BETTYSTOWN ENERGY MASTER PLAN

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Contents

Bettystown profile

Bettystown, previously known as Betaghstown, is a town in an area known as East Meath within County Meath, notable for its close location to several beaches. Bettystown is located approximately 50 km north of Dublin and 35 km north of Dublin Airport. The town is 8 km Southeast of Drogheda and is designated as a small town by the Meath Development Plan.

A picturesque shoreline and proximity to Dublin means that Bettystown is a well-connected and thriving commuter town. During the Celtic Tiger, with increasing property prices in Dublin, Bettystown expanded to cater for large numbers of commuters to Dublin. This has been reflected in the area's population growth, which has almost doubled since the start of the century. Together with the neighbouring villages of Laytown and Mornington it comprises the census town of Laytown-Bettystown-Mornington which had a combined population of 11,872 (with Donacarney) at the 2016 Census.

To complement Bettystown's population increase have come new housing developments and transport links. It's now served as well as many Dublin suburbs and, thanks to city traffic, has a shorter journey time to boot. The town also acts as a focal point for many of the smaller dormitory towns that are located in East Meath due to its accessibility via the M1 and the train station in nearby Laytown.

Before the huge increases in residential development, Bettystown was known as a summer holiday destination, particularly for visitors from Dublin, with a number of caravan parks and seaside amusements. The main attraction is its long beach, stretching from the River Boyne on the border of County Meath and County Louth in the north down to the River Nanny at Laytown to the South.

However, that's not its only claim to fame. The town became popular amongst archaeologists in 1850 when a Celtic brooch, dating back to 710-750 AD, was found on its shores. This brooch was a wonderful example of Viking crafting skills and is now known as the Tara Brooch and can be seen today in the National Museum of Ireland in Dublin.

In recent years Bettystown along with Meath County Council have realised the importance of improving the town centre in order to better connect it with its impressive natural amenities. The vision of the town is to "Improve the public realm through a reorganisation of the centre of the town with better connections to the beach. Parking should be better organised along the main routes with enhanced gateways to the town and the identification of opportunities for regeneration.". It is hoped that through a joint Public Realm Plan with Laytown that Bettystown can become a more attractive town for its residents whilst also promoting environmentally and socially sustainable principles such as active travel and community interaction.

Glossary of Terms

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Units

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

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

Ireland's Climate Action Plan 2021

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

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

- Targets for each sector of the economy will be updated annually, including in 2022, to ensure alignment with the governments' legally binding economy-wide carbon budgets and sectoral ceilings

- Whilst all the sectors referenced in Table 1 are relevant in some form or another to this EMP, of particular importance are the Electricity, Transport and the Built environment sectors, which feature prominently in the report

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

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

- One of the standout targets for the Electricity sector which is particularly relevant for the Bettystown 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 Electric Vehicles will cover 40% of car journeys by 2030. Conversely, public and active transport services will receive heavy investment, enabling an additional 500,000 daily journeys

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

Energy Master Plan Summary

To assist in achieving the Bettystown 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 Bettystown 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 utilizing 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, Commercial, Transport) energy consumption, energy cost and contribution to CO2 emissions in the Bettystown SEC, followed by a brief discussion on how the SEC compares to national averages.

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

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

Reviewing the natural resources available to the community, high level analysis is provided on various renewable energy technologies that the community could further pursue. A wide range of natural resources are often within a community's grasp, however the understanding of how to progress from a concept through to reality can be an enormous barrier.

This EMP outlines the processes required by the SEC to quantify what these resources can offer, alongside how renewable projects can transition from an idea to a system that is owned by the community, contributing to the sustainable, decarbonisation of the area.

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

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

Additionally, the EMP can also be used as a mechanism to increase awareness in energy efficiency. This process begins through the interactive community survey issued, meetings with the SEC committee, energy audits of commercial 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 17 Small Area Plans [1] which are defined by the Central Statistics Office (CSO) and are shown below in Figure 1.

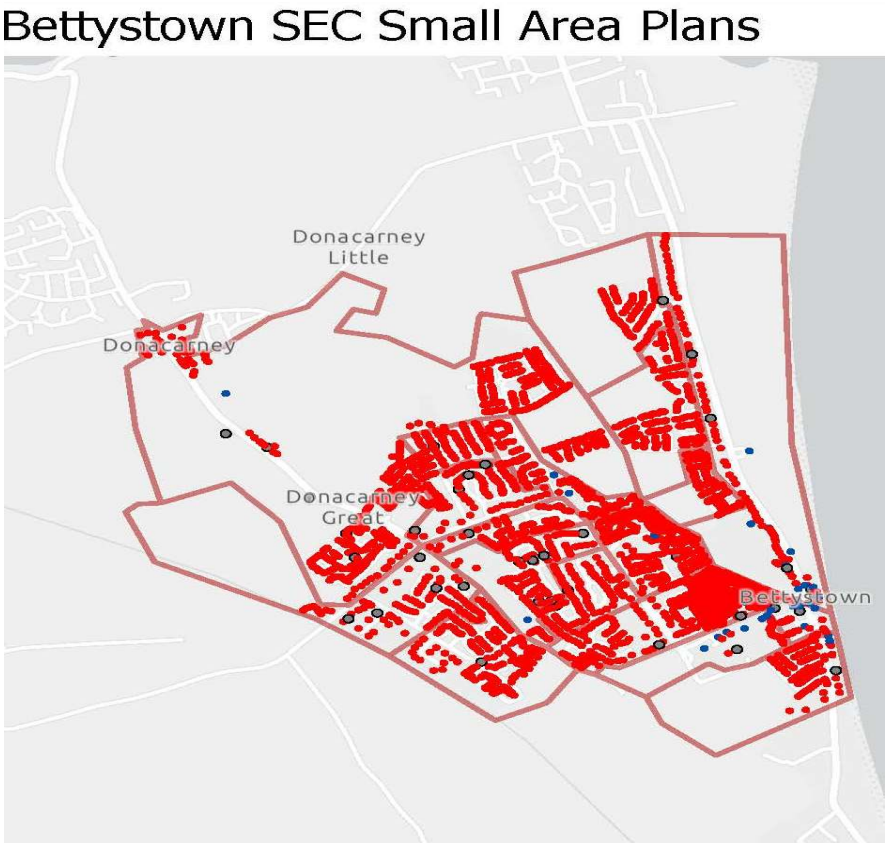


Figure 1 - The image depicts the area covered by Bettystown SEC. This was generated using the Small Areas as defined by the Central Statistics Office (CSO SAPMAP 2016).

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

Executive Summary

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

Table 2 – SEC Total Energy, CO_2 and Cost Analysis

	ELECTRICITY	FOSSIL FUELS	TRANSPORT	TOTAL
ENERGY MWh	21,158	30,496	20,084	71,738
CO2 EMISSIONS tCO2	6,974	6,603	4,737	18,314
TOTAL ENERGY COST	€2,145,565	€3,301,705	€2,428,737	€7,876,007

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

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

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

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

Table 3 – Sectoral percentage energy consumption

Bettystown SEC Primary Energy Baseline (kWh)				
Sector	**Electricity**	**Fossil Fuel**	**Renewable**	**Total** (MW)
Residential	18,348,517	27,202,104	45,820	45,596
Non-residential	2,809,285	3,293,880		6,103
Transport	29,268	18,752,260	1,302,498	20,084
Total Energy	21,187,071	49,248,244	1,348,318	71,784

Our analysis of the energy consumption within the catchment area has been identified that 63.5% of the energy demand relates to the residential sector, 8.5% in the commercial sector and approximately 28% relates to the Transport sector.

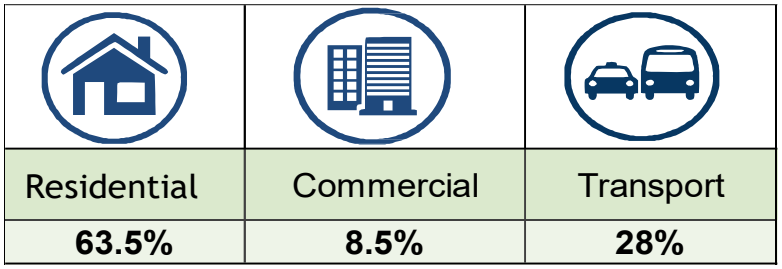


Figure 2 – Primary Energy percentage per sector

Residential sector

Background

The Residential sector is one of the largest emitting sectors in Ireland, accounting for 29% of CO_2 emissions and roughly a quarter of the energy used in Ireland as per 2020 estimates from SEAI. Therefore, if communities want to make progress towards individual targets, as well as contributing to the national target of reducing all CO_2 emissions 51% by 2030, it is vital this sector is given particularly close focus.

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

The momentum within the country has been to ensure that as many homes as possible upgrade their homes insulation ahead of 2030, with the Irish Government setting the ambitious target of 'retrofitting' 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 Bettystown SEC based upon Housing age, occupancy, ownership and type.

Furthermore, the fuels used to heat homes within the Bettystown SEC are analysed for their emissions in tonnes of CO2 equivalent. The fuel mix can have a significant impact on the carbon footprint of a community as each fuel type has its own associated CO2 output. For example, coal produces approximately 0.4kg and 0.3kg of CO2 for every kilowatt hour of energy delivered, compared to just over 0.2kg for natural gas.

The BER is based upon the provision of space heating, water heating for domestic purposes, ventilation, and lighting. The BER does not include what are called point load consumption such as plugged-in electrical appliances. An excellent reference which provides a breakdown of all energy used in the home is the "SEAI Energy in the Residential Sector 2018 Report.

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

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

Method

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

The residential housing stock is based on a baseline year of 2016 and a breakdown of the number of residential units which are vacant or classified as holiday homes is derived from the Eircode Database which is based on a baseline year of 2021.

The SEAI Building Energy Rating (BER) Map shown in Figure 8 displays colour coded 'Small Areas' of the Bettystown SEC. The colour of a given small area represents the BER of the median geo-located dwelling in that small area. The map only contains BER Information at the Small Area level for dwellings that have had a BER completed.

The medians were derived from all geo-located dwellings with a BER in that particular Small Area. For example, Small Areas that are green represent areas with a 'good' median BER. Small Areas with dwellings that have a poor median BER are either red or purple. SEAI's corresponding prices and emission factors as of 2020 were applied to calculate the total spend and CO_2 emissions for various sources of energy and heating.

Results and Analysis

Housing Ownership

Within the catchment area approximately 74.3% of the housing is owner occupied. With a 24.3% 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 implementing from 2025.

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

Table 4 – Percentage of homes owned outright by owner

Occupancy type	No. of homes	% of homes
Owned with mortgage or loan	915	50.0%
Owned outright	445	24.3%
Rented from private landlord	349	19.1%
Rented from Local Authority	37	2.0%
Rented from voluntary/co-operative housing body	11	0.6%
Occupied free of rent	10	0.5%
Not stated	62	3.4%
Total	**1829**	**100%**

Housing Type

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

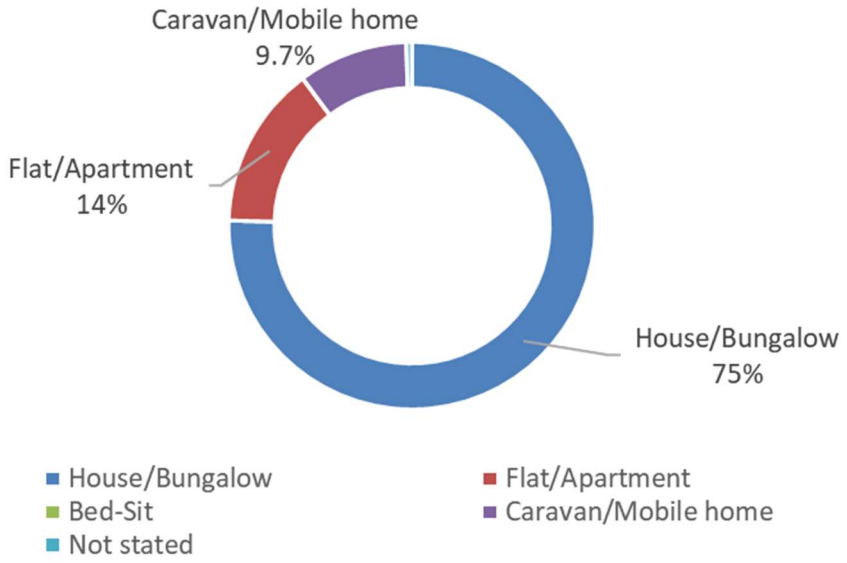


Figure 3 - Housing Stock percentage type

Housing Age

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

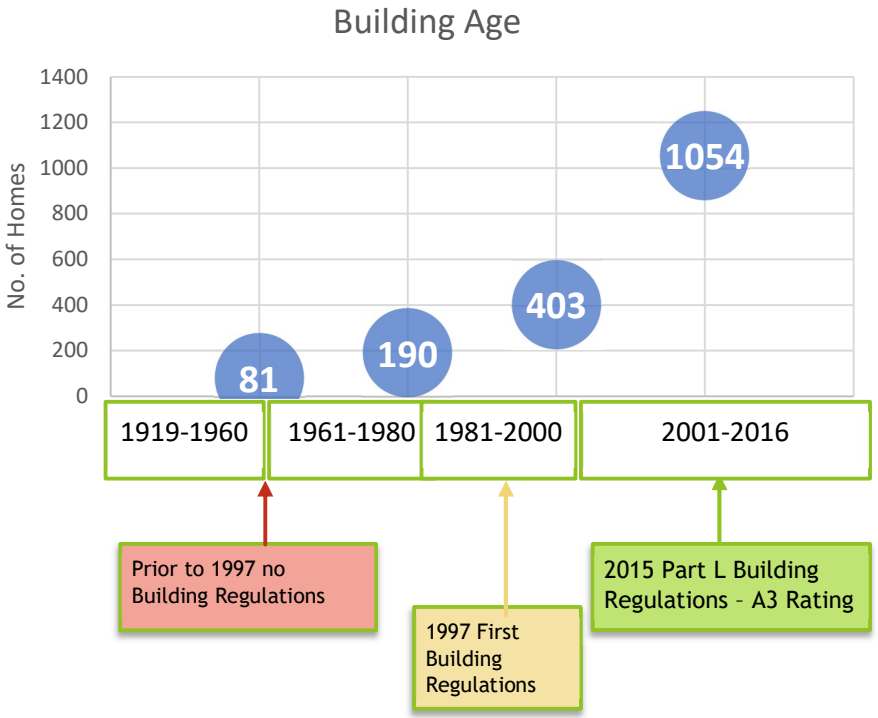


Figure 4 - Relationship between Dwelling Age and Irish Building Regulations

Within the catchment area there is a good mix of housing age types which will each require different energy efficiency measures to achieve a more energy efficient housing stock. 57.6% of Bettystown's housing stock would be considered modern having been constructed after the year 2000, which indicates that measures such as cavity insulation improvements and attic insulation can be promoted.

Housing which was constructed prior to the introduction of the building regulations tended to be solid wall or hollow block construction which is unsuitable for cavity insulation due to the lack of a suitable cavity. These buildings tend to be more suited to internal or external insulation measures[3].

With 18.3% of dwellings having been constructed from pre 1919 – 1990, this strongly indicates that only a small number of homes will require major changes to improve energy efficiency and reduce their energy requirements. However, the types of buildings within lower age bands present many challenges due to the historic construction methods applied from their era and the materials used, alongside the important significance associated with preserving the heritage of these homes.

Table 5 – Age profile of the Bettystown SEC housing stock

Period	No. of homes	% of homes
Pre 1919	35	1.9%
1919 - 1945	19	1.0%
1946 - 1960	27	1.5%
1961 - 1970	49	2.7%
1971 - 1980	141	7.7%
1981 - 1990	63	3.4%
1991 - 2000	340	18.6%
2001 - 2010	1016	55.5%
2011 or later	38	2.1%
Not stated	101	5.5%
Total	**1829**	**100%**

Housing Fuel Mix

The residential fuel mix as illustrated in Table 6 provides a breakdown of the different types of fuel sources used in the community for the heating of residential properties. The CO_2 Emissions associated with Bettystown 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 energy efficiency measures and to provide the remaining heat requirements from low or natural CO_2 producing fuel sources.

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

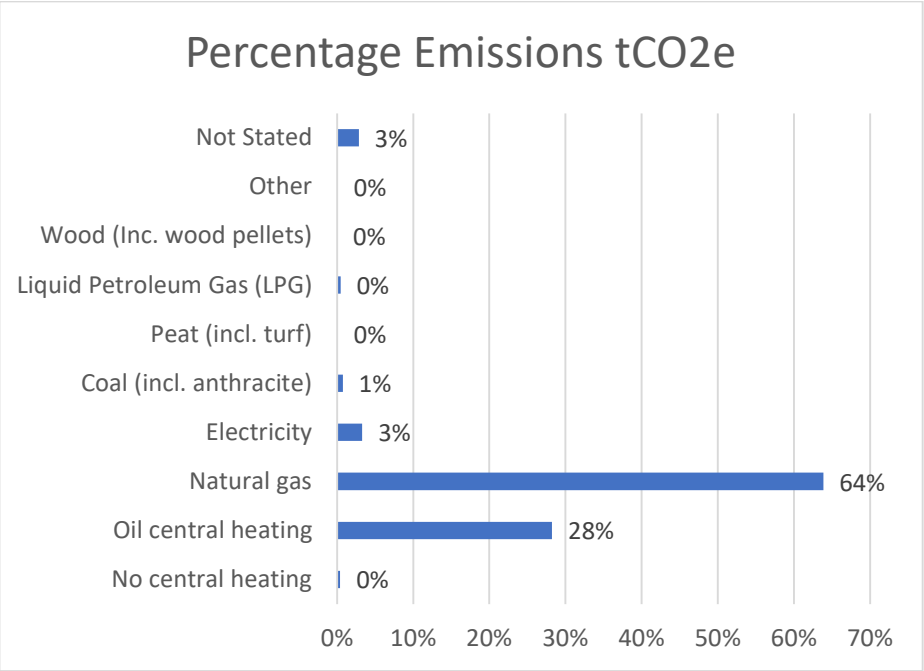


Figure 5 - Percentage emissions in tCO_2e

Within Bettystown SEC, the main fuel types currently are natural gas and oil which make up 94% of the total thermal energy consumed. Combined these two fuel types make up 92% 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 6 - Residential Fuel Mix[5]

Heating Type	No. of Units	Fuel	% of Total Thermal Energy	Thermal TFC (kWh)	Emissions tCO2e
No central heating	6	Oil[4]	0%	83,310	22.0
Oil central heating	433	Oil	24%	6,012,205	1586.6
Natural gas	1278	Natural Gas	70%	17,745,030	3588.0
Electricity	45	Electricity	2%	624,825	184.8
Coal (incl. anthracite)	9	Coal	0%	124,965	42.6
Peat (incl. turf)	1	Peat	0%	13,885	4.9
(LPG) Liquid Petroleum Gas	8	LPG	0%	111,080	25.5
Wood (Inc. wood pellets)	3	Wood Pellets	0%	41,655	0.0
Other	1	Other	0%	13,885	3.6
Not Stated	45	Other	2%	624,825	160.6
Totals	**1,829**			**25,395,665**	**5,619**

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, however this figure is based upon a limited number of buildings which have had BER's carried out on them and should be reviewed in that context.

[4] 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.

[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.

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

Of the 1,829 homes registered within the heatmap catchment of the Bettystown SEC region, a very impressive 50%[6] of these homes have Building Energy Rating certificates.

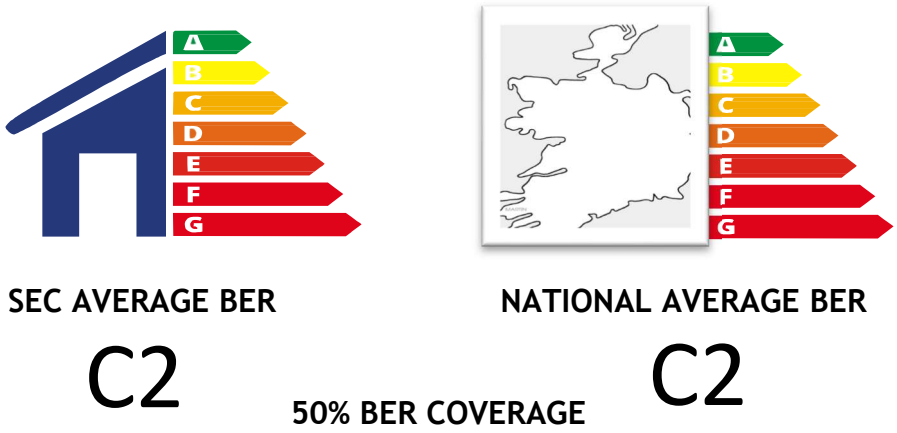


Figure 6 - Building Energy Rating information on catchment

The number of dwellings in Bettystown with a BER of B or greater is higher than the national average (14% vs 11%), however it is still equal to the national average for its overall BER.

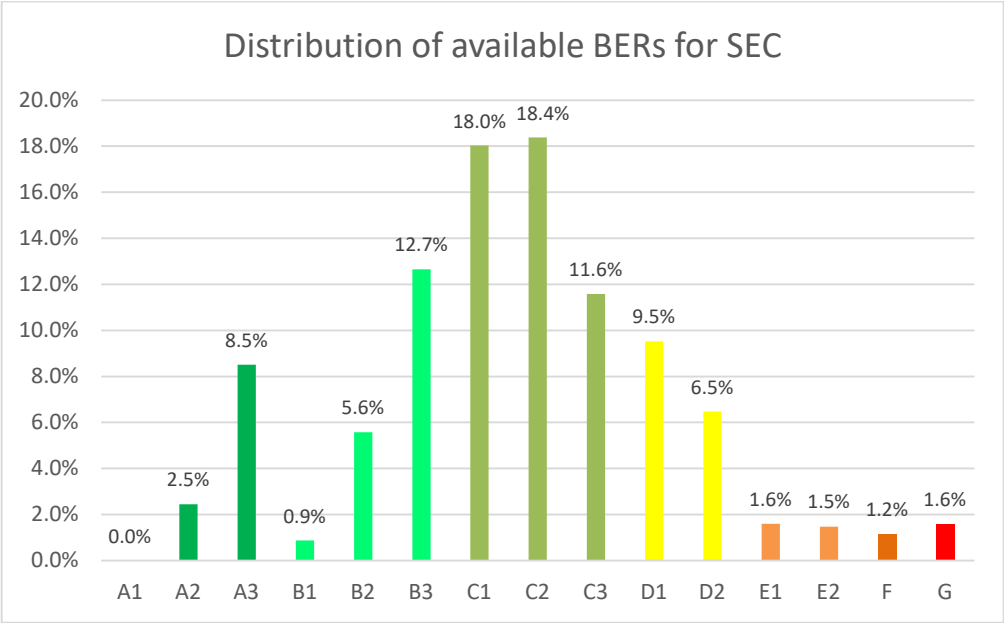


Figure 7 – Distribution of available BERs for Bettystown SEC

The chart above indicates that Building Energy Ratings for a large volume of Bettystown SEC's residential building stock ranges from a C1 to an D2, 64% collectively, with such dwellings requiring between 150-300 kWh/m2/yr. of energy.[7] The chart above indicates that 82.6% of the housing stock in the Bettystown SEC are below the Irish Government's target BER B2. However, of that total, approximately 60.7% 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.

[6] Please note that the SEC average BER is based upon 42% of the building stock within the catchment area which currently has a Building Energy Rating (BER) associated with it. The average BER may be lower based on the fact that buildings are legally required to get a BER carried out when they are sold, leased or rented or when the client is getting grant aided work carried out on the property.

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

It's interesting for SECs to see how each subsection of their community fares in terms of BERs. This can reveal insights into fuel poverty and nudges decision makers towards those areas in need of most investment. The map below of the Bettystown SEC illustrates the median BER's which have been recorded in each Small Area Plan.

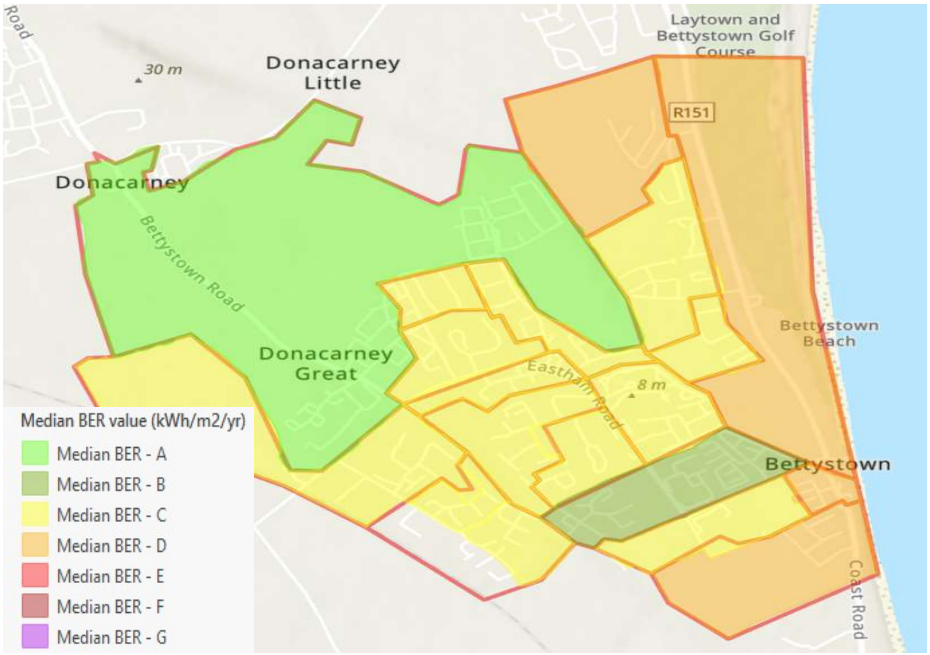


Figure 8 - Map of Median BER in SEC Catchment Area

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

[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.

Residential Energy Baseline

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

Table 7 - Residential Energy, CO_2 and Spend [8]

	Electricity	Fossil Fuel	Renewable	Total
Total Primary Energy (kWh)	18,348,517	27,202,104	45,821	45,596,441
Total CO_2 (tonnes)	5,427	5,977	0	11,405
Total Spend (€)	€1,662,649	€633,662	€3,149	€2,299,460

For homeowners who wish to upgrade their BER's, The Sustainable Energy Authority of Ireland (SEAI) provides financial incentives to homeowners in the form of grants and supports, details of which can be found in the Appendices. It's important that homeowners are supported throughout the application process, so that they are investing in measures that are appropriate for their home. Whilst the costs of many of the retrofit measures associated with improving a home's energy efficiency may appear prohibitive on the surface for both lower income groups and landlords alike, SEAI's new 'National Retrofitting Scheme'[9] has meant home upgrades are more achievable for homeowners than ever before.

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

For example, homeowners can now avail of grants equivalent to 80% of the typical cost for attic and cavity wall insulation, with an upper limit of €2,500. These measures have been shown to improve energy efficiency significantly within typical Irish homes and should be an affordable measure for the majority of homeowners in Bettystown 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 €109 million has been provided for this scheme this year. The scheme will target the least energy efficient properties, by prioritising homes that were built and occupied before 1993 and have a pre-works BER of E, F or G. Applications will also be accepted from qualifying homeowners who previously received supports under the scheme, but who could still benefit from even deeper measures.

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

Please see the Appendix Section for a Summary of these grants

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

Retrofit Case Studies

Background

The momentum within the country has been to upgrade the fabric of buildings so that heat pumps can be utilised as the primary heating source. However, in order for heat pumps to be a viable option, buildings need to be insulated to a level where they have a Heat Loss indicator of 2.0 or less. SEAI define these dwellings as being 'heat pump ready' [11]. If properties are not insulated to an adequately high level, then this technology is not suitable as a primary heat source.

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

Method

As part of the Energy Master Plan 10 residential properties were selected within the community for energy assessments using the Building Energy Rating system.

The audits were carried out in July 2022. In conjunction with the Building Energy Rating, an uplift report was produced for each property indicating the works which would provide an increase in the energy rating of the building up to at least A3. The individual building information has been redacted from the following case studies for the privacy of the homeowners. The following table illustrates the spread of buildings which were reviewed.

Table 8 – Residential Building Energy Rating and possible uplift.

Building No.	Building Size m2	Existing BER Rating	Measures No.	Possible BER Uplift
1	112	C1	9	A1
2	85	D1	9	A1
3	160	B2	9	A1
4	151	D1	9	A1
5	167	B3	9	A1
6	169	C2	9	A1
7	204	D2	9	A2
8	142	B3	6	A2
9	80	B3	7	A1
10	125	C2	9	A2

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

[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.

Dwelling Type Storey with lower ground floor with 4 Bedrooms and 2 Living rooms- Detached Dwelling

Total Building Area: M2 229

D1

	Element	BER Rating	Energy Value (kWh/m2/yr)	Co2 Emissions KgCO2/m2/yr)	Energy Savings	Total Annual Space Heating kWh/yr	Space Heating in Kw/hour	Heat Loss Indicator (HLI) w/km2	Space Heating costs per year	Carbon Emissions	
	Dwelling Current Condition	**D1**	**237.31**	**59.31**	-	**39,094**	**20.36**	**2.79**	€4,691.28	13,581	

	Element	BER Rating	Energy Value (kWh/m2/yr)	Co2 Emissions KgCO2/m2/yr)	% Energy Saving %	Total Annual Space Heating kWh/yr	Energy Requirement per hour for space Heating Kwh/Hour	Heat Loss Indicator (HLI)	Space Heating Cost per year €	Overall Carbon Emission KgCo2/Year KgCO2/year	
1	**Ventilation**	Instal mechanical extract ventilation system to dwelling :example https://www.vent-axia.com/range/centralised-mechanical-extract-ventilation-mev	D1	239.54	59.88	**-0.94%**	36,565	**19.04**	2.82	€4,387.80	13,712
2	**Roof Insulation**	Add 200mm quilt insulation to existing 100mm quilt insulation laid perpendicular to existing U Value 0.13 w/m2k	D1	226.25	56.45	**4.66%**	36,797	**19.17**	2.65	€4,415.64	12,926
3	**External Walls**	Full fill bonded bead added to existing partially filled cavity walls with Kore silver bead or equal. U Value 0.37 w/m2k Semi exopsed walls in lower ground floor fitted with 100mm PIR u Value 0.27 w/m2k	C3	205.33	51.06	**8.82%**	32,442	**16.90**	2.39	€3,893.04	11,692
4	**Windows and Doors**	Fit new energyefficient windows and doors thoughout to U Value 1.20 w/m2k or better - Windows and doors to conservatory to stay in place.	C2	186.73	46.27	**7.84%**	28,571	**14.88**	2.09	€3,428.52	10,595
5	**Chimneys**	Block up 2 chimneys in dwelling and remove open fires.	C2	180.12	43.21	**10.62%**	27,195	**14.16**	2.06	€3,263.40	9,895
6	**Airtightness**	Improve Air permeability to approximately 7 m3/m2/hr by getting air test done and addressing all leakage areas and re test.	C1	175.16	41.97	**2.09%**	26,162	**13.63**	2.00	€3,139.44	9,611
7	**New Boiler and controls**	Fit new oil fired condensing boiler (efficiency 95%) and time and temperature zone control (2 no space heating zones and separate hot water zone)	B1	99.44	23.84	**31.91%**	14,723	**7.67**	2.00	€1,766.76	5,459
8	**Air Source Heat Pump**	*Install an Air to Water Heat Pump (Mitsubishi 10.0 Kw unit used in this assesment) with time and temperature zone control in place of existing Storage Radiators.	A3	51.11	10.05	**52.27%**	3,556	**1.85**	2.00	€782.32	2,301
9	**Photovoltaic**	Add 8 No. PV Panels to South facing roof 2.47Kwp (assuming 360 watts per panel)	A2	28.67	5.64	**9.46%**	3,556	**1.85**	2.00	€782.32	1,292

*The Heat pump used in this Assessment is a Mitsubishi 10.0 Kw - The Heap Pump installed MUST be specified by the Installer and/or Manufacturer.

A2

Carbon Dioxide Savings per year - Tonnes	12.29

Energy in Transport

Background

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

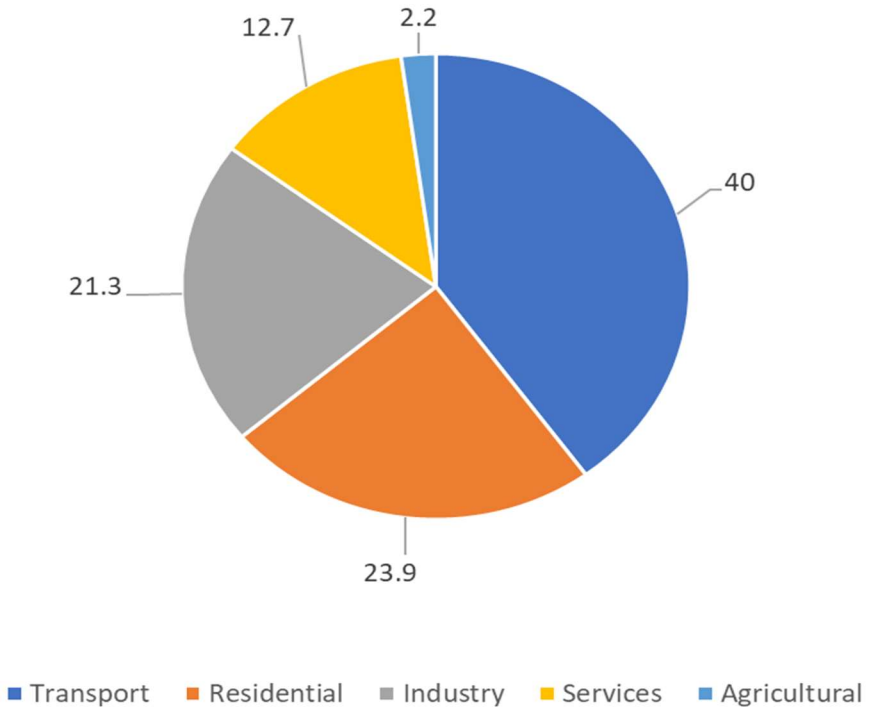


Figure 9 – Percentage share of Energy Related CO_2 by sector for 2020 in Ireland

Whilst it's important to note that Figure 9 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:

- Provide an additional 500,000 daily public and active transport journeys
- Electrify 845,000 passenger cars
- Electrify mass transportation with up to 1,500 Electric Buses

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

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

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

Method

An analysis of the means of transport for workers and students as well as the transport fuel mix in the catchment area of Bettystown SEC has been carried out based on data from the Central Statistics Office (CSO). SEAI's corresponding energy usage, prices and emission factors for various forms of transport as of 2020 were applied to calculate the total spend and CO_2 emissions for various sources of fuel for vehicles in the catchment area.

Results and Analysis

Commuting to work

Commuting to work by private car is the primary method of transport in the Bettystown SEC with 67% of workers either driving or being driven by car.

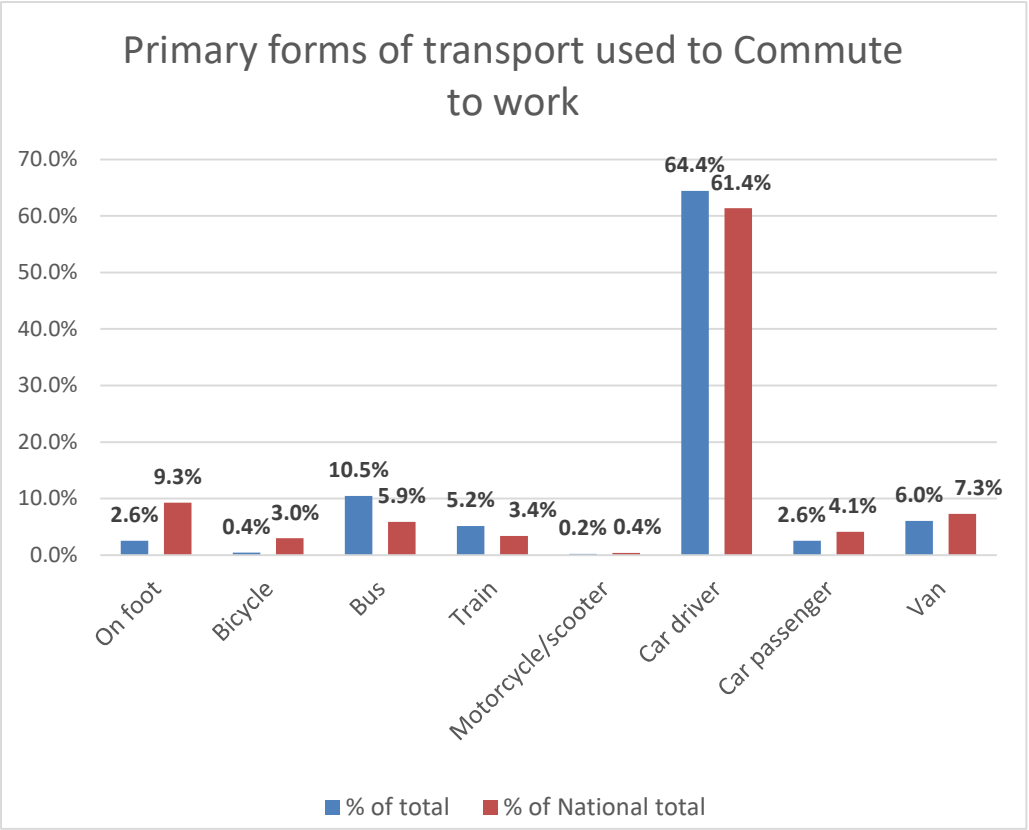


Figure 10 – Primary forms of transport used to commute to work

Bettystown lags behind national averages in active transport usage for commuting to work but is ahead in terms of public transport usage. This could perhaps be attributed to its geographic position in the Dublin commuter belt. That being said, it still has higher than average rate for commuters using their car to travel to work. To tackle these high levels and shift more commuters away from driving traditional fossil fueled cars, the SEC could encourage more of its residents to use public transport by highlighting the 20% decrease in selected public transport services announced from April 2022 onwards.

The SEC should try and promote local bus services that run routes from Bettystown to Dublin as much as possible. Matthews Coaches runs 27 return journeys Mon-Friday to the capital with an additional stop off in the nearby Laytown. Irish Rail's Laytown to Dublin Connolly route also operates 29 services across Mon-Fri – so there is no shortage of options for those commuting to Dublin.

On a more local level, Bus Eireann operate successful services to isolated and vulnerable people within the community who wish to travel to and from Drogheda. Ensuring regular, consistent, and reliable operation of such services can help in increasing the number of locals who will use it. It is also important to circulate the operation of such services through as many means as possible such as social media, local newsagents etc.

Sustainable transport is among the greatest challenges for suburban regions, particularly in an area like Bettystown which has grown as a result of being within driving distance of Dublin City. Until there is more of a regional balance in terms of industry and commercial activity, active transport commutes to work are likely to remain relatively low for the foreseeable future in Bettystown.

Reducing car journeys through remote working

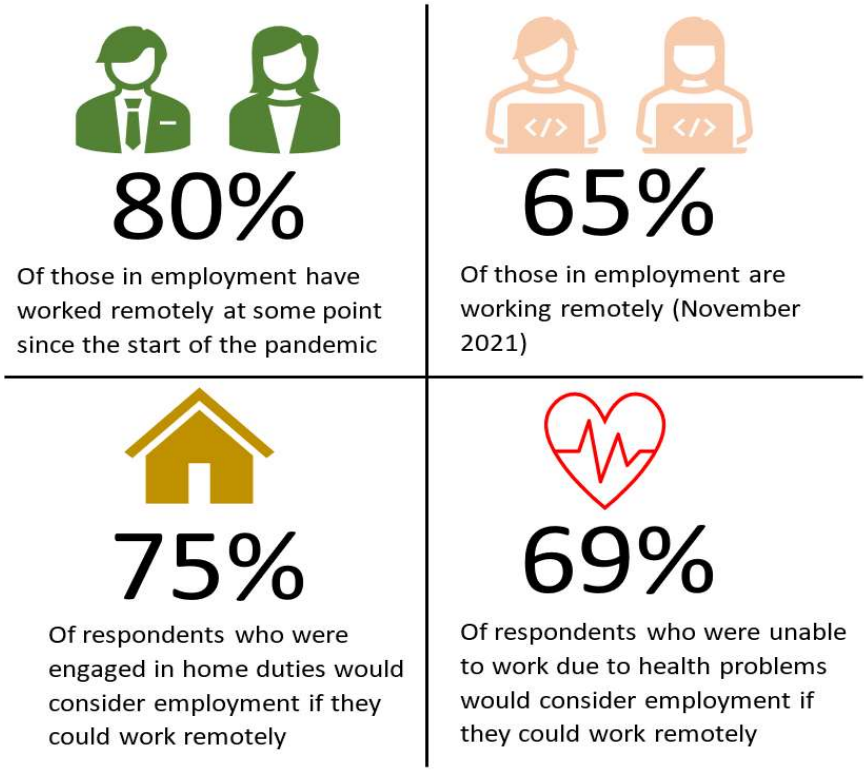
The impact of COVID-19 on the nature of transport in Bettystown cannot be understated and the profile will have changed significantly in the last two years, with a greater shift to home-based working and education, thus leading to a reduction in car usage.

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

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

Bettystown SEC could explore the potential for smart remote working hubs within existing community building infrastructure or as additions onto community buildings with childcare and after school facilities. It can also be used as an opportunity to give derelict buildings within the community a new lease of life. The Building Block [14] in Sligo town is an excellent example of this, which is a shared working space that prior to its development in 2017, had been unused for 10 years. Key elements which will be required to make this successful are comfortable buildings with high-speed broadband and shared canteen facilities. It is noted that this process is underway in Bettystown with funding recently announced to convert a previously unused building into a shared community hub with remote working facilities.

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



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

Figure 11 – Results from the CSO 'Our Lives Online: Remote Work' survey from November 2021

Commuting to school or college

The outcome is similar for students commuting to primary, secondary and college education. Naturally we would expect the car to dominate the uptake for primary school children, so this slightly skews the results. However, there is still a lower usage of public transport amongst the student population in the community, with the Bettystown SEC's usage over 10% lower than the national average.

This may be seen as a cause for concern but could also be viewed as a significant opportunity, as the community could try to address this by lobbying their local councilors and TDs if they can prove there is demand for the service.

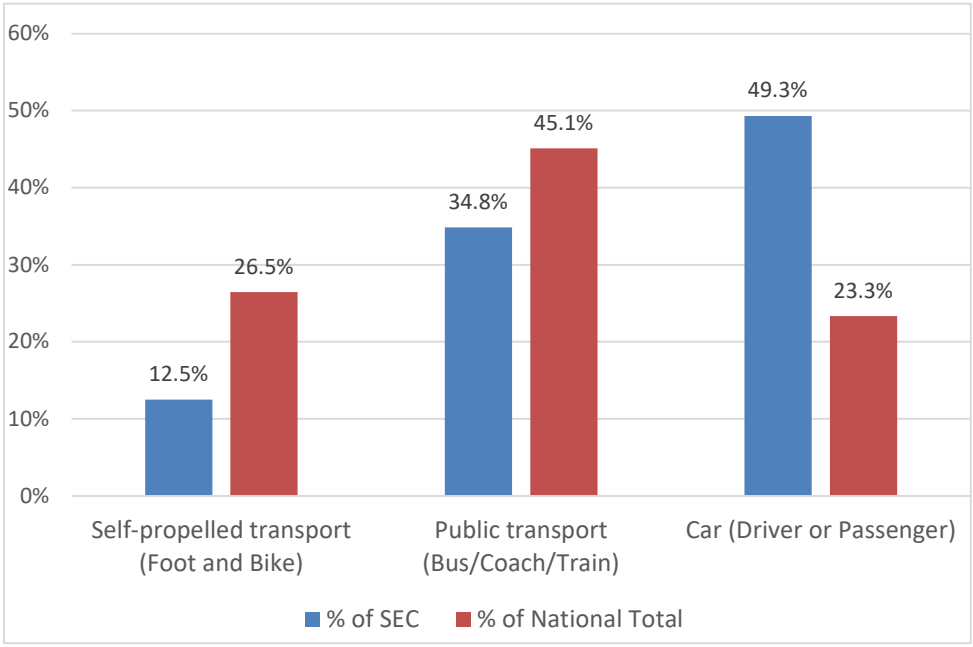


Figure 12 – Primary forms of transport for primary, secondary and college students

Bettystown has a notably lower level of students who either walk or cycle to school, sitting 14% below the national average. 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.

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

[15] 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).

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

Energy consumption from transport

An analysis of transport related energy consumption was carried out for the Bettystown SEC catchment areas. The analysis was based upon a statistical analysis of vehicle ownership in the catchment area along with the types of vehicles used and their associated carbon emissions.[15] As already referenced, the Census data shows that the majority of commutes within the Bettystown SEC catchment area are by car or van.

Table 9 – Means of commuting in the SEC[16]

Commuting to work	No. of people	% of total
On foot	50	3.6%
Bicycle	4	0.3%
Bus	24	1.8%
Train	0	0.0%
Motorcycle/scooter	0	0.0%
Car driver	853	62.2%
Car passenger	56	4.1%
Van	187	13.6%
Other	19	1.4%
Work from home	125	9.1%
Not stated	53	3.9%
Total	**1371**	**100%**

[16] Means of commuting in the SEC is based on information from the 2016 Census, which was the information available at the time of publication

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 10 – Private Vehicle Transport Energy and CO_2 impacts

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

Based on this information and values, a conservative estimate of energy used in transport is shown in Table 11 below.

Table 11 - SEC Transport Energy, CO_2 and Spend

	Electricity	Fossil Fuel	Renewable	Total
Total Primary Energy (kWh)	29,268	18,752,260	1,302,498	20,084,027
Total CO_2 (tonnes)	5.01	4,736	0	4,741
Total Spend (€)	€3,541	€2,425,196	€157,602	€2,586,339

Switch to electrical vehicles

An analysis of the impact of changing 40% of the existing private vehicle fleet to battery electric vehicles is detailed in the table below. It indicates that a CO_2 reduction of 1204 tonnes and a reduction in energy spend of approximately €551,029 per annum.

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

Table 12 - SEC Transport Energy, CO_2 and Spend with 40% Electric Vehicles

	Electricity	Fossil Fuel	Renewable	Total
Total Primary Energy (kWh)	2,926,849	12,045,402	1,026,740	15,998,992
Total CO_2 (tonnes)	501	3,037	0	3,537
Total Spend (€)	€354,149	€1,556,925	€124,236	€2,035,310

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 coming decade.

The key benefit for the user is the reduced operational costs associated with fuel to power the car. The following fuel costs for the EV are based upon home charging with night rate electricity in 2020.[17]

Table 13 - Comparison of CO_2 impacts and fuel costs based on 250km per week

Vehicle	Weekly fuel cost	Weekly gCO_2
Electric e.g. Nissan LEAF	€2.54	13,800
Petrol equivalent	€21.60	27,200
Diesel equivalent	€15.74	21,800

The Bettystown 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 [18]

Although it is a significant investment to purchase an EV, households with 2 vehicles should be encouraged to look at the possibility of having a smaller electric car alongside their first car for shorter journeys as a starting point on the route to electric vehicles.

SEAI provides a series of supports to incentivise the transition from fossil fuel-based vehicles towards electrical vehicles, details of which can be found in the Appendices.

Whilst we anticipate the accelerated growth of a 'second-hand' market to grow in the next five years, in the short term the Bettystown SEC should focus on implementing the 'Avoid-Shift-Improve' or ASI model for transport within the community.

Table 14 – 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

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

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

Car Sharing/Pooling

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

- Reduced driving and car maintenance costs
- Social and inclusive
- Suitable for longer distance commutes daily
- Suitable for school runs as the start and finish times are defined

Commercial/Business

Background

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

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

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

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

For this reason, an important theme throughout all these reports is the importance of engaging employee's regarding good energy management and educating all building users on the 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.

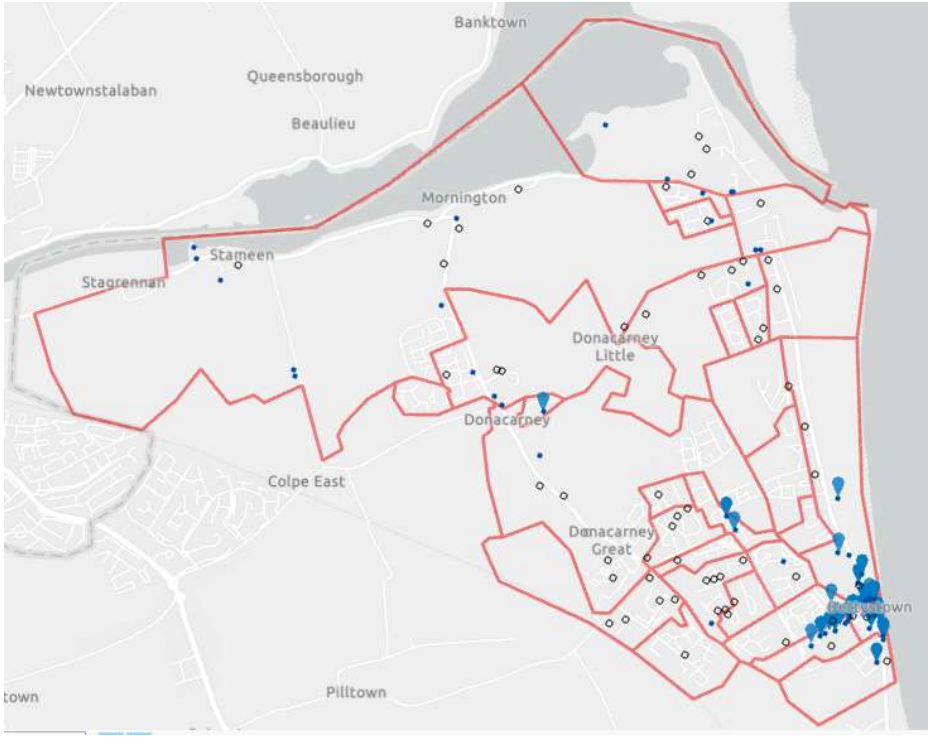


Figure 13 – The spread of commercial businesses in the Bettystown SEC (Blue pins)

Method

An analysis of commercial/business energy consumption within the SEC catchment was carried out using various data sources including CIBSE TM46 Energy Benchmarks, Valuations Office and Energy Consumption and SEAI's 'Extensive Survey of Commercial Building Stock in Ireland'.

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

As part of the energy master plan for Bettystown five non-domestic premises were audited to Ashrae level 1 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 organizations implement the measures identified in their reports to contribute towards the energy consumption reduction goals as set out in the Climate Action Plan.

The premises which were audited were provided with a detailed report outlining the findings of the audit and any recommendations:

Results and Analysis

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

Table 15 - SEC Non-Domestic Energy, CO_2 and Spend

Electricity typical benchmark (MW·h)	Fossil-thermal typical benchmark (MW·h)	Illustrative electricity typical benchmark (tCO2)	Illustrative fossil-thermal typical benchmark (tCO2)	Illustrative total typical benchmark (tCO2)	Illustrative total Energy Spend (€)
2,809	3,294	1,546	626	2,172	€3,150,959

Support for SMEs

Aside from the recommendations contained within the EMP and supplementary non-domestic audits, businesses can utilize the recently created 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-domestic audits identified several opportunities within the premises and Bettystown SEC which can be developed into energy efficiency projects. The standout projects are:

- **Non-Domestic Audit Site 1**
  - All lighting across the site should be upgraded to energy efficient LED light fittings
  - Install Energy trackers throughout the school to monitor energy use throughout the building

- **Non-Domestic Audit Site 2**
  - Although it was reported that there used to be TRVs on the radiators which have since been removed, it may be worth looking into installing modern, efficient TRVs

[19] climatetoolkit4business.gov.ie

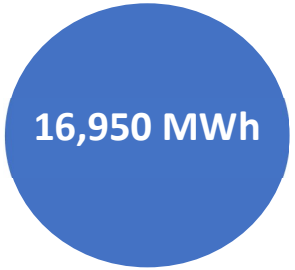
[20] https://www.seai.ie/business-and-public-sector/small-and-medium-business/supports/energy-audits/

Renewable Electricity

Where a 20% reduction in electricity consumption could be achieved there would remain a residual demand in the catchment area of 16,950 MWh. In order to offset this residual demand 7.7 MW Wind turbine or a 19.35 MW solar farm would be required to service the catchment area.

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

Residual Energy Demand



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

Renewable Electricity Support Scheme

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

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

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

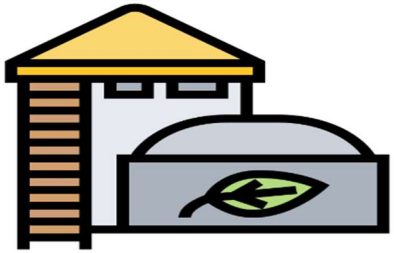
In total, about 3,000 ‘gigawatt-hours’ will be put up for auction by the state. The most cost-efficient bidder will be the first picked, the second most cost-efficient will be the second picked and so on until all the gigawatt-hours are accounted for. In essence this means only the most efficient project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

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

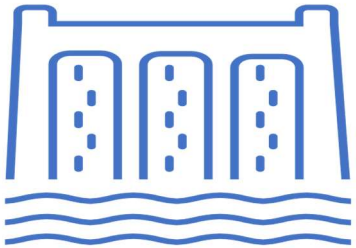
Eligible technologies under the RESS scheme include:

Onshore wind turbines/solar thermal/solar PV technology

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



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

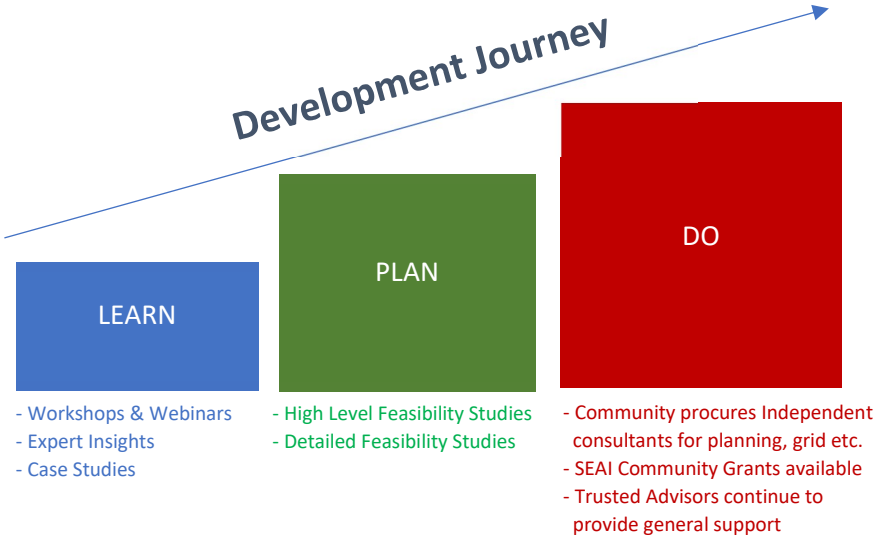
One of the key community provisions as part of RESS is the Community Enabling Framework which provides end-to-end support to create a community energy sector in Ireland that can flourish sustainably over time and one that will deliver meaningful impact to communities nationwide. SEAI have been appointed 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[22]. Toolkits include: onshore wind, solar PV, the planning process and grid connection. There are several more in development. The Toolkits provides a set of guidance modules across a number of different areas (including technology options, business planning, project development stages, setting up an organisation / governance strategy) to support development and delivery of a Renewable Energy project.

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

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



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

Sustainable Energy Roadmap

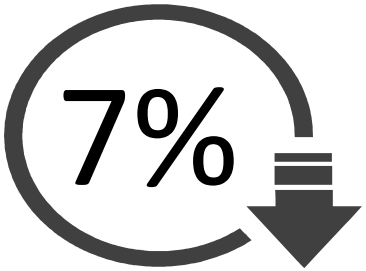
The Sustainability Energy Roadmap is one of the key outputs of the Energy Master Plan as it outlines to the community the scale of the challenge faced in moving the community from their baseline to achieving 2030 reduction targets. The following analysis provides a general path for the SEC to reach each of its targets: 30% energy reduction and a transition to a majority of its energy being generated renewably by 2030.

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

Table 16:- 7% Annual reduction in the Carbon Footprint for Bettystown SEC

Community CO2	
tCO2	18,314
% Annual CO2 Reduction	7%
Year	**tCO2**
2022	17,032
2023	15,840
2024	14,731
2025	13,700
2026	12,741
2027	11,849
2028	11,019
2029	10,248
2030	9,531
2031	8,864
2032	8,243

Table 17 - Bettystown SEC Plan to 2030			
	Number of Projects	**Primary Energy Savings (kWh)**	**CO_2 Savings (tonnes)**
Community owned Wind Project in MW	7.7	16,949,656	5,014
Residential Housing Upgrades to B2 Medium Heat Pump	400	1,760,000	1,000
Electrical Vehicle (EV) Ownership	40% Change	4,085,035	1,204
Reduction in Car Journeys though remote working & EV Ownership	40% Change	6,399,597	1,415
Total		29,194,288	8,632



Annual Reduction in the Carbon Footprint for Bettystown SEC

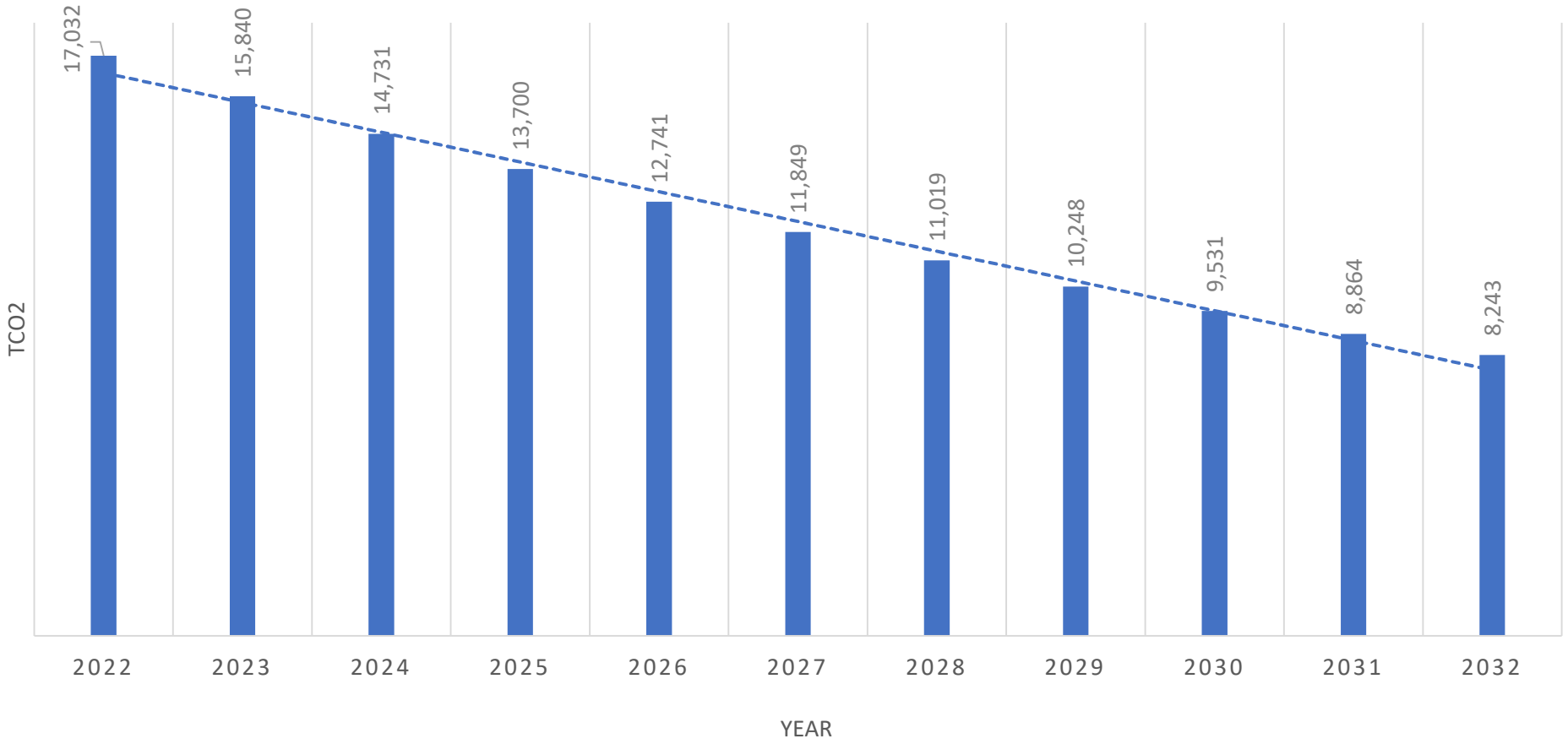


Figure 14 – The reduction in tonnes of CO_2 annually if the SEC reduces its Carbon footprint by 7%

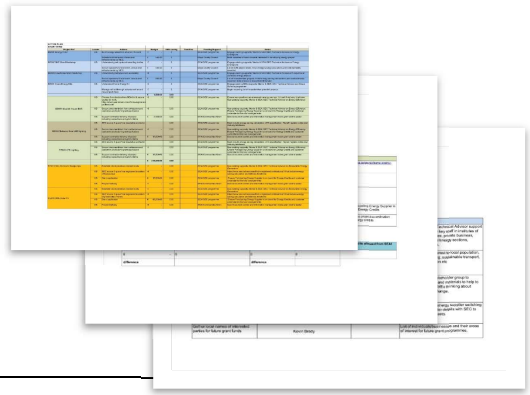
Register of Opportunities (RoO)

The Register of Opportunities (RoO)[23] developed for Bettystown 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. 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.
* Example of Register of Opportunities Document



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

As part of the scope of works for the Energy Master Plan for Bettystown SEC, a number of domestic energy audits and non-domestic 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 Appendix:

- 6kWp Solar PV System for Audit Site 1
- Community Electrical Vehicle Charging point
- Feasibility study for a Renewable Energy Community Power project
- Community Electric Bike scheme

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 Bettystown SEC

Capacity Building

One of the key elements in the development of a success Sustainable Energy Community is the ability to building 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 appoint 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 SEC's 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 Appendix A for more information on BEC 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.

LEAF (Local Energy Action Fund) Funding

Avail of funding streams from SEAI for activation of energy efficiency projects within your community. These funding streams are constantly changing, and the community should continue to engage with SEAI on a regular basis to understand what is available for communities.

NO PLANET 2.0

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

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

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

Appendix A: Grant Streams

Better Energy Communities

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

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

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

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

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

BEC 2021 Funding Levels

Residential		
Home type	Fuel type	Funding Level
Private	Fuel Poor	Up to 80%
Private	Non-Fuel Poor	Up to 35%
Local Authority		Up to 35%
Private Rented Homes		Up to 35%
Housing Association		Up to 50%

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 and public 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.[24]

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