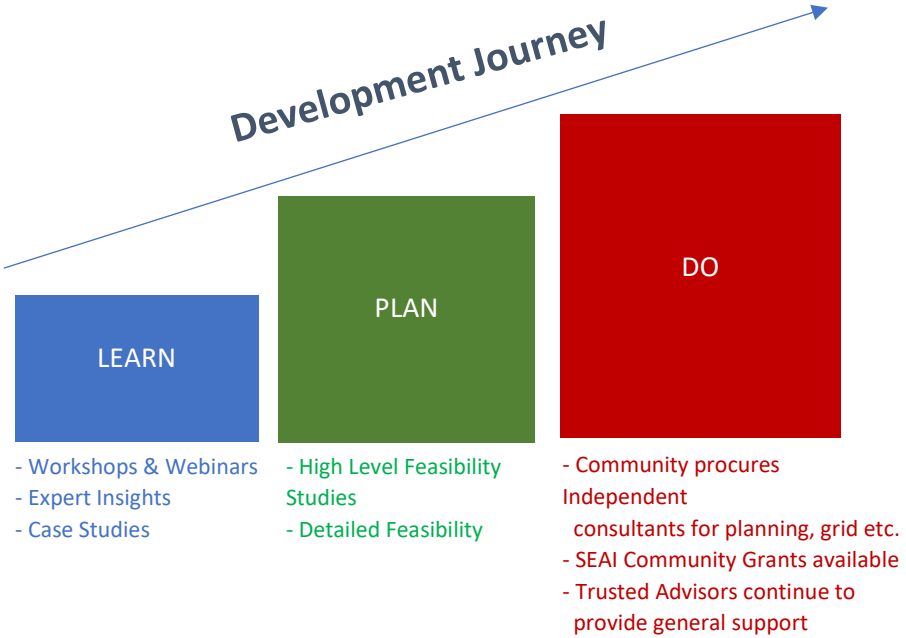
This feasibility study should look at grid capacity and constraints, planning constraints, environmental designations, and residential buffer zones around the proposed sites. One of the key community provisions as part of RESS is the Community Enabling Framework which provides end-to-end support to create 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[25]. Toolkits include: onshore wind, solar PV, the planning process and grid connection. There are several more in development. The Toolkits provides a set of guidance modules across a number of different areas (including technology options, business planning, project development stages, setting up an organisation / governance strategy) to support development and delivery of a Renewable Energy project.

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

Ballymacarney Solar project

It's worth pointing out that Irelands' largest operational solar farm sits on the doorstep of Kilbride. The Ballymacarney Solar project is based only a handful of kilometres from Kilbride and recently became Ireland's largest Solar farm, with the capacity to generate clean electricity for over 40,000 homes.

The project was planned and developed by Statkraft, a Norwegian renewable energy company with construction commencing in early 2021. Spanning over 500 acres of land, the project features a network of photovoltaic panels capable of generating 200MWp of electricity. This clean, renewable energy is integrated into the national grid, powering homes and businesses across Ireland.

The Ballymacarney Solar project will assist in achieving Ireland's national objective of reducing Ireland's carbon footprint. Moreover, the project has been designed with community engagement at its core. Local residents have been actively involved in the project's development, and Statkraft has implemented measures to minimise any potential impact on the surrounding environment. It would be hoped that this project could act as a catalyst, with the community benefit fund arising from the development incentivizing other communities to engage in the planning process for utility scale renewable energy generation projects.

Register of Opportunities (RoO)

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

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

The Register of Opportunities (RoO) is a live document used to identify, evaluate, and plan your energy projects and is **a separate document to this EMP**. The complete RoO is provided in a supplementary document to this report.The Sustainable Energy Community owns this document and is responsible for using, editing and improving the content in order to match its ambitions.
The RoO is presented in an excel workbook because some parts contain formulas to calculate financial and energy savings.

As part of the scope of works for the Energy Master Plan for Kilbride SEC, a number of domestic energy audits and non-residential audits were carried out on buildings selected within the community. Sections of the register of opportunities was generated from these audits based on the information available.

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

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

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

- Standard retrofit of around 20% of the housing stock in the community
- Deep retrofit of 30% of homes that have a BER or D or worse
- Installation of a community Electric Vehicle Charging Point
- 25% of homes to install a basic 2 kilowatt-peak roof mounted Solar PV system
- Transition from oil to electric heating panels in non-domestic buildings

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

Action Plan for Kilbride SEC

Capacity Building

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

Energy Master Plan Dissemination to Community

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

Communication and Engagement Events

Engagement with other community organisations to identify shared needs especially in the development of existing community assets for remote working may be beneficial to the greater community. The upgrading and reimagining of community buildings through BEC grants to provide remote working hubs, childcare facilities, or social hubs feeds into the DO stage of the SEC's plan.

Please refer to the sections below for more information on grants. In addition to other community groups, private sector groups such as energy project developers which have community benefit funds may be interested in providing support to the SEC, but only if they are aware of its existence.

Low Lying Fruit First

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

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

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

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

Annex A – Grant Streams

Community Grant Program

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

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

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

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

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

Community Grant Program 2023 Funding Levels

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

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

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

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

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

SEAI's Home Energy Grants

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

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

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

Free Energy Upgrade

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

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

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

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

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

Individual Energy Upgrade Grants

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

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

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

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

One Stop Shop Service

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

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

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

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

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

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

Electric Vehicles

Privately bought EVs

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

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

Commercially bought EVs

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

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

Vehicle Registration Tax

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

Home Unit Charger

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

Benefit in Kind

For commercial electric cars, Revenue provides an exemption for Benefit in Kind.[26]

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

Schools Grants

SEAI Communities Grant

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

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

Non-Domestic Microgen Grant

The Non-Domestic Microgen Grant (NDMG) provides financial assistance to help schools and other sectors to install solar PV panels to generate electricity on site. Grants are available for systems up to a maximum 1000kWp (1 Megawatt), with average potential savings of between €2,000 - €3000 annual electrical costs (depending on installation size and current utility rates). The grant amount received is based on the standard output of your solar PV system. If a larger size system is installed, then the installation will not be considered eligible to claim the NDMG grant.

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

Business grants

Green Transition Fund

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

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

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

Climate Planning Fund for Business

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

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

Enterprise Emissions Reduction Investment Fund

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

Grant Offer	Support Available
Capital investment for Energy Monitoring & Tracking (EM & T) Systems: Supporting companies to put in place monitoring and targeting systems to begin accounting for the carbon footprint of their activities	Grant rate of up to 50% of eligible costs, up to a maximum support of €50,000
Capital investment for decarbonisation processes: Supporting investment in carbon reducing technologies in manufacturing combustion processes	Max. grant rate of 30-50%, dependent on company size, up to a maximum support of €1m
Innovation Vouchers: Providing assistance to SMEs to explore a business opportunity or problem with a registered knowledge provider in the areas of sustainability and decarbonisation	€5,000 per company
Exploring Innovation: Grant to support planning of research, development or innovation projects in the areas of sustainability and decarbonisation	Grant rate of up to 50% of eligible costs. Typical maximum support of €35k
Research & Development: Supporting the development of new or substantially improved products, services or processes, in the areas of sustainability and decarbonisation	Grant rates depend on project type and company size
Agile Innovation: Supporting the development of new or substantially improved products, services or processes, in the areas of sustainability and decarbonisation	Grant rate of up to 50% of eligible costs.

Support Scheme for Energy Audits

SEAI are currently running an energy audit scheme that offers SMEs a €2,000 voucher towards the cost of a high-quality energy audit [27]. 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.

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

Non-Domestic Microgen Grant

The Non-Domestic Microgen Grant (NDMG) provides financial assistance to help businesses and other sectors to install solar PV panels to generate electricity on site. This technology reduces commercial electricity costs and increases security of supply, while enhancing a positive sustainability image. Grants are available for systems up to a maximum 6kWp * (Approx. 16 Panels or 25m²) with potential savings of between €2,000 - €3000 annual electrical costs (depending on installation size and current utility rates).

* The maximum installation of 6kWp (kilowatt peak) is calculated by adding the rated output of all the panels on your building. If you have a 400W rated panel, you can have a maximum of 15 panels (400 x 15 = 6000W (6kWp))

Solar PV System	Grant Value
1kWp	€900
2kWp	€1,800
3kWp	€2,100
4kWp	€2,400
5kWp	€2,400
6kWp	€2,400
A typical 6kWp Solar PV system installed typically consists of 16-18 panels with an overall area of 25m²	

EXEED

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

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

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

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

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

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

SSRH (Support Scheme for Renewable Heating)

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

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

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

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

Heat pump installation grant

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

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

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

Accelerated Capital Allowance (ACA)

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

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

Eligibility for ACA

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

Equipment use

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

Time period

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

Eligible costs and minimum expenditure

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

How to claim the ACA

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

Financial supports for companies purchasing EVs

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

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

Dairy Farm grants

As of May 2023 some of the key grants for dairy farmers are:

Grant	% Offered	Notes
Dairy Equipment Scheme (DES)	40% with a €90,000 investment ceiling	This scheme provides grant aid to farmers who are upgrading or investing in new dairy equipment.
Young Farmer Capital Investment Scheme	60% of the eligible cost, with a maximum grant of €60,000	This scheme provides grant aid to young farmers who are starting out in farming or expanding their farm enterprise.
Solar Capital Investment Scheme (SCIS)	60% grant rate, with a €90,000 investment ceiling that is separate from other schemes	This scheme provides grant aid to farmers to get Solar PV installed up to 62kW to offset their electricity costs and consumption.
Women Farmer Capital Investment Scheme (WFCIS)	60% grant rate, with a €90,000 investment ceiling	This scheme provides grant aid to female farmers who are expanding their farm enterprise.

Annex B – Home Energy Assessments

Home Energy Upgrade Advisory Report

Start your journey to

Upgrade your home!

Detached house

Dwelling Floor Area: 155.74m² **Construction Year: 1970**

Energy Rating & Planning Services

Your journey from **BER C3** to **BER A2**

Your upgrades explained:

The upgrades specified below are calculated to meet One-Stop-Shop requirements, however each element can be selected individually should you wish to avail of SEAI's individual grants. To qualify for a One-Stop-Shop SEAI grant approval, your house will need to reach a 100 kWh per m² per year uplift as a result of the overall upgrades and reach a minimum BER rating of B2 or higher. Your home must have an existing BER rating of B3 or lower to qualify for One-Stop-Shop grants and be constructed before 2011 generally. The different measures advised show the cumulative impact of the applying improvements to your home.

Is dwelling one-stop shop ready?

100 kWh/m²/yr Uplift	✓
HLI below 2.0 W/K.m²	✓
Rating B2 or higher after upgrades	✓
Constructed before 2011	✓

Potential impact of the **recommended energy upgrades**

Energy Upgrade	% Saving	HLI	Uplift	Energy Value	CO_2	BER Rating
	%	W/K.m²	kWh/m²/yr	kWh/m²/yr	$KgCO_2/m^2/yr$	-
Current State	-	3.10	-	210.2	45.7	C3
Attic Insulation	14.0%	2.79	29.4	180.8	39.8	C2
All flat ceiling areas - Add 325mm quilt insulation to existing 75mm quilt insulation laid perpendicular - U Value 0.11 W/m²K.						
Walls	3.4%	2.61	36.5	173.7	38.8	C1
Heat loss external cavity wall to the back of the living room to be fully filled with bonded bead insulation and fitted with 100mm external insulation - U Value 0.27 W/m²K. Semi-exposed solid block wall at the side of the garage to be fitted with 50mm PIR - U Value 0.27 W/m²K.						
Windows	4.6%	2.42	46.1	164.1	38.0	C1
Fit 4 new energy efficient windows to replace the 4 single glazed windows at the back of the house to U Value 0.85 W/m²K or better						
Door	0.4%	2.41	47.1	163.2	37.0	C1
Fit new energy efficient doors, replacing the single glazed door at the back of the house and side door beside garage to U Value 1.2 W/m²K or better						
Chimney	4.4%	2.33	56.4	153.8	36.6	C1
Remove stove and block up flue. Ensure mechanical extract fans in wetrooms.						
Air Tightness	1.6%	2.29	59.6	150.6	36.0	C1
Improve Air permeability to approximately 3 m³/m²/hr or better by getting air test done and addressing all leakage areas and re test. Attics sealed						
Mechanical Ventilation	-0.5%	2.28	58.6	151.6	36.4	C1
Install a whole house extract mechanical ventilation system with rigid ducting and fans in all wet rooms. (Vent Axia Sentinal used in this assessment.)						
Air Source Heat Pump	45.5%	2.28	154.1	56.1	7.2	A3
Install an Air to Water Heat Pump (Mitsubishi 8.5 kW unit used in this assessment) with time and temperature zone control. Heat Pump must be specified by Designer/Installer. Ensure low temperature radiators are installed throughout.						
Possible Additional Energy Upgrades						
Solar PV	14.4%	2.28	181.9	28.3	3.6	A2
Add 8 No. PV Panels to South facing roof 2.47 kWp (assuming 360 watts per panel)						

Your retrofitted home's energy performance:

BER	Annual Estimated Space Heating Energy bill	% Savings	CO_2	HLI
A2	€547	87.8%	6.5 tonnes	2.28

Home Energy Upgrade Advisory Report

Start your journey to

Upgrade your home!

Detached house

Dwelling Floor Area: 155.74 m²

Your upgrades explained:

To ensure that your Heat Pump system is installed according to relevant guidelines and operates efficiently, your home will need certain upgrades to its fabric and ventilation elements to minimise heat loss.

Such upgrades allow it to operate at lower space heating distribution temperatures and to meet most or all the space and water heat demand. Additionally, as the size of your house is unique the Heat Pump selected must be specified by the installer and/or manufacturer.

This means that the BER rating of your house must reach a minimum '*Heat Loss Indicator*' or HLI. This should be less than or equal to 2.00 W/K.m². This is usually explained in a Technical Assessment report specific to your home.

Package of your energy upgrades to save money make your home comfortable and protect the environment

Recommended Energy Upgrade	Building Element Qualities	% Uplift	One Stop Shop Grants	SEAI Individual Grants
	-	%	€	€
Attic Insulation	152.74 m²	14.0%	€1,500	€1,500
Walls	25.50 m²	3.4%	-	-
Windows	7.04 m²	4.6%	-	-
Door	3.73 m²	0.4%	€800	-
Chimney	1 No.	4.4%	-	-
Air Tightness	Item	1.6%	€1,000	-
Mechanical Ventilation	Item	-0.5%	€1,500	-
Air Source Heat Pump	Item	45.5%	€8,500	€6,500
Solar PV	2	14.4%	€1,800	€1,800
After all upgrades		87.8%	€15,100	€9,800

Notes:

1. While in some cases, a Heat Pump system can be installed with a HLI between 2.0 and 2.3 provided certain conditions are met, which your home energy advisor will advise you

2. A grant for this type of upgrade is available at the time of publication of this report. Grant availability is subject to eligibility criteria, and should be checked to see if the works to your own home meet the eligibility criteria. Eligibility criteria are subject to change

3. An additional €1,000-2,000 may be available through SEAI grants if the designer installer of the Heat Pump system recommends new radiators.

Grants Available?

subject to availability, terms and conditions

Home Energy Upgrade Advisory Report

Start your journey to

Upgrade your home!

Detached house

Dwelling Floor Area: 273.07m² **Construction Year: 1990**

Energy Rating & Planning Services

Your journey from BER C1 to BER A1

Your upgrades explained:

The upgrades specified below are calculated to meet One-Stop-Shop requirements, however each element can be selected individually should you wish to avail of SEAI's individual grants. To qualify for a One-Stop-Shop SEAI grant approval, your house will need to reach a 100 kWh per m² per year uplift as a result of the overall upgrades and reach a minimum BER rating of B2 or higher. Your home must have an existing BER rating of B3 or lower to qualify for One-Stop-Shop grants and be constructed before 2011 generally. The different measures advised show the cumulative impact of the applying improvements to your home.

Is dwelling one-stop shop ready?

100 kWh/m²/yr Uplift	✓
HLI below 2.0 W/K.m²	✓
Rating B2 or higher after upgrades	✓
Constructed before 2011	✓

Potential impact of the **recommended energy upgrades**

Energy Upgrade	% Saving	HLI	Uplift	Energy Value	CO_2	BER Rating
	%	W/K.m²	kWh/m²/yr	kWh/m²/yr	$KgCO_2/m^2/yr$	-
Current State	-	2.33	-	171.6	43.2	C1
Attic Insulation	0.7%	2.31	1.3	170.3	42.8	C1
Flat ceiling area at first floor - Add 150mm quilt insulation to existing 150mm quilt insulation laid perpendicular - U Value 0.13 W/m²K.						
Walls	9.9%	2.10	18.3	153.2	38.4	C1
Heat loss external cavity walls to be fully filled with bonded bead insulation - U Value 0.30 W/m²K.						
Windows	11.6%	1.75	38.3	133.3	33.3	B3
Fit new energy efficient windows throughout to U Value 0.85 W/m²K or better						
Doors	0.7%	1.73	39.4	132.1	33.0	B3
Fit new energy efficient doors to U Value 1.2 W/m²K or better						
Chimney	2.6%	1.73	43.9	127.6	30.7	B3
Remove open fire and block up chimney. Ensure mechanical extract fans in wetrooms.						
Air Source Heat Pump	52.8%	1.73	134.4	37.1	4.8	A2
Install an Air to Water Heat Pump (Mitsubishl 12.0 kW unit used in this assessment) with time and temperature zone control. Heat Pump must be specified by Designer/Installer. Ensure low temperature radiators are installed throughout.						
Possible Additional Energy Upgrades						
Air Tightness	0.9%	1.65	136.0	35.5	4.6	A2
Improve Air permeability to approximately 5 m³/m²/hr or better by getting air test done and addressing all leakage areas and re test. Attics sealed						
Mechanical Ventilation	-0.5%	1.61	135.2	36.4	4.7	A2
Install a whole house extract mechanical ventilation system with rigid ducting and fans in all wet rooms. (Vent Axia Sentinal used in this assessment.)						
Solar PV	9.3%	1.61	151.0	20.5	2.6	A1
Add 8 No. PV Panels to South facing roof 2.47 kWp (assuming 360 watts per panel)						

Your retrofitted home's energy performance:

BER	Annual Estimated Space Heating Energy bill	% Savings	CO_2	HLI
A1	€540	88.0%	11.1 tonnes	1.61

Home Energy Upgrade Advisory Report

Start your journey to

Upgrade your home!

Detached house

Dwelling Floor Area: 273.07 m²

Your upgrades explained:

To ensure that your Heat Pump system is installed according to relevant guidelines and operates efficiently, your home will need certain upgrades to its fabric and ventilation elements to minimise heat loss.

Such upgrades allow it to operate at lower space heating distribution temperatures and to meet most or all the space and water heat demand. Additionally, as the size of your house is unique the Heat Pump selected must be specified by the installer and/or manufacturer.

This means that the BER rating of your house must reach a minimum '*Heat Loss Indicator*' or HLI. This should be less than or equal to 2.00 W/K.m². This is usually explained in a Technical Assessment report specific to your home.

Package of your energy upgrades to save money make your home comfortable and protect the environment

Recommended Energy Upgrade	Building Element Qualities	% Uplift	One Stop Shop Grants	SEAI Individual Grants
	-	%	€	€
Attic Insulation	33.68 m²	0.7%	€1,500	€1,500
Walls	200.04 m²	9.9%	€1,700	€1,700
Windows	55.98 m²	11.6%	€4,000	-
Doors	2.10 m²	0.7%	€800	-
Chimney	1 No.	2.6%	-	-
Air Source Heat Pump	Item	52.8%	€8,500	€6,500
Air Tightness	Item	0.9%	€1,000	-
Mechanical Ventilation	Item	-0.5%	€1,500	-
Solar PV	2	9.3%	€1,800	€1,800
After all upgrades		88.0%	€20,800	€11,500

Notes:

1. While in some cases, a Heat Pump system can be installed with a HLI between 2.0 and 2.3 provided certain conditions are met, which your home energy advisor will advise you

2. A grant for this type of upgrade is available at the time of publication of this report. Grant availability is subject to eligibility criteria, and should be checked to see if the works to your own home meet the eligibility criteria. Eligibility criteria are subject to change

3. An additional €1,000-2,000 may be available through SEAI grants if the designer installer of the Heat Pump system recommends new radiators.

Grants Available?

subject to availability, terms and conditions