Energy Master Plan and

Register of Opportunities

Connecting Cabra Sustainable Energy Community (SEC)

This project is supported by the Sustainable Energy Authority of Ireland

Supported by

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1 Summary

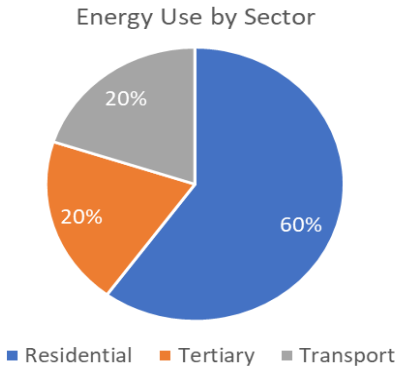
Connecting Cabra Sustainable Energy Community (CC SEC)

Connecting Cabra SEC was set up under the SEAI by local volunteers from the community in Cabra with TU Dublin as a lead partner in 2021. The group recognises the interconnectedness of issues around climate change such as fuel poverty, active transport, accessibility and mobility, biodiversity and green spaces, and the circular economy.

Current Cabra SEC Baseline Data

Total Energy Consumption **152,159,371 kWh/yr**	**Estimated Cost** **€ 21,098,133**
Tertiary Total Energy **30,855,187 kWh/yr**	**Average BER** **321 kWh/m²/yr (E1)**
7,038 Total Dwellings[1]	**Residential Total Energy** **92,771,960 kWh/yr**

Based on 2016 Census Data



The average residential energy consumption in Cabra is 20% above the national average due to the older age profile of housing and consequent poorer energy performance.

Residential Retrofit Measures

The following tables summarise the recommended residential retrofit measures based on domestic surveys carried out at 10 selected households in Cabra SEC area, as well as a summary of the average costs and benefits. Measures highlighted green are recommended in all cases, orange where applicable and red not recommended.

	Level of Domestic Retrofit			
Measure Implemented	Basic	Intermediate	Advanced	Deep
Low energy lights	Yes	Yes	Yes	Yes
Roof Insulation	Yes	No	No	No
Heating Controls	Yes*	Yes*	Yes*	No
Internal Insulation	No	Yes*	Yes*	Yes*
External wall insulation	No	Yes	Yes	Yes
Windows	No	Yes*	Yes*	Yes*
Floor Insulation	No	No	Yes	Yes
A/W Heat Pump	No	No	No	Yes
Solar Photovoltaic	No	No	Yes	Yes

* Where applicable

[1] Including occupied and unoccupied.

	Average Cost	Average Saving	Payback (Years)
Basic	€1,430	€386	3.7
Intermediate	€19,184	€1,290	14.9
Advanced	€34,625	€2,022	17.1
Deep	€31,885	€1,847	17.3

Commercial & Public

Energy audits were carried out at three non-domestic sites: Christ the King Girls' National School, Christ The King Parish Schools' Boys and Naomh Fionnbarra GAA club. These include typical energy uses in the commercial and public sector, that is primarily lighting and space heating. One of the sites audited had a significant refrigeration or cooling load which would be typical in, for example, the retail and hospitality sector.

Projects Identified		
Starter	Standard	Advanced
LED Lighting Heating Controls Energy Management	Air to Air Heat Pump	Solar PV

Energy Management Plan

The Connecting Cabra SEC group has been very successful in promoting engagement with the local community. The group has already held a number of initiatives and plans to build on these. The group has already held and participated in events such as:

- An online "meet the retrofit neighbours" webinar event in summer 2022 where approx. 80-100 community people logged onto the zoom public meeting to listen to the experiences of their neighbours who had completed retrofits on their homes.
- Completed a community online and paper energy use survey with Cabra Library - where 10 lucky household responders received a free BER energy audit. The survey/questionnaire got about 60 responses from people in the community who provided information on their home and transport energy use.
- The group then held an energy showcase event in Christ the King Community Hall in October 2022 where the Lord Mayor Caroline Conroy attended along with approx. 200 people. Groups and companies showcased their equipment and provided information on projects they were completing in the area. Groups and companies included retrofit companies such as PV solar companies "Energysmart.ie", Builder providers Murdock's/Brookes, City Cycles, Moby Bike rental, Reilly's Garden, Cabra Tidy Towns.
- Connecting Cabra have also held other events in the community such as "parking day" event to highlight the need for more community civic space and seating areas and took part in "Dublin bike week" to highlight the need for better "bicycle" infrastructure in the area.

Connecting Cabra SEC plans to build on this success through, *inter alia*, the following measures:

- Engagement with householders and businesses.
- Awareness-raising activities within the community (Community newsletter articles, social media posts on Twitter, Facebook and Instagram, events, and surveys)
- Promoting the inclusion of energy efficiency in refurbishment/extension projects completed in the community.
- Promotion of grant schemes (Better Energy Homes (BEH) & deep retrofit)
- Promoting interest in projects for Communities Application (Local GAA centre and community schools and community buildings / halls etc).
- Monitoring and reporting on progress.
- Publicising success stories on social media postings and at Cabra Library (printed documentation for those who do not use electronic communications).
- 'Switch & Save' Initiative for both residential and commercial sectors.
- Residential Energy Usage and Behavioural Survey (recent questionnaire completed Summer 2022)
- Initiatives such as encouraging increased use of public transport, walking & cycling to reduce the use of fossil fuels and car for the 1- 2km trip to shops, commute to work and schools. This may include creating mobility hubs where EV bike rentals and EV cargo bikes can be used by the residents of Cabra for the short commute to shops and work.

2 Introduction

Energy Solutions was appointed to develop a comprehensive Energy Master Plan (EMP) as well as generating an associated Register of Opportunities (RoO) for Connecting Cabra Sustainable Energy Community.

The EMP and RoO includes:

- A baseline analysis of energy consumption and uses in Cabra and factors affecting consumption; e.g. age of houses.
- Energy audits of commercial and domestic buildings.
- A plan to improve efficiency and reduce CO_2 emissions.
- Opportunities to introduce renewable energy technologies for homes and small businesses.
- A Register of Opportunities.

3 Baseline Energy Balance

3.1 Overview of Connecting Cabra SEC

The boundary of Connecting Cabra SEC is defined by the boundary of 74 small areas (as defined by the CSO for the purposes of the census) as shown in Figure 1.

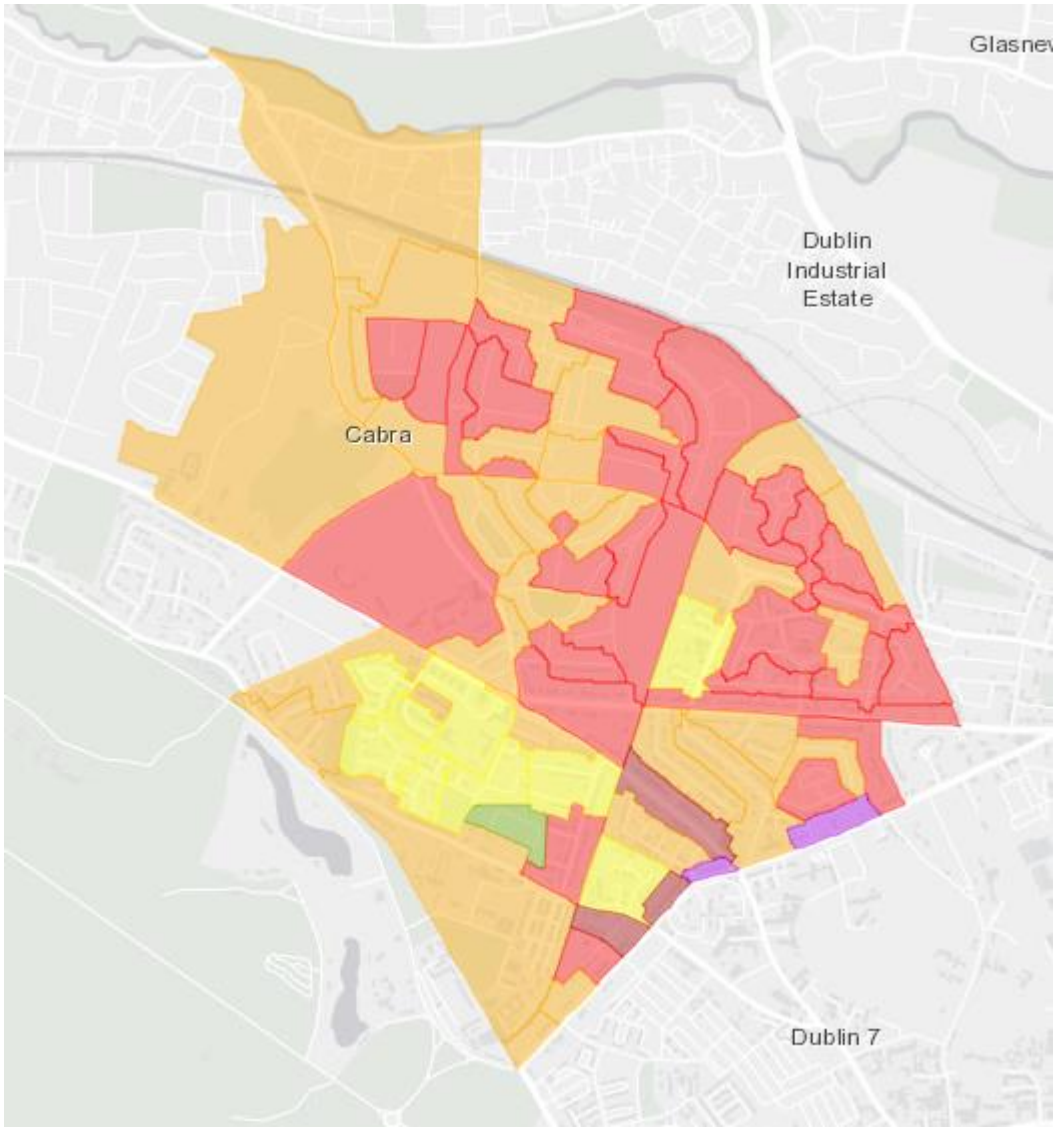


Figure 1 - Map of Cabra SEC

3.2 Connecting Cabra SEC Energy Demand Analysis

The 2016 census data provides much information relevant to energy consumption and energy efficiency including age of dwellings, heating fuel type, house ownership and car ownership. The SEC area has a total of 7,038 households.

3.3 Energy Consumption in Dwellings

SEAI has published the BER database by small area and BERs have been carried out and registered for 3,061 houses in the SEC area or 40% of the total housing stock. This is a reasonable sample of the housing stock and the data may be considered reasonably representative.

The BER database published by SEAI is used in this analysis for the calculation of energy consumption. The BER is an indication of the energy consumption of a house standardised for typical occupancy and comfort levels. It is calculated based on a Dwelling Energy Assessment Procedure (DEAP) model which calculates normal use of energy for space heating, hot water, ventilation and lighting per square metre of the area of a residential unit. The final energy rating given to a household is in kWh/m^2/year of primary energy and an energy efficiency scale from A (<25) to G. (>450)

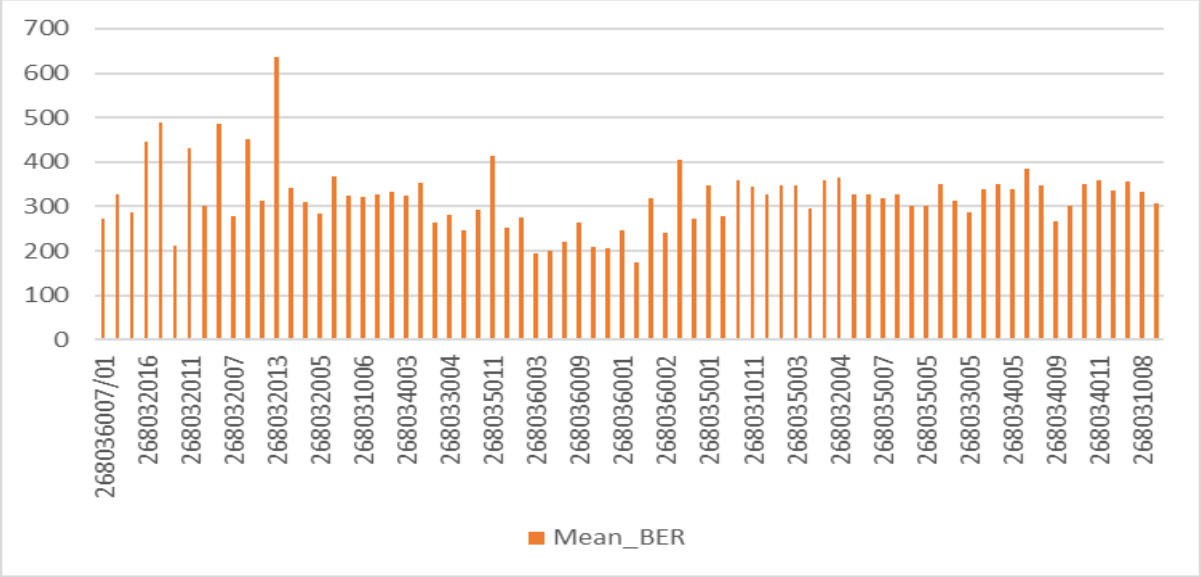


Figure 2 – Distribution of BERs by small area in Connecting Cabra SEC (SEAI Data) (Y-Axis is kWh/m2/yr)

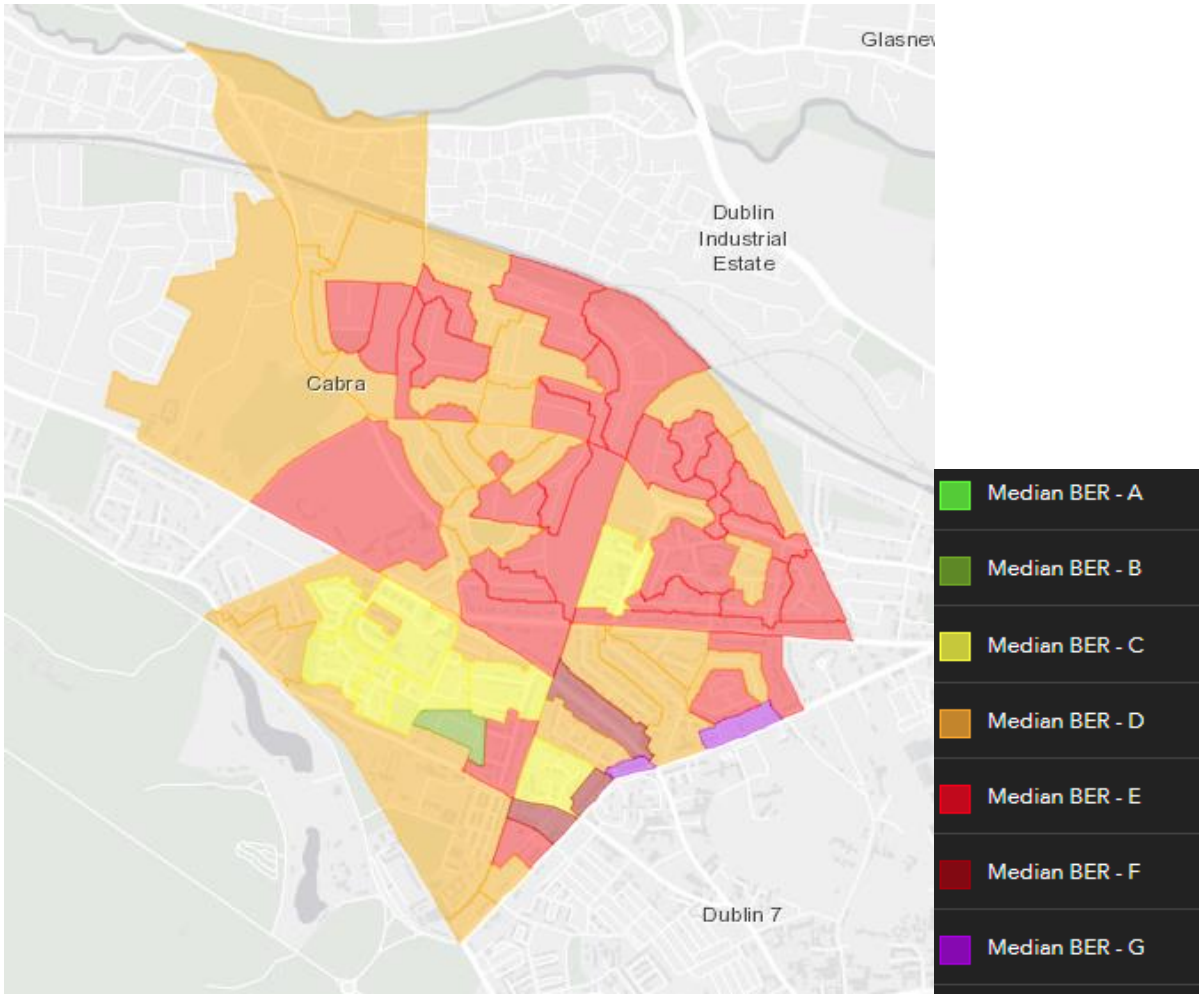


Figure 3 – Map of BERS in Cabra SEC

The BER does not account for electricity used for domestic appliances which is the largest consumer of electricity. The electricity baseline demand of the SEC is therefore based on the national average household electricity consumption.

	kWh/yr	€/yr	CO_2 T/yr
Residential Electricity Demand	*26,416,147 (17.4%)*	*6,987,071 (33.1%)*	*7,814 (21.8%)*
Residential Heat Demand	*66,355,813 (43.6%)*	*5,646,880 (26.7%)*	*13,417 (37.4%)*
Total Residential	92,771,960 (60.1%)	12,633,950 (59.8%)	21,231 (59.2%)
Commercial Electricity Demand	*11,570,695 (7.6%)*	*2,815,150 (13.3%)*	*3,423 (9.5%)*
Commercial Heat Demand	*19,284,492 (12.7%)*	*1,369,199 (6.5%)*	*3,899 (10.8%)*
Total Commercial	30,855,187 (20.7%)	4,184,349 (19.8%)	7,322 (20.3%)
Transport Energy	28,532,225 (18.8%)	4,279,834 (20.2%)	7,276 (20.3%)
Total Cabra SEC area	**152,159,371 (100%)**	**21,098,133 (100%)**	**35,829 (100%)**

Table 1 – Cabra SEC Baseline Energy Consumption (commercial sector is based on SEAI data)

The data from SEAI shows that the average BER across the entire area is 321 kWh/m^2/yr or a BER of E1. This reflects the older age profile of housing in the area and shows significant potential for improvement in energy performance of dwellings. The primary factor, other than floor area, influencing energy consumption in houses is the year of construction.

In Cabra SEC the fossil fuel consumption is estimated at 16,699 kWh/dwelling/year, this is 20% higher than the SEAI national average of fossil fuel consumption.

The energy demand is stated in delivered energy which would be equivalent to metered energy consumption at a premises. Energy consumption in BERs is stated as primary energy which is the energy supply at a system level required to deliver that quantity of energy to the final consumer. A primary energy factor of 1.89 is applied for electricity and 1.1 for gas and other household fuels.

SEAI's Energy in the Residential Sector 2019 report[2] details the efficiency and consumption patterns across the residential sector in Ireland. The national average 'non-electrical energy' (fossil fuel) consumption is 13,885 kWh/year and the average electricity consumption was 4,638 kWh/year per dwelling.

The consumption per household in Connecting Cabra SEC is estimated by adjusting the national average household energy consumption according to differences between BER data in Cabra SEC vs national averages. In Cabra SEC the fossil fuel consumption is estimated at 16,699 kWh/dwelling/year, **this is 20% higher than the SEAI national average of fossil fuel consumption.** Very few households in the SEC are heated by electricity, with a total of 248 dwellings using electricity for their main source of heating. Figure 4 shows the average household energy consumption in Cabra compared to the national average. The energy use for heating is higher than the national average due to the lower BER while the electricity consumption is lower due to the smaller floor area of housing in Cabra compared to the national average.

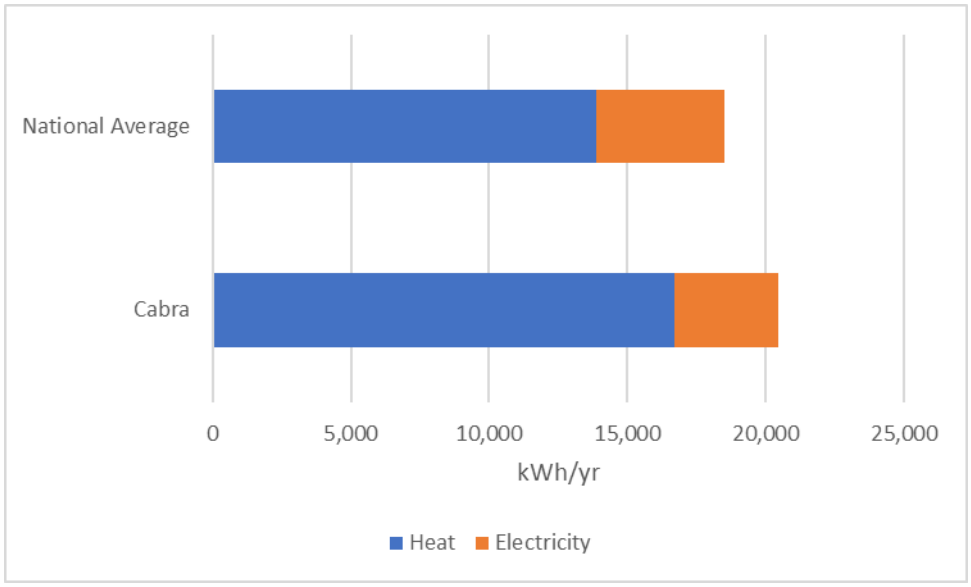


Figure 4 – Cabra Household Energy Consumption vs National Average

[2] Energy in the Residential Sector, https://www.seai.ie/resources/publications/Energy-in-the-Residential-Sector-2018-Final.pdf

4 Transport Sector

The transport sector is where we, as a nation, consume the most fossil fuels and where we emit the most CO_2. It is also the largest source of final energy demand in Ireland. In spite of this there has been no meaningful reduction in this consumption in the last 30 years according to energy balance reports from the SEAI. Private cars are the transport mode with the largest energy use. They accounted for 42% of transport final energy demand in 2019. On the other hand, public and private bus or coach transport accounted for 2.6% of transport energy use in 2019 and rail accounting for less than 1%. The balance is largely accounted for by HGV, LGV and aviation with the sum of the three being 42.8%.

The average CO_2 emissions per kilometre per car in Ireland is 112 g CO_2/km. In comparison, a passenger on the dart only contributes to 11 g CO_2/km and a passenger on an intercity bus, 15 g CO_2/km. It is difficult to estimate transport emissions in Cabra but the consumption figures would expected to be similar to those mentioned above.

Renewable transport fuels grew by 0.6% between 2018 and 2019 to 3.6%. This is almost all from biofuels blended with petrol and diesel. Electricity increased to 0.3% of transport final energy demand in 2019. Most of this was from Luas and DART, but electric vehicles are growing strongly from a low base.

Clearly the biggest challenge and opportunity is to achieve modal shift from passenger cars and to reduce the environmental impact of passenger cars. The Connecting Cabra group has sought to overcome this with plans promoting mobility hubs and use of EV rental cargo bikes and regular bike rentals for commute to school, work and shops.

There are many environmental benefits to owning an electric car. There are no tailpipe emissions from an electric car, thus it produces less than half the CO_2 per km compared to a diesel or petrol car. In terms of cost, EV's have the lowest rate of motor tax per annum at €120 and can have a 74% reduction in transport costs compared to a comparable new diesel engine car. However barriers to EV adoption include cost, range limitation and limited charging infrastructure. For example a large number of houses don't have a private driveway in Cabra precluding the installation of household EV chargers. However, residents in Cabra are investigating a potential new initiative to encourage people who have a driveway and an EV charger to allow their neighbours to use theirs and charge them via a new dedicated app.

Of course, there are plenty of other options to reduce your energy usage from travel and the best option is to minimise passenger car use altogether by improving better walking, cycling infrastructure to encourage more "active travel". The number of cycling lanes in Dublin are growing as well as the number of public bikes and the Connecting Cabra group have been actively seeking the support of local councillors and Dublin City Council to improve walking and cycling infrastructure in the area. Public transport can also have a major impact in reducing your carbon footprint. Encouraging signs have come from recent reduction in the price of trips using LEAP cards.

In addition to reduced environmental impact, walking and cycling has health benefits. Active travel like walking or cycling helps to reduce pollution and it's better for your health. Being active is important for maintaining and improving our physical and mental health. Adults should aim for at least 30 minutes a day of moderate activity, 5 days a week according to the HSE.

The Connecting Cabra Group and TU Dublin (masters students) completed related but separate research work during 2022 into active travel and mobility measures and improvement that could be considered/implemented by the community and DCC for the Cabra area. In addition to that, the CCSEC group did a survey/Questionnaire in summer 2022 which sought information from

Cabra residents about their home and transport energy use, with 10 lucky respondents getting the chance to have a free BER energy audit completed on their homes.

This provided valuable information about the types of commutes and trips being completed by individual residents in Cabra SEC area. Trips/Journeys such as types of commutes to work, school and shops etc and distance travelled.

4.1 Car Ownership

Figure 5 displays the car ownership of each household. 36.5% of households have no car, 42.0% of households have one car, 13.2% have two cars, 2.3% have three cars and 0.4% of households have four or more cars. Figures 6 and 7 displays the means of travelling to work, school or college. Cabra has relatively good public transport including the Luas, train and bus routes. The use of public transport services was the third most popular method of travelling to work according to the 2016 census.

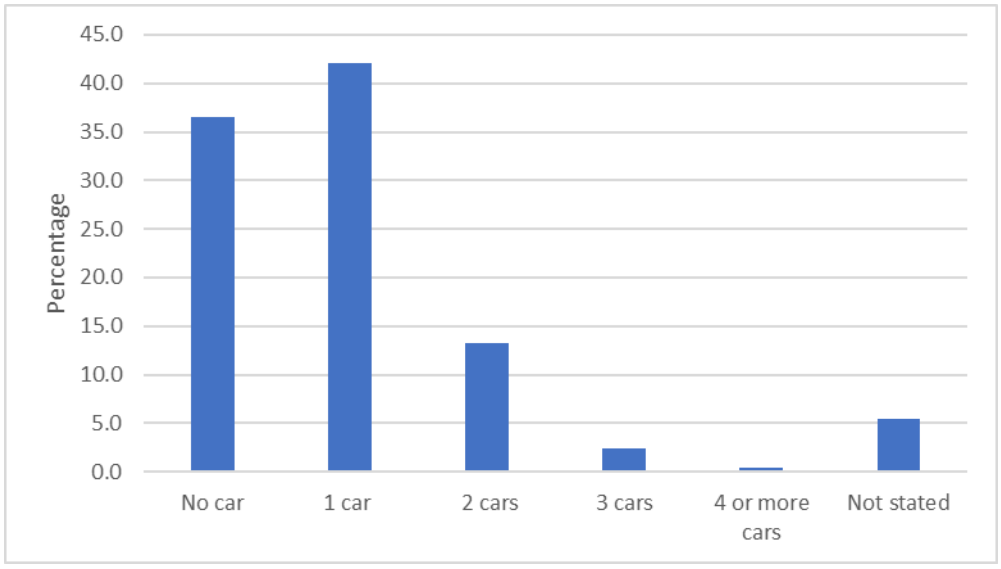


Figure 5- Car Ownership

4.2 Means of Travelling to work, school or college

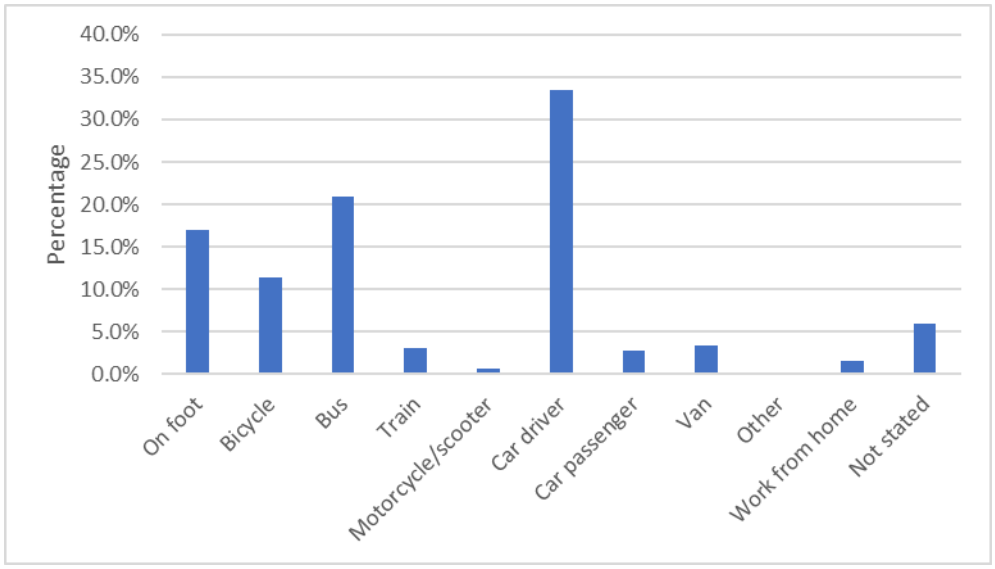


Figure 6- Means of travelling to work

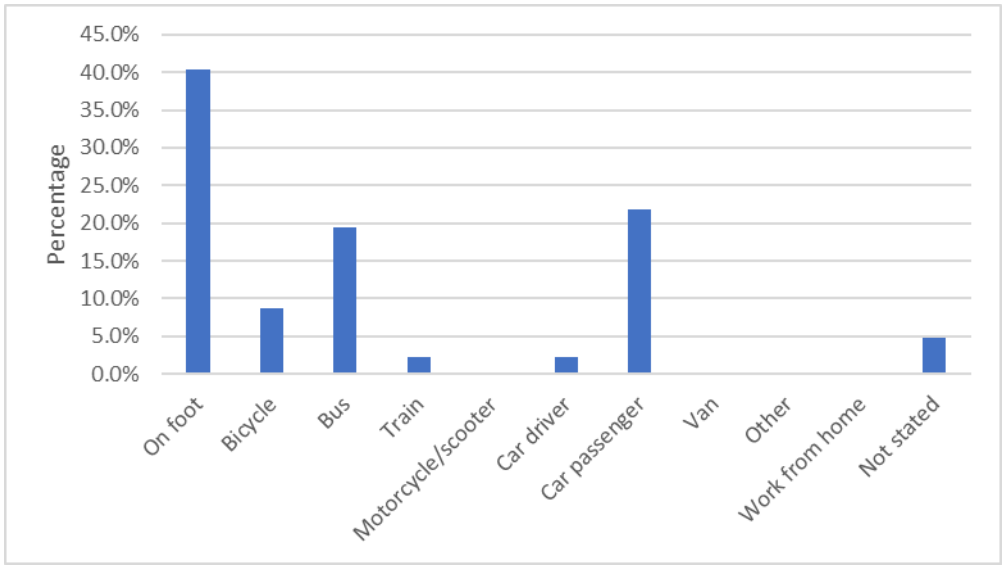
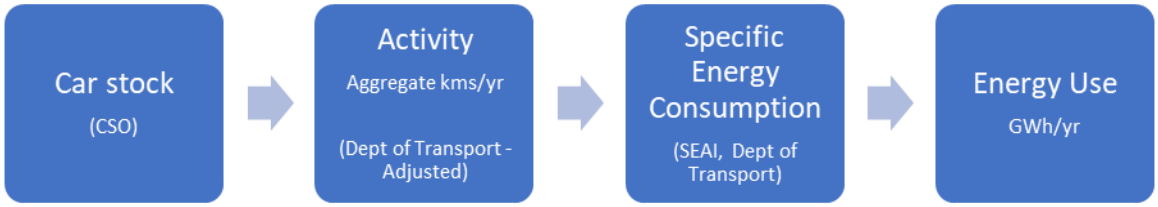


Figure 7- Means of travelling to school

From the 2016 census data it can be seen that the majority of residents' travel to work or school by car, with 48% of residents travelling to work by car and 34% of students travelling to school or college as a car passenger. As mentioned previously Cabra has relatively good public transport connections and this could be why the Luas and bus was the second most popular method of transport to work or school with 27% of residents using public transport to travel to work and 30% of students using public transport to travel to school or college.

4.3 Baseline Emissions

We have evaluated transport energy consumption based on cars ownership, activity and emission factors. This method is aligned with the methodologies suggested by the European Commission (EC) and used for national reporting and is designed to be compatible with ex post reporting on the basis of currently collated and reported statistics. The statistics used to evaluate the energy consumption in the transport sector include:



1. Private Cars Licensed for the First Time by Engine Capacity cc, Licensing Authority, Car Make, Year, Statistic and Emission Band - CSO
2. Vehicles Licensed for the First Time (Number) by Type of Vehicle Registration, Year and Type of Fuel - CSO
3. Number of Private Cars under current licence – Department of Transport, CSO Transport Omnibus
4. Fuel consumption and distance travelled for private cars – SEAI

Number of Cars	5434
Cars per household	0.77
Transport Energy Consumption (kWh/yr)	28,532,225
Transport Energy Spend (€/yr)	4,279,834
CO_2 T/yr	7,276

4.4 EV Charging and Mobility Hubs (15 minute city)

As mentioned previously, the supply of electric vehicles EVs) has been increasing annually faster than demand. In 2022 there was a high purchase level of EVs at 15,678 up 81% on 2021 and accounting for c. 15% of all new car purchases in Ireland. With this increase in demand there is urgent need for charging infrastructure in the country. The Electric Vehicle Charging Infrastructure Strategy 2022 – 2025 published by the Department of Transport outlines four main categories of infrastructure to serve different user needs according to where, when and how drivers need to charge their EV's. These are home charging, residential neighbourhood charging (including on-street and co-charging), destination charging (e.g. sports facilities, shops, hotels, tourist locations) and motorway/ en-route charging (ultra-rapid charging).

There are plenty of areas in Cabra where destination charging would be useful and, if implemented, would encourage the purchase of EV's in the community. It is the government's ambition to have a charging network to support up to 194,000 electric cars and vans by 2025. However, the framework to specify national EV charge points has yet to be published. Home charging currently accounts for 80% of charging points in Ireland. It is the most cost effective and convenient charging methods. There are many schemes for financial support for EVs available at the moment which also cover charging installation. One such scheme is the EV Home Charge Point Grant Scheme which provides up to €600 towards the installation cost of a domestic charge point. Home charging allows electric vehicles to be parked, plugged in and left to charge overnight, with the possibility of benefiting from lower night-rate electricity prices.

In cities and towns in Ireland and elsewhere, EV charge points for different types of electric vehicles are being clustered to form sustainable mobility hubs, for example the recent development in Finglas[3]. The idea of a sustainable mobility hub is for there to be an area where citizens can access multi-modal and green transport options. These modes of transport would range from regular bike rentals, e-bikes, e-cargo bikes, e-scooters as well as EV charging infrastructure and links to public transport and amenities. An ideal location for a sustainable mobility hub in Cabra would be at the Luas station at Broombridge. Improvements in cycling infrastructure would have to be included in order to maximise the impact that a sustainable mobility hub would have on the community's attitude towards the hub. A sustainable mobility hub would also reduce problems like congestion on roads and air pollution while also encouraging a more healthy and active relationship with transport.

Figure 8 shows possible locations for mobility hubs in CCSEC. One of the key benefits of these Larger mobility or "gateway" hubs and "smaller mobility hubs" could be to encourage people to reduce use of cars for the 1 or 2 mile trips to work, schools, commuter stations and shops by using bike/e-bike rentals, cargo bikes or e-cargo bikes. It would also have the positive benefit of

[3] https://www.fingal.ie/news/fingal-county-council-launch-first-mobility-hub-main-street-blanchardstown

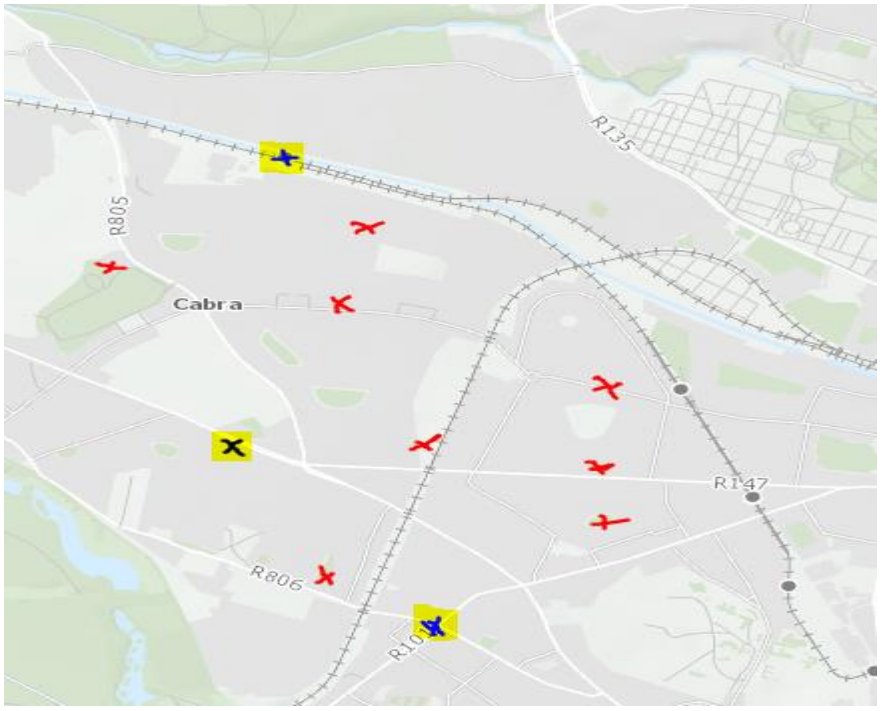
reducing traffic congestion in Cabra, Phibsborough and Stoneybatter villages and improving air quality. It may also have the benefit of encouraging younger people in the community to help collect and deliver shopping to people with mobility issues (Cargo bikes).

A mobility hub needs space for parking vehicles and bikes and a network connection and therefore needs a landowner to provide the space and co-operation with an organisation that has or will fund and apply for a network connection. Partnerships between Dublin City Council, ESB Networks and EV charger providers are needed. We note some retail outlets such as Tesco and Lidl have already been active in providing EV charging stations along with car sharing locations such as Go-car and Go-van but other community building such as the DCC controlled John Pau Park and Naomh Fionnbarra GAA club to mention 2 may also be able to facilitate some of these hubs.

The locations identified as potential "Larger gateway mobility hubs" with Dublin bikes, private bike rental points, electric bikes, scooters and cargo bikes are along with EV car charging stations are listed below:

Potential Locations	**Suitability**
Broombridge Train and Luas station	Car park and existing electrical network connections nearby. Would need partnership with Irish Rail/Luas and TII.
Cabra Library on Navan Road which could be combined with Tesco existing EV charging and Go-car and Go-Van base	DCC owned car parking. Potential to connect to library electricity connection. Would need commitment from Dublin City Council.
Corner of North Circular Road / Blackhorse Avenue	Vacant space. Would need network connection. Would need commitment from Dublin City Council.

Figure 8 – Potential Large and small mobility hub locations in Cabra area (15 minute city).



Locations marked in **blue X** and highlighted in Yellow would be the larger mobility hubs (smaller in scale but similar to the mobility hub found at Finglas). Locations marked with **red X** are some potential locations for smaller mobility hubs where regular bike, cargo and e-cargo bike rentals could be located (these may only require 4-5 public bicycle lock spaces in concrete with 2-3 charging ports for smaller EV bicycle/E-Cargo bikes). DCC may require ESB input for suitable locations for these. Some of the locations marked in red are Bannow road, Naomh Fionnbarra GAA club, Cabra Parkside Community Sports Centre and Nephin road, Carnlough road at junction with Cabra above proposed new Dart station and new Hamilton apartments, Dunard Green area, Annamoe road/ Annamoe Green, 2 locations on Fausaugh road shops and the 17 shops Cabra road.

5 Characterization of the Domestic Sector

5.1 Age Profile of Dwellings

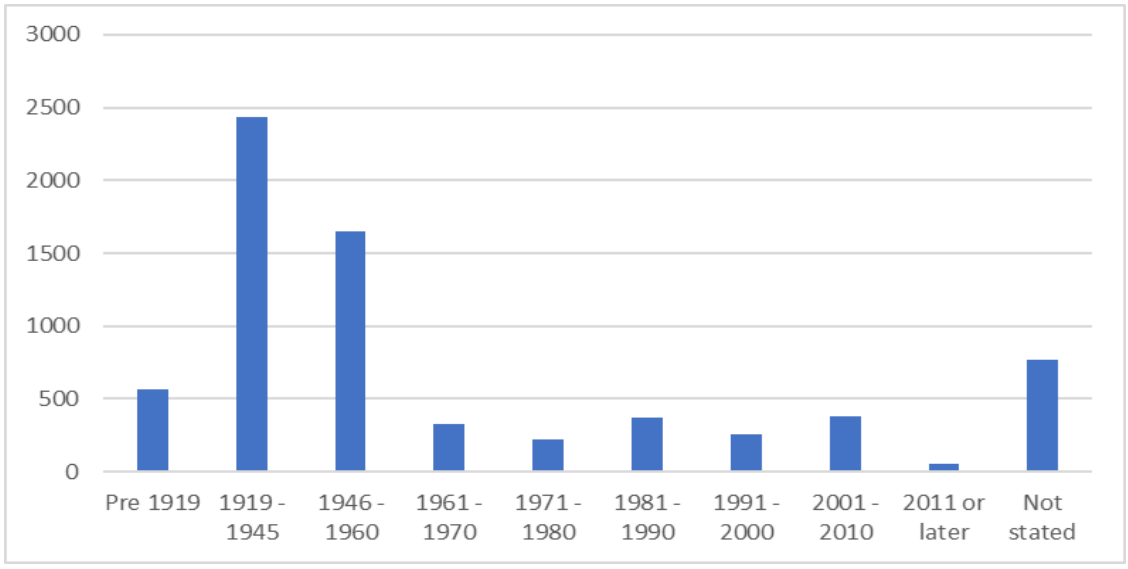


Figure 9- Summary of Age Profile of Dwellings

The age profile of domestic dwellings is shown in Figure 9. 43% of the 7,038 dwellings were constructed pre-1945, while 9.1% of dwellings were built between 1991 and 2010.

5.2 Dwelling Type and Ownership

Figure 10 shows the distribution of dwelling ownership with the majority being owner occupied. 58% of residents own their home in Cabra, 22% of households are rented from a private landlord while 13% of households are rented from the Local Authority.

The ownership profile has a bearing on the potential for energy efficient retrofits, especially in the private rented sector where there is little incentive for a property owner to invest in energy efficiency while the benefit of reduced energy costs and increased comfort is accrued to the tenant. This effectively rules out the privately rented dwellings as candidates for energy efficient retrofits. A Local Authority is more likely to invest in energy efficiency than a private landlord.

80% of dwellings are houses/bungalows and 17% of dwellings are apartments/flats. This may have impacts on the scope for energy efficient retrofits considering the practicality of certain measures (e.g. fabric upgrades, solar PV, heat pumps) in apartments and flats and other packages of measures need to be considered.

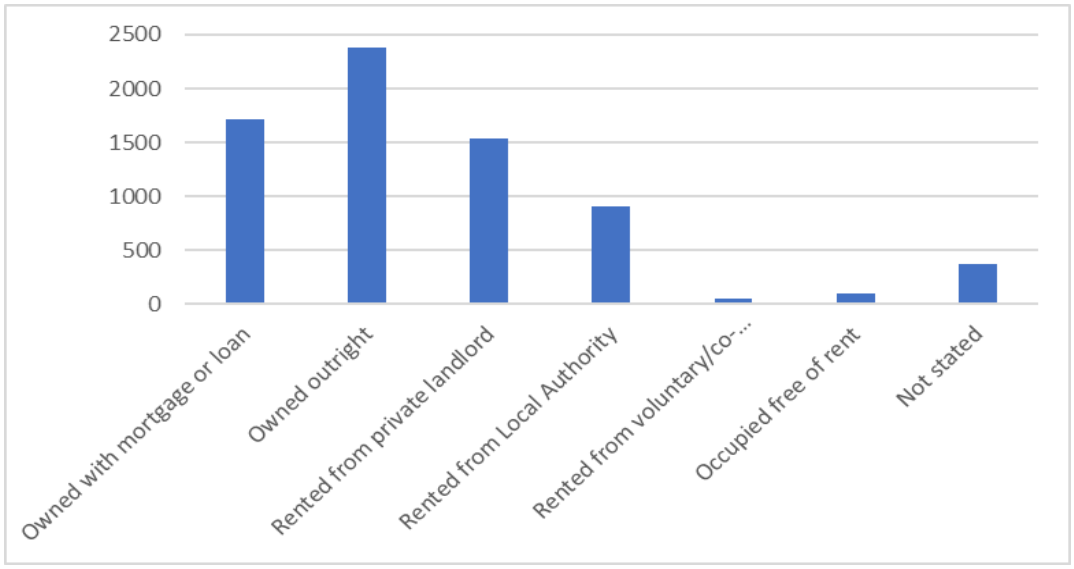


Figure 10- Summary of Dwelling Ownership

5.3 Heating and Hot Water

The predominant means of heating is natural gas (Figure 11) accounting for 71.2% of the heating. Only 1.6% of households are heated electrically supplemented by solid fuels (coal, peat and wood) and 5.6% of households use oil as their primary source of heating. The main electricity use in the SEC is therefore for lighting and appliances with some consumption for domestic hot water supply although it accounts for 14.6% of heating as well.

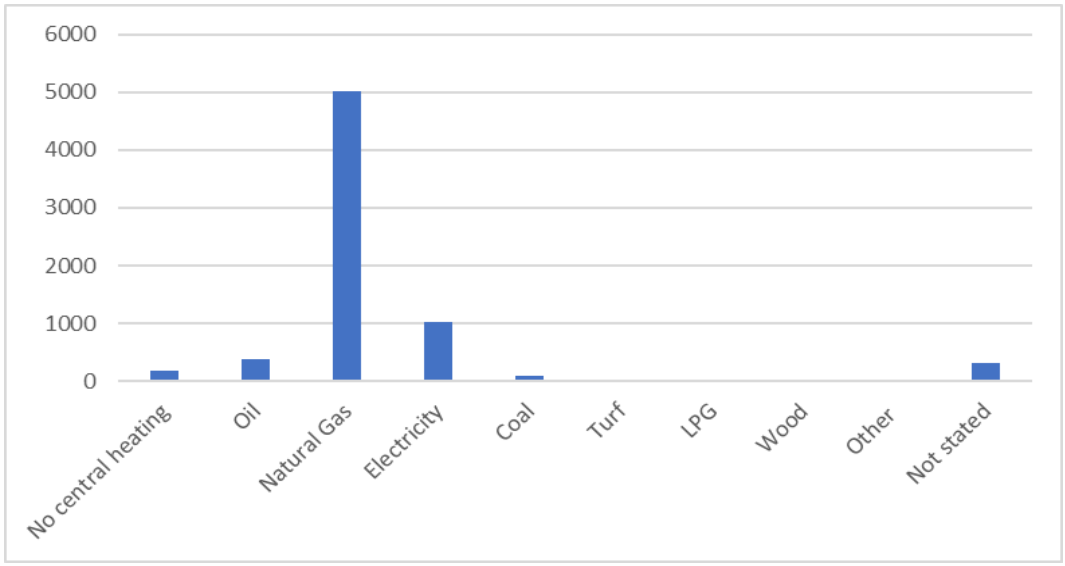


Figure 11- Distribution of heating Type

6 Community Survey

Connecting Cabra SEC carried out a very successful survey of residents with fifty-eight respondents. The survey served a dual function of capturing information on attitudes and behaviours in relation to sustainable energy and engaging with and recruiting households and individuals to the SEC. 55 of these provided contact details and expressed support and an interest in taking part in future Communities energy efficiency projects.

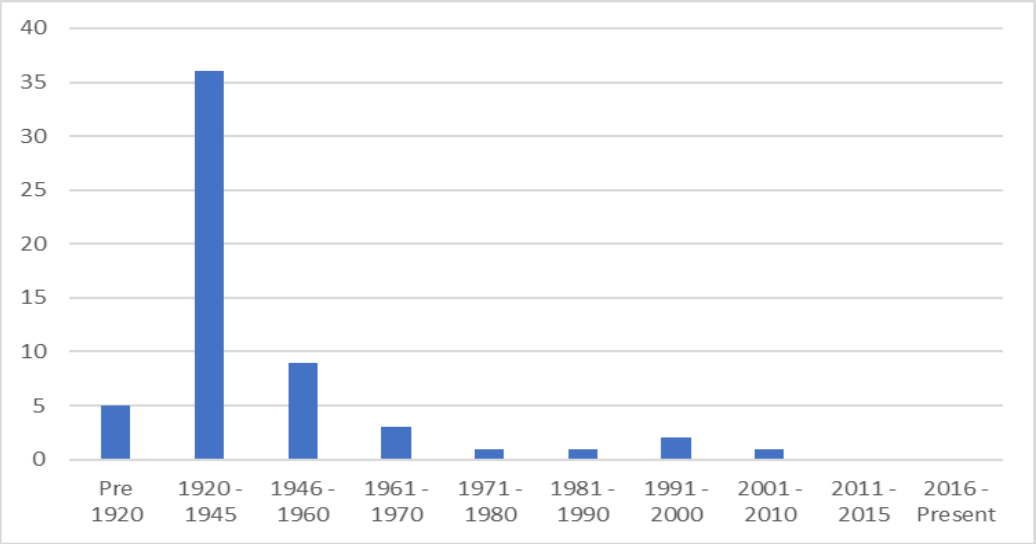


Figure 12- Year of construction of dwellings surveyed.

Figure 12 shows the age distribution of the houses surveyed. The profile does not match that of the whole SEC exactly but 71% of the houses are pre-1945 compared to 43% of all dwellings in the SEC, in both this was the majority. As with the entire SEC, this indicates a good scope for potential energy efficiency upgrades. 55 respondents provided a BER rating for their house. 16 had a rating of C or worse and 7 have a rating of E1 or worse. 35 respondents said they did not have a BER. Based on SEAI data (Section 3.3) the average BER in the SEC is E1, so the BER of the respondent sample is slightly better than in the entire SEC. However, the BER distribution of the survey still indicates a good potential for energy efficiency gains.

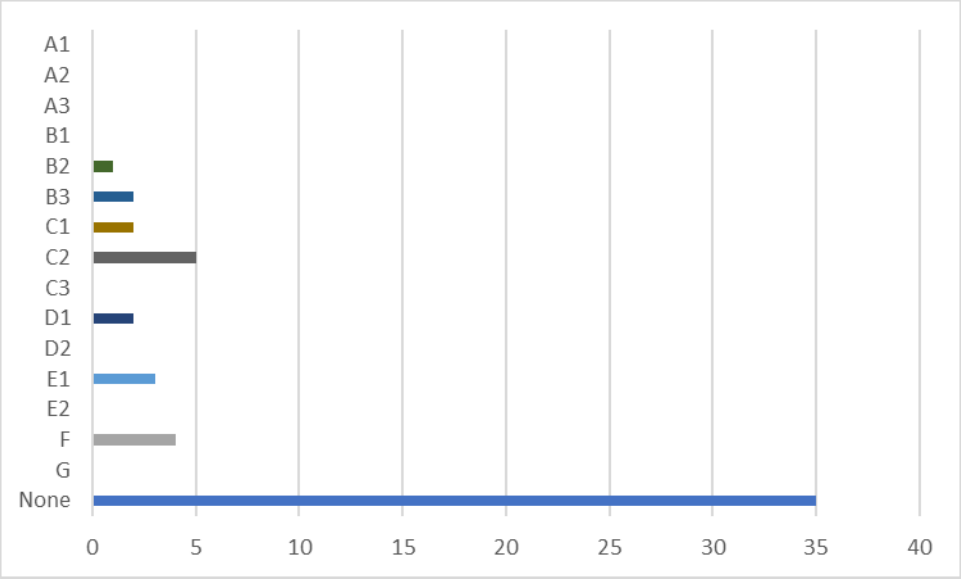


Figure 13- Distribution of BERs

Respondents are generally satisfied with comfort levels in their homes with 45.4% being quite comfortable or extremely comfortable, but, notwithstanding this, 94.6% think that improving energy efficiency would improve comfort levels. 85.9% think that energy efficiency upgrades would increase their home's value. This follows through to the potential to invest in energy efficiency with 86.0% of respondents being very likely or extremely likely to invest in energy efficiency.

This represents a significant potential pipeline of projects and Cabra SEC will maintain contact with the respondents who provided contact details to encourage and facilitate projects.

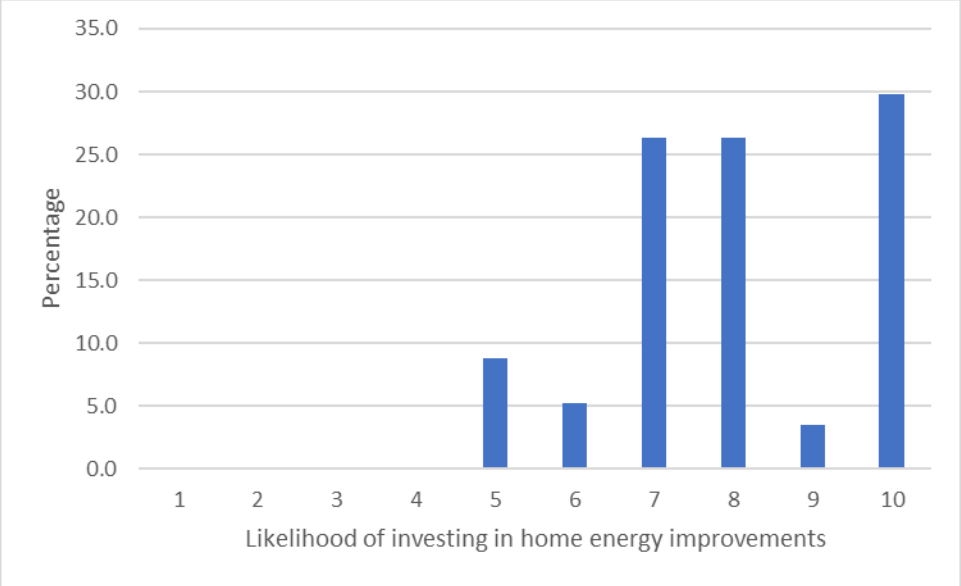


Figure 14 Potential to invest in energy efficiency

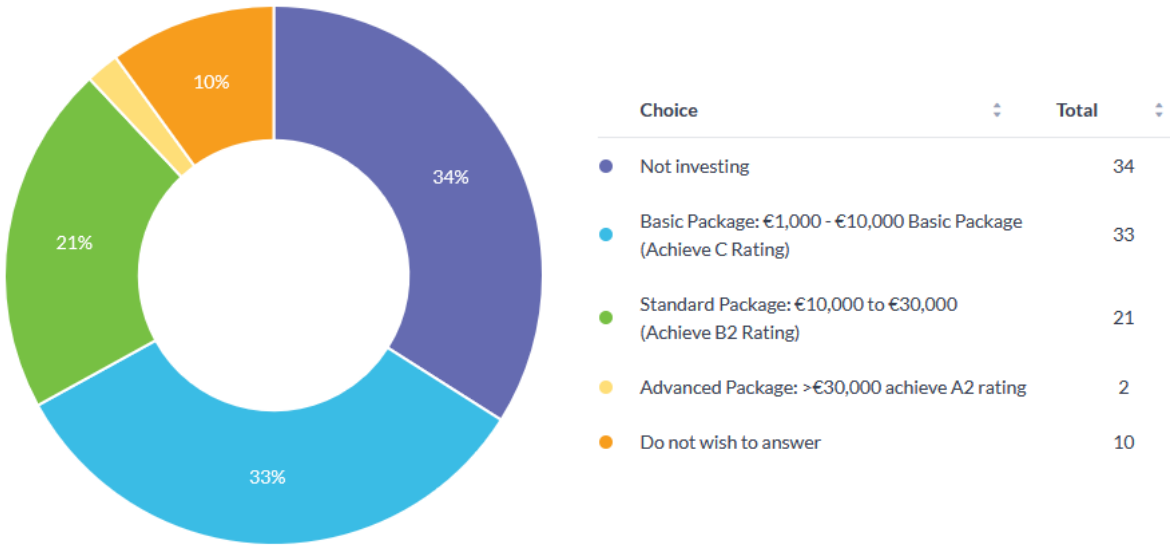


Figure 15 Likely budget for investment in energy efficiency in the next year or so

7 Register of Opportunities

The register of opportunities (RoO) primarily comprises the accompanying excel spreadsheet which is designed to record potential projects through identification, commitment, and implementation.

The register of opportunities for residential has been developed as a template for specific houses and projects with a general register of opportunities for the sector. The register should be populated with households committed to and implementing energy efficiency projects as they are identified.

The RoO for non-residential sites records potential projects identified through energy audits and similarly allows tracking from identification to completion.

Appendix 2 contains extracts from the RoO.

7.1 Residential Register of Opportunities

The housing in Cabra is mainly owner occupied with 1,964 dwellings being owner occupied (64.9% of households responding). There are 382 households renting from private landlords (14.8% of total households) and 117 local authority (4.5% total households). The main targets for energy efficient upgrades are owner occupied and local authority housing.

For owner occupied dwellings, the engagement of householders and recruitment for deeper engagement will be on an individual basis. Each householder will personally fund the works in their house and the recommended actions must be flexible and avoid being too prescriptive. A suite of measures from which householders may choose, depending on their budget and personal preferences will assist householders in making informed decisions and in meeting the objectives of Cabra.

As noted from the CSO data, the majority of houses are privately owned where the owner will have to fund the retrofit works. Local authority housing where retrofits are the responsibility of the local authority and privately owned rented accommodation where the split incentive is a significant barrier. Dwellings rented from local authorities will be upgraded by the local authority. Connecting Cabra SEC is engaging with Dublin City Council on retrofit plans for local authority housing.

The Lord Mayor attended and spoke at the SEC launch event and Dublin City Council fully supports Connecting Cabra SEC in the development of its Energy Master Plan. Having particular regard to the Sustainable Energy Roadmap and Register of Opportunities sections of the EMP, the Council is committed to collaborating with Connecting Cabra SEC, in the identification of Council buildings that could be included in the future implementation of the EMP and associated funding opportunities.

Engagement with the community and recruitment of householders planning upgrades is essential to achieving these goals.

A householder may choose to implement a starter package of measure without major cost and disruption. However, a standard or advanced package is a bigger investment and a bigger more complex project and could be carried out as part of a general refurbishment or an extension project than as standalone measures.

It is important therefore to capture houses where refurbishment work is planned to provide the option of grant aided energy efficiency measures. This could be done through general engagement and awareness, estate agents and planning searches.

In summary:

- The ambition to reduce energy consumption in owner occupied and local authority housing in line with national goals over the next ten years is challenging and entails, on average, a standard measure of packages.
- Engagement and recruitment of householders is key to achieving the targeted savings as is capturing interest and activity (e.g., works carried out under Better Energy Homes).
- Packages of measures must be flexible and must be adaptable to householders' preferences and budgets.

There are ambitious National targets for retrofits in dwellings including the plan to retrofit 500,000 dwellings to B2 by 2030 stated in the Climate Action Plan. This equates to approximately 25% of the National housing stock. Applied to Cabra SEC it equates to about 1,750 houses in total or 175 per annum. Cabra SEC plans to meet and exceed these national targets.

7.1.1 Domestic Audits

Audits of 10 households were carried out to determine the Building Energy Rating (BER) and to demonstrate measures and packages of measures as a pathway to improving energy efficiency. The houses were selected based on representativeness of typical house types in the area. They are referred to CC1 to CC10 to preserve anonymity. The average BER of the houses surveyed is a D1, which is better than the average BER in the wider SEC which is E1. Figure 16 shows the BER bands in kWh/ m^2/yr.

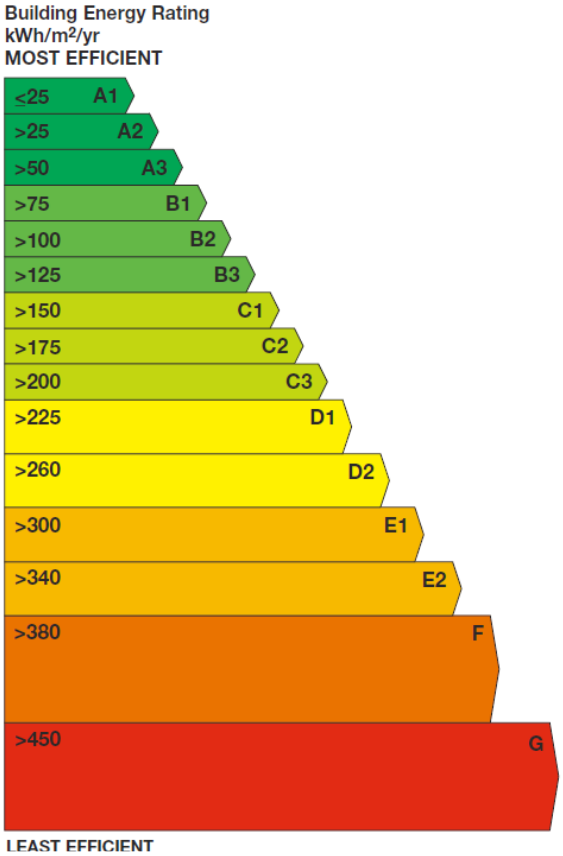


Figure 16 – BER grade ranges

The domestic energy audit reports are intended to provide a generic template for representative audits. So, for example, a house built in the 1930's may be likely to have had upgrades including the installation central heating, double glazing perhaps and a degree of roof insulation at some stage. The houses do not typically have substantial levels of existing wall insulation or solar PV

or heat pumps. In all cases pathways to improved energy performance are laid out in the energy audit reports.

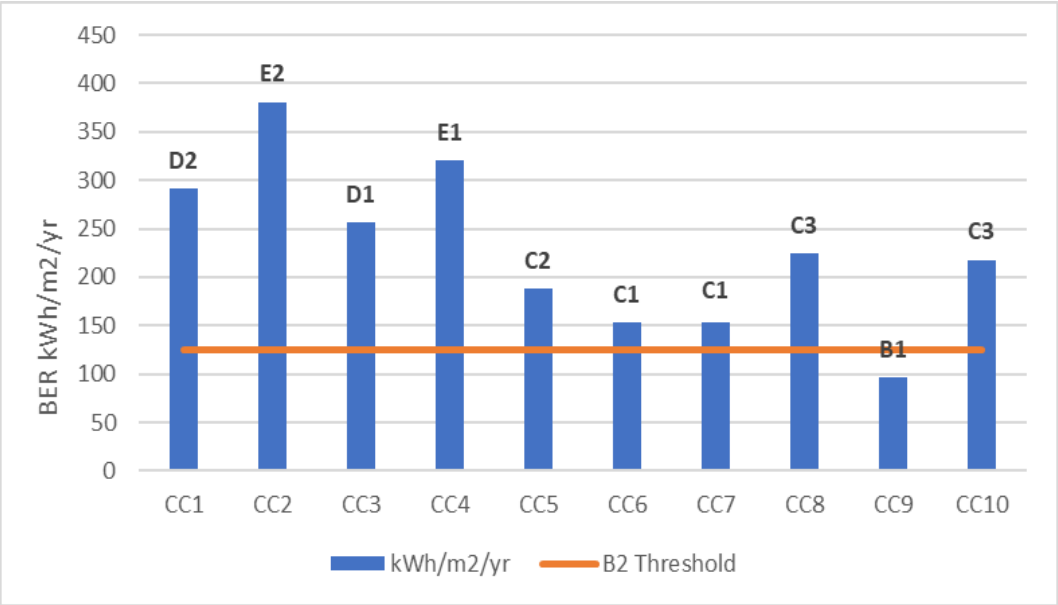


Figure 17 – BERs of Houses Surveyed

Table 3 below summarises the measures recommended for intermediate, advanced, and deep packages in the house types surveyed. Cells coloured green indicates recommended for all house types, red where it's not recommended and orange where recommended for some house types. Figure 18 shows the percentage improvement in energy performance for the intermediate packages. The average saving for the deep package across all ten houses is 83% with a 39% average saving for intermediate.

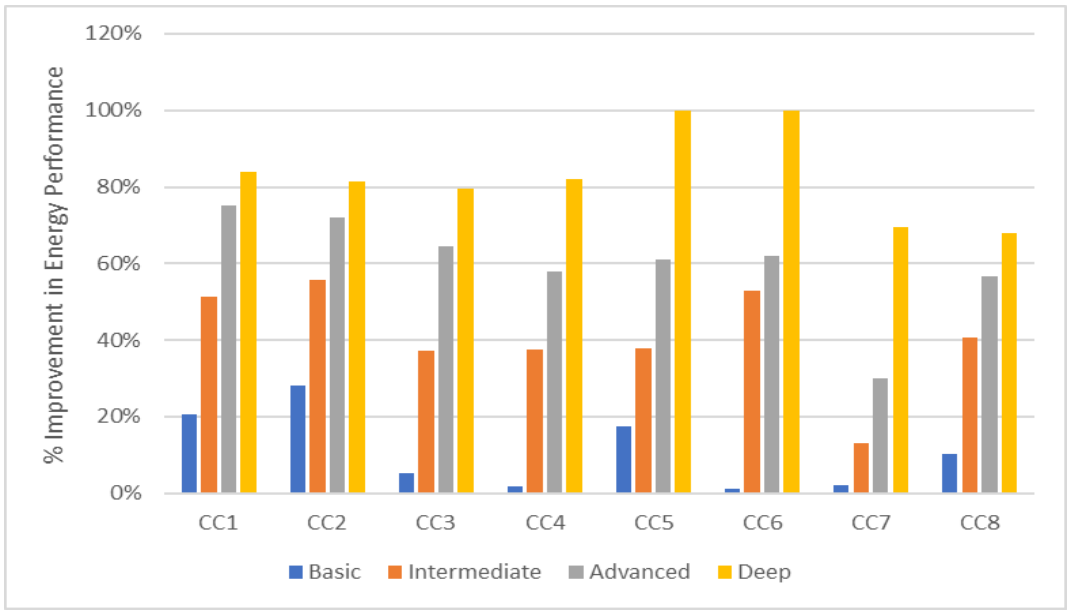


Figure 18 – Energy performance improvement for retrofit options.

The measures are generally self-explanatory and the detail for individual houses will tend to be bespoke. There is a brief discussion on some of the measures following and more information is available in SEAI's Upgrading to an A-Rated Home Guide.

Wall insulation is recommended for standard and advanced cost packages for houses that have some existing wall insulation. External wall insulation (EWI) is generally recommended for houses without any wall insulation.

Heating controls are recommended for some houses and heat pumps for all houses in deep packages. Up to three sets of measures are shown for each. The basic package typically includes lower cost measures such as low energy lighting and measures that don't conflict with additional deeper measures that might be implemented at a later stage. The standard package includes wall insulation, a condensing boiler and heating controls.

House ID	CC1				CC2				CC3				CC4				CC5				CC6				CC7				CC8				CC9				CC10			
Measure	Basic	Intermediate	Advanced	Deep	Basic	Intermediate	Advanced	Deep	Basic	Intermediate	Advanced	Deep	Basic	Intermediate	Advanced	Deep	Basic	Intermediate	Advanced	Deep	Basic	Intermediate	Advanced	Deep	Basic	Intermediate	Advanced	Deep	Basic	Intermediate	Advanced	Deep	Basic	Intermediate	Advanced	Deep	Basic	Intermediate	Advanced	Deep
Low energy lights					Y	Y	Y	Y	Y	Y	Y	Y					Y	Y	Y	Y					Y	Y	Y	Y	Y	Y	Y	Y					Y	Y	Y	Y
Roof Insulation	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y					Y	Y	Y	Y
Heating Controls	Y	Y	Y		Y	Y	Y		Y	Y	Y						Y	Y	Y										Y	Y	Y									
Internal Insulation						Y	Y	Y		Y	Y	Y	Y	Y	Y	Y					Y	Y	Y	Y														Y	Y	Y	Y
External wall insulation		Y	Y	Y		Y	Y	Y		Y	Y	Y		Y	Y	Y		Y	Y	Y		Y	Y	Y		Y	Y	Y		Y	Y	Y						Y	Y	Y
Windows		Y	Y	Y														Y	Y	Y										Y	Y	Y							Y	Y
Floor Insulation			Y	Y			Y	Y			Y	Y			Y	Y			Y	Y			Y	Y							Y	Y							Y	Y
A/W Heat Pump				Y				Y				Y				Y												Y				Y			Y						Y
Solar Photovoltaic			Y	Y			Y	Y			Y	Y			Y	Y			Y	Y							Y	Y			Y	Y			Y	Y			Y	Y

Table 2 – Recommended Measures and Packages

	Level of Domestic Retrofit			
Measure Implemented	Basic	Intermediate	Advanced	Deep
Low energy lights	Yes	Yes	Yes	Yes
Roof Insulation	Yes	No	No	No
Heating Controls	Yes*	Yes*	Yes*	No
Internal Insulation	No	Yes*	Yes*	Yes*
External wall insulation	No	Yes	Yes	Yes
Windows	No	Yes*	Yes*	Yes*
Floor Insulation	No	No	Yes	Yes
A/W Heat Pump	No	No	No	Yes
Solar Photovoltaic	No	No	Yes	Yes

Table 3 – Summary of Recommended Measures

7.1.2 Residential Costs and Incentives

The average investment cost and savings for the households surveyed are listed in Table 4. The basic and intermediate packages attract fixed rate grants through the Better Energy Homes and the advanced and deep packages attracts grants through the Communities or National Retrofit One Stop Shop programmes (excluding those measures that are not grant aided).

There is clearly a substantial investment from the householder, but the grant levels assist financially and provides an opportunity to improve comfort, reduce energy costs and enhance the value of houses. Funding through credit union loans or other financing mechanisms may also be available. Details on grants are contained in Section 9.

It should be noted that these costs are only indicative, and it is difficult to estimate costs in the current inflationary environment. Homeowners considering retrofits should contact potential

service providers for 2-3 quotes and discussing with neighbours who have completed similar projects before making a final decision.

	Average Cost	Average Saving	Payback (Years)
Basic	€1,430	€386	3.7
Intermediate	€19,184	€1,290	14.9
Advanced	€34,625	€2,022	17.1
Deep	€31,885	€1,847	17.3

Table 4 – Average Costs and Savings for Retrofit Packages

7.2 Commercial and Public Sector

7.2.1 Overview

The tertiary industry is the segment of the economy that provides services to consumers. There are several different types of service industries located in Cabra including Tesco on the Navan road, Lidl (which recently installed solar PV), Batchelors Beans factory on Bannow road, An Post Depot on Bannow road. There is also a swimming pool at Inspire fitness and School of the deaf site off Ratoath Road. Swimming pools typically uses a lot of energy. The Register of Opportunities could be extended by carrying out Energy Audits of these or other businesses; Arden Energy will carry out audits of additional businesses in Cabra that are interested in audits.

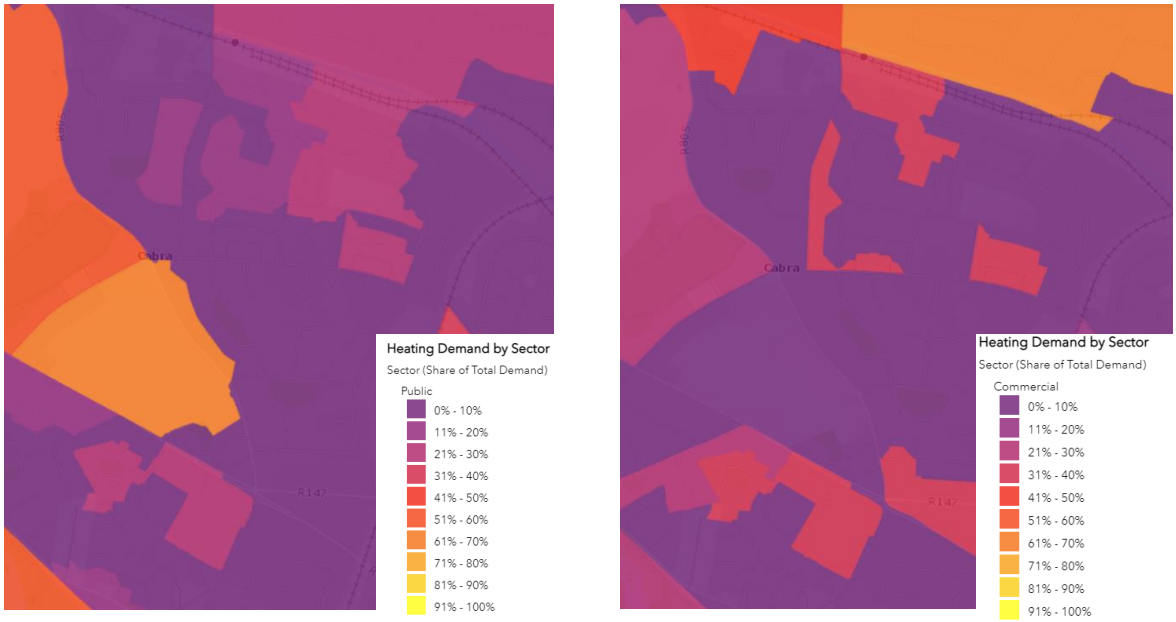


Figure 19 – Heat Map (Public – LHS & Commercial – RHS)

The combined tertiary sector accounts for just over 20% of total energy consumption in the SEC area. Figure 19 shows the proportion of heat demand accounted for by the public and commercial sectors individually in the area. There is generally no high concentration of heat demand in the area although the area-coloured orange to the left-hand side of the map for the public sector shows slightly higher demand in the public sector in this area. This area includes the holy family school for the deaf St. Declan's college and Cabra Parkside Community Sports Centre.

Cabra Parkside Community Sports Centre had an energy retrofit in 2019 comprising new LED lighting, Improved building control systems for effective management of all equipment and renewable energy measures through the installation of solar photovoltaic panels [4].

Engagement with commercial operations should be considered as the commercial sector provides opportunities for significant energy savings with fewer sites and can improve the value for money assessment in a SEAI Communities grant application.

[4] https://dublinclimatechange.codema.ie/success-stories/dublin-city-council-awards-second-energy-performance-contract/

Community organisations such as sports clubs are valuable demonstrators, where energy efficiency projects promote awareness of the SEC and of energy efficiency in the community. Likewise, schools act as educators and promote the concept of energy efficiency. Projects in these types of organisations therefore have a multiplier effect and are encouraged in SEAI's community programme.

During the development of the EMP and RoO we sought to identify and engage with commercial and public sector organisations that might be suitable for energy efficient retrofits. Commercial and Public Sector buildings were identified through the Valuation Office and through local knowledge.

Site surveys of the following sites were carried out:

- Christ The King Girls' National School.
- Christ The King Parish Schools' Boys.
- Naomh Fionnbarra GAA Club.

7.2.2 Energy Consumption in sites surveyed.

Table 5 following summarises the annual electricity and gas consumption for Christ The King Girls' National School, Christ The King Parish Schools' Boys and Naomh Fionnbarra GAA Club. The estimates are based on actual bills over 2019 and into early 2020 prior to the introduction of COVID related restrictions.

Site	Energy Source	kWh/yr	€/yr	CO2 (T/Yr)
Christ The King Girls' National School	Electricity Imported	24,314	€5,772	8
	Natural gas	66,931	€5,055	14
Christ The King Parish Schools' Boys	Electricity Imported	22,716	€3,912	8
	Natural gas	66,931	€5,055	14
Naomh Fionnbarra GAA Club	Electricity Imported	37,190	€10,587	13
	Natural gas	139,268	€13,396	28

Table 5 – Energy Consumption in Tertiary Sites Audited

7.2.3 Energy Uses and Retrofit Opportunities

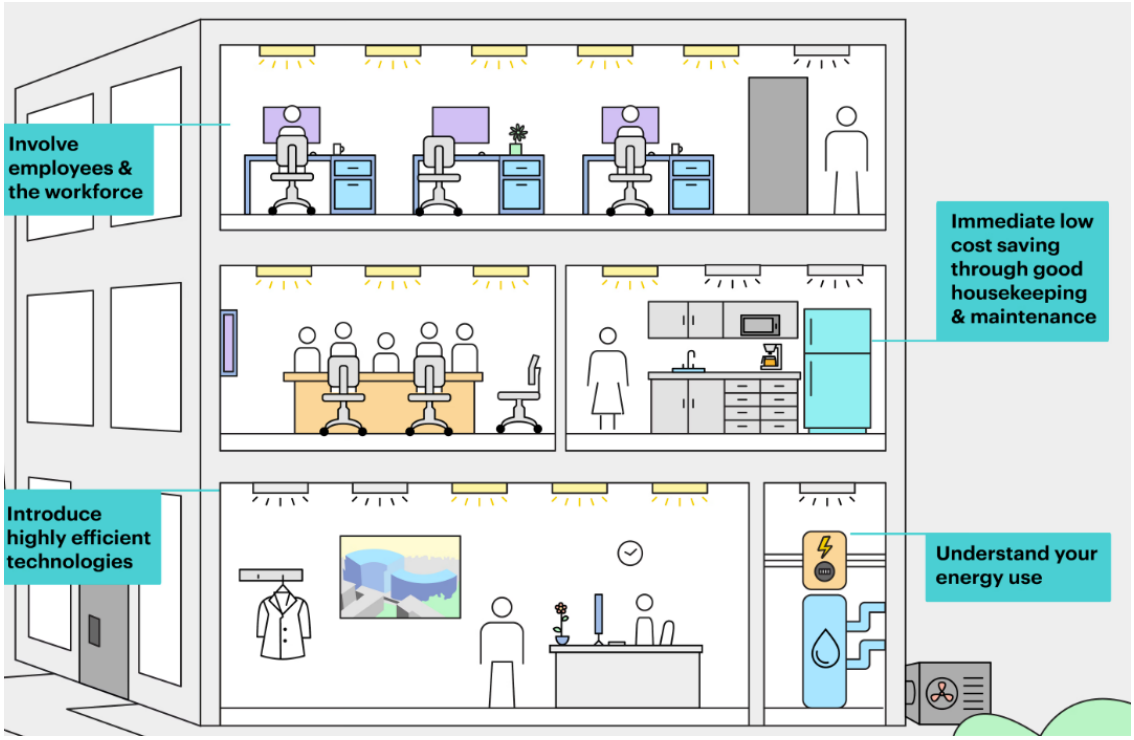


Figure 20 – Opportunities for Energy Efficiency (International Energy Agency (IEA))

Low Energy Lights

Lighting is a significant energy use in all buildings. Switching to lower energy lighting such as LEDs will lower bills. For example, switching a typical double linear fluorescent fitting (139W) with a 60W equivalent LED fitting would reduce electricity consumption by 57% and replacing a 50W halogen lamp with a 6W equivalent LED would save almost 90%. In general LEDs use approximately a 20-40% of the energy of alternatives thus also reducing your carbon footprint. Furthermore, LEDs last up to ten times longer than halogen bulbs.

Heating Controls

Space heating is the largest energy use in most buildings. Upgrading the heating controls of a building results in a warmer, more energy efficient structure. By installing heating controls energy usage can be reduced by up to 20% and save money on your heating bills. For example, zoned controls with independent time and temperature control allows heat supply to be targeted to only those areas that need heating, thus cutting out unnecessary energy usage.

Heat Pump

For buildings with existing direct electric heating (eg storage heaters) installing an air to air heat pump, sometimes called a split system air conditioner, would improve efficiency. A heat pump would have a typical efficiency of up to 500% compared to the efficiency of less than 100% for storage heaters. It would also be easier to control and more responsive to demands and would improve comfort.

Typical Indoor Unit for Air to Air Heat Pump

8 Renewable Energy and Active Consumers

8.1 Renewable Energy Sources

Renewable sources of energy are the cleanest source we can produce in terms of greenhouse gas emissions and increasing the proportion of energy sourced from renewable sources is central to national and EU energy and climate change policy. Renewable Energy Sources include:

- **Solar Photovoltaic**
  Solar PV panels convert energy from light directly into electricity. The cost of solar PV panels has fallen by around 90% in the past 10-15 years making the business case for solar PV a reasonable investment.

- **Solar Thermal**
  Solar thermal panels convert the energy from sunlight into heat, usually for domestic hot water. It is a proven and reliable technology but possibly has a longer payback than solar PV. It is also slightly more complicated to install in existing buildings.

- **Wind**
  Wind turbines convert energy from the wind into electricity. Larger 'utility scale' wind turbines are common. There are small scale wind turbines available, but these work best in rural areas with uninterrupted wind flows. Turbulence from building and other obstacles reduces the yield from small wind turbines significantly and they are not suitable for urban areas.

- **District Heating**
  District heating systems deliver space and water heating through a network of insulated pipes. Energy in the form of heat is produced in large, centralised plants (Energy sources include Geothermal, heat pump, Biofuel based plants, and Waste-Heat). District heating systems are widely used in Europe and provide 90% of the heat in Sustainable cities such as Copenhagen and Stockholm. In Ireland, district heating systems have a relatively low level of adoption, but recently, there is a greater interest in District heating with a scheme recently established in Tallaght and a long-planned scheme supplying waste heat from the waste incinerator to buildings in the Dublin docklands and surrounding areas.

8.2 Solar Photovoltaic

Solar PV panels are those that generate electricity when exposed to light. They are the rooftop solar you see on roofs and businesses. There are numerous benefits to switching to a solar PV system. These benefits include lower electricity bills and an improved BER. Thus, when it comes to selling your home, a higher BER will add value and help you achieve a higher sale price, as well as reducing your energy waste. Using a solar PV system means you are generating your own renewable energy. This has great benefits for our environment and lowers your greenhouse gas emissions.

Solar PV panels are rated in kWp (kW peak). By definition, 1 kWp generates 1 kWh of electricity per kWh/m2/yr of solar insolation. The average solar insolation in Ireland is 962 kWh/m^2/yr.

The electricity produced by the PV module in kWh/year is

$$\textit{Solar Output (kWh/yr)} = 0.80 \times \textit{kWp} \times S \times \textit{ZPV}^{5}$$

[5] SEAI Dwelling Energy Assessment Procedure

where S is the annual solar radiation (kWh/m2/yr), ZPV is the overshading factor and 0.8 is a factor accounting for system losses.

Tilt of collector	Orientation of collector				
	South	SE/SW	E/W	NE/NW	North
Horizontal	963				
15°	1036	1005	929	848	813
30°	1074	1021	886	736	676
45°	1072	1005	837	644	556
60°	1027	956	778	574	463
75°	942	879	708	515	416
Vertical	822	773	628	461	380

Figure 21 – annual solar radiation (insolation) for different orientations and tilt (SEAI)

So, according to SEAI's methodology, a 1 KW unshaded, south facing solar PV installation at a tilt of 30 degrees would yield 859 kWh per annum.

The European Commission has developed a simple online PV calculation PVGIS. According to PVGIS, the yield for a 1 kW south facing, 30-degree tilt solar PV installation in Cabra would be 930 kWh/yr.

A reasonable rule of thumb would be around 900 kWh per annum for a 1 kW solar PV system. The value of this electricity is the marginal cost of electricity, that is the daytime unit rate paid.

Cost-Benefit and Supports

Solar PV installations can cost from €2,200/kW to €1,000/kW depending on size. A 3kW system would cost around €6,000 while a 6kW system would cost around €9,000 so there are economies of scale. A solar system has generally been designed around on site demands and to avoid excessive export in the absence of an export tariff.

A Microgeneration Support Scheme which provides an export tariff was recently established. The scheme provides a Clean Export Guarantee tariff offered by electricity suppliers at around the wholesale market rate for electricity. A Clean Export Premium set at a level to incentivise solar PV further is also mooted.

At present, the installation of solar photovoltaic (PV) panels can be funded through the SEAI community grant or the domestic Solar PV grant.

In order to be eligible for the SEAI's solar PV grant the dwelling must be built and occupied before 2011 and must have a BER rating of C or greater. As part of the advanced package, the solar PV grant would be included. For a solar PV grant, one would receive €900 per kWp up to 2 kWp and €300 for every additional kWp up to 4kWp if you get a battery. For example, you will receive €1,800 for 2kWp solar panels (i.e. 6/7 solar panels). Battery energy storage systems are used for larger solar PV systems, so that the excess electricity generated during daytime hours can be used at another time. They are only recommended for suitable dwellings and can receive a grant of €600.

	Indicative Cost	Grant	Cost after grant	Annual Generation (kWh)	Value of Electricity (€/yr)	Payback
2 KW Solar	€4,400.00	€900.00	€3,500.00	1,800	€385.20	9
4 kW Solar	€7,000.00	€2,400.00	€4,600.00	3,600	€770.40	9

Table 6 – Solar PV Cost Benefit summary

8.2.1 Planning Requirements

New planning permission exemptions for rooftop solar panels on homes and other buildings were published on Friday 7th October 2022. Planning permission is no longer required for solar PV installations.

8.2.2 Heat Pumps

An alternative to fossil fuel heating systems is an air source (AS) heat pump which would offer lower running costs and reduced carbon emissions. Heat-pumps are electrical devices which convert energy from the air outside of your home into useful heat. They are an extremely efficient supplementary system in retrofit situations to reduce reliance on oil, gas, solid fuel and electric home heating systems and thereby reduce your carbon footprint.

One of the requirements for a dwelling to qualify for a heat pump system grant is that the dwelling has a low heat loss. This requires buildings to be correctly insulated to a high standard The efficiency performance of the heat pump depends on buildings having a Heat Loss Indicator (HLI) of at least 2.0 or under. This is to ensure your heat pump system performs well and ~~your~~ and does not adversely affect your electricity bills. Once again this is why it is recommended in the advanced package of domestic retrofit measures. The grant for an air source heat pump through the SEAI is €3,500. The insulation required is also grant aided.

8.3 Energy Communities and Active Consumers

The Clean Energy for all Europeans Package (CEP) contains provisions for the empowerment of individuals and groups of consumers seeking to participate in the electricity sector.

The Commission for the Regulation of Utilities (CRU), which is responsible for regulation of energy and water supply, recently published a paper titled “Energy Communities and Active Consumers”. The CRU defines a ‘citizen energy community’ as a legal entity that is based on voluntary and open participation and is effectively controlled by members or shareholders and has for its primary purpose to provide environmental, economic, or social community benefits to its members or shareholders or to the local areas where it operates, rather than to generate financial profits; and, may engage in generation, including from renewable sources, distribution, supply, consumption, aggregation, energy storage, energy efficiency services or charging services for electric vehicles or provide other energy services to its members or shareholders.

When appropriate market and regulatory arrangements are instituted, this will give communities such as Cabra the opportunity to become energy independent. This has already been achieved by Samso, an island in Denmark. They managed to become 100% green by working on community projects such as solar and wind farms.

Supports are available for Community Energy initiatives including the following.

- Renewable Electricity Support Scheme (RESS)

  The Renewable Electricity Support Scheme (RESS) has been set up by the government to promote investment in renewable energy generation in Ireland. RESS is a competitive auction-based framework will help achieve Ireland's targets for electricity generation from renewable sources by 2030. RESS is designed to help deliver community participation through community-led projects and community benefit funds.

  Community-led projects can apply for RESS if they meet the following criteria[6]:

  1. Application must be made in conjunction with a Sustainable Energy Community (SEC) such as the Cabra SEC;
  2. Project size must be between 0.5 and 5MW;
  3. The Community group must be based on open and voluntary participation; and,
  4. Participation to be based on local domicile.

  This latter criterion limits participation based on proximity so the renewable energy project would need to be close to Cabra SEC to qualify[7]. There are presently proposals to open up for citizen and community participation in renewable energy projects and Cabra SEC is monitoring these developments in the hope of being able to participate in community power initiatives.

  The main limitation for Cabra is the availability of land for a solar farm. A 5 MW solar farm occupies about 25 acres or more of land. It is not possible to aggregate rooftop solar for the purposes of RESS.

- Community Benefit Funds

  A mandatory Community Benefit Fund must be provided by all projects successful in a RESS auction. The contribution is to be set at €2/MWh generated by successful projects. The Fund will be targeted at encouraging investment in local renewable energy, energy efficiency measures and climate action initiatives. The community benefit fund under RESS-1 will deliver approximately €4.5million a year to sustainable community initiatives targeted at those communities living in close proximity to the RESS-1 Projects.

  Given its urban location, this scheme is unlikely to benefit CCSEC.

  The results of RESS-1 (the first auction under the new regime) will be announced in the near future and the level of funding being made available to communities should become more visible.

[6]In February 2021 it was announced that Community-led projects seeking to apply to future RESS auctions, must be 100% owned by the community (to gain 15-year support from Government in the form of a premium on top of the market price), as opposed to being majority owned as for RESS-1.

[7] RESS requires that Community projects must be owned by a Renewable Energy Community. The exact definition of a Renewable Energy Community is part of a wider consultation on Energy Communities and Active Consumers. One proposal is based on connection to the same 38 kVA substation.

8.4 District Heating

District heating provides a local-level solution to enable Communities to decarbonise heat while integrating more renewable electricity. District heating systems deliver space and water heating through a network of insulated pipes. In much the same manner as electricity is delivered to residential and commercial buildings, energy in the form of heat is produced in large, centralised plants (Energy sources include Geothermal, heat pump, Biofuel based plants, and Waste-Heat).

District heating systems are widely used in Europe and provide 90% of the heat in Sustainable cities such as Copenhagen and Stockholm. In Ireland, district heating systems have a relatively low level of adaption, but recently, the Irish authorities have developed a greater interest in District heating. Codema, tasked with energy planning for the Dublin Local Authorities, have developed exciting heat mapping tools that analyse the correlation between heat load and potential sources. Codema claims that District heating represents the most feasible low-carbon heating option for 87% of heat demand in Dublin by 2050; this equates to 538,983 homes and 41,394 businesses being heated by DH. Heat pumps are the most feasible option for 13% of the heat demand in Dublin by 2050 serving 72,528 homes and 5,600 businesses. The figure below demonstrates the potential for District heat in greater Dublin by analysing the Renewable/Waste potential and areas suitable for district heating.

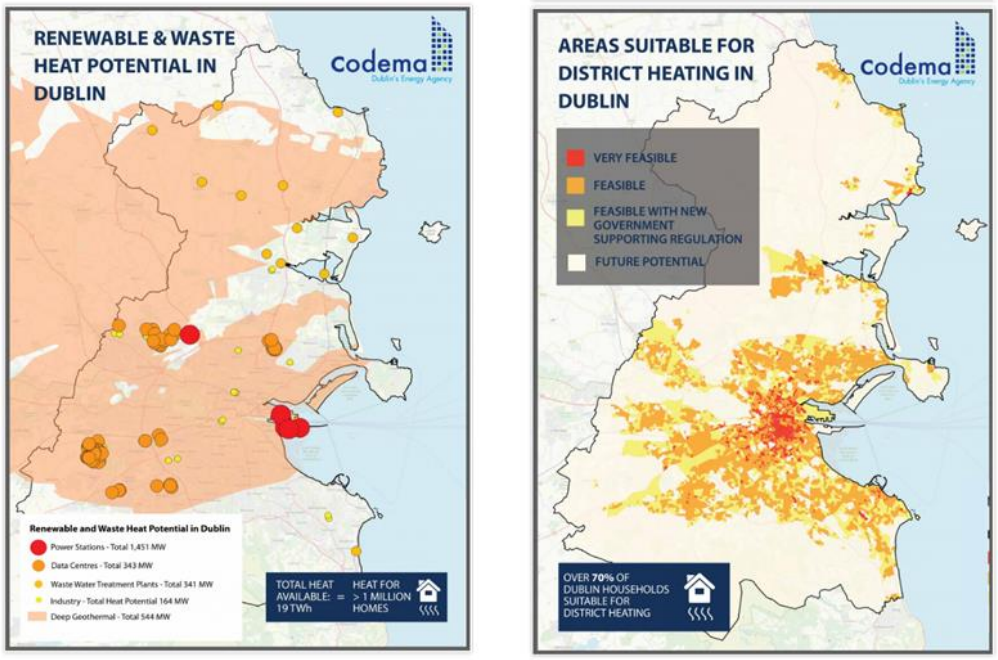


Figure 22 – Dublin Renewable/Waste heat potential and Areas of suitability (SEAI)

District Heating may resolve many issues of phasing out fossil fuel in existing buildings. The OPW submitted a report (report) which outlined the significant challenges of using decentralised RES Heat technology to phase out fossil fuel in existing public buildings. A central point in the report is the challenge of integrating renewable heat-based technologies; neither heat pumps nor biomass are drop-in solutions for existing fossil-based boilers. Heat pumps, in particular, can generally only be installed in existing buildings as part of an extensive building upgrade project which in many cases is not financially feasible. Bio-fuel-based technology requires space for plant integration and access for fuel delivery, the lack of which in an urban setting provides a significant challenge. However, district heating systems which utilise a large centralised plant/or local waste heat source provide an interesting solution.

Recently, there have been several District heating R&D initiatives and demonstrations in the greater Dublin area. The most notable demonstration is the Tallaght District Heating Scheme (TDHS), which will be the first large-scale district heating network of its kind in Ireland. The

Tallaght area was identified as having a high heat demand density, a key indicator for district heating viability; statistics were made available through SEAI Heat Map tool. Harnessing the waste heat and passing it through a large-scale heat pump can achieve far greater efficiencies than air-source heat pumps, even when supplying at high temperatures. Supplying hot water up to 85°C through the district heating network makes the system fully compatible with existing building heating systems. In addition, the Tallaght District Heating Scheme (TDHS) was developed by forming an Energy Community, which aligns with the EU's Clean Energy Package ambition for Community Ownership of the local RES Plant.

8.5 TU Dublin Geothermal Research and Potential for District heating in Cabra.

Recently, there has also been a significant breakthrough in using Geothermal Energy for district heating in the Dublin City Area. TU Dublin has partnered with Geological Survey Ireland to explore the geothermal resource beneath Dublin City Centre. In 2021, a temperature of 38° degrees Celsius was measured in an exploratory borehole at a depth of 1km beneath the surface. Given that there should be a constant increase in temperature with an increase in depth, these results indicate that the high energy capacity required for district heating (Op temperature~ 80-90°degrees), may be located at drilling depths of 2km and 3km.

District heating schemes are high capital expenditure projects and almost certainly have to be led by local authorities. Should the long-planned Dublin District Heating scheme be developed it could provide a template for replication in other district heating schemes in Dublin City.

Figure 23 – Borehole at TUD

8.6 Smart Meters

A Smart Meter measures electricity usage, similar to a traditional meter, without the need for estimated meter readings. With Smart Meters, you no longer have to submit readings or have someone read the meter. Smart meters will help people understand better the way electricity is consumed in their homes and about the sources of electricity. Smart digital meters will give people control and more choice when it comes to their energy practice.

For example, a smart meter allows a person to change their energy use to a time when the grid is not under pressure or supplied mostly with renewable energy and therefore has lower electricity tariffs and cleaner energy. The installation of smart digital metering has already commenced across Europe and internationally.

The phased rollout in Ireland started in 2020 and will continue for four years to 2024. It is expected that around 2.3 million electricity smart digital meters will be installed in homes and businesses nationwide, replacing old mechanical meters. You can contact your supplier to see when you are in line to have your smart meter installed. If you have already had a smart meter installed, you should contact your supplier to enquire about time of use tariffs and smart data services available.

9 SEAI Grants

When considering retrofitting your home, it can be difficult to determine the most financially beneficial method. Today SEAI have three main grant schemes to help with the cost taken on by homeowners when trying to make their premises more energy efficient:

1. Community Grants Scheme
2. One Stop Shop Service
3. Individual Grants including Fully Funded Energy Upgrades

9.1 Communities Grant

SEAI's Communities grant is generally open for applications on a first come first served basis each year. It tends to be launched for applications in the latter part of the year for delivery of projects the following year. The grant gives preferential treatment to applications with a strong SEC participation.

The SEAI Community Grant supports energy efficiency community projects through capital funding, partnerships, and technical support. To successfully apply for a community grant there are several requirements the proposal must meet. Firstly, projects are required to demonstrate a building fabric first approach meaning that they must be as energy efficient as possible, decarbonise heat considering and utilising renewables where feasible, improve ventilation and adopt smart technologies as appropriate. Projects should prioritise the delivery of homes to a minimum BER of B2 (homes constructed after 2011 can't be included). A minimum of 10 homes must be included in the proposal and an SEC should also be involved. All homes require a pre- and post-works Building Energy Rating (BER) to be completed and published. Local Authority Homes are exempt from publishing a pre-BER. The domestic grant rates are identical to the grant offerings under the One Stop Shop scheme, see Table 6.

Connecting Cabra SEC and interested householders should contact project co-ordinators[8] and one-stop shops[9] to discuss potential projects and the possibility of including projects in Cabra in a grant application.

Main points of the grant schemes include:

- Fossil fuel boilers are not grant aided,
- The minimum post works BER for dwellings is B2 (<125 kWh/m^2/yr)
- Community Grant levels are 30% for non-domestic. Higher grant levels are available for fuel poor households and for voluntary community organisations as well as schools and some other non-domestics which may qualify for a 50% grant. See SEAI's website for further details.
- A project co-ordinator needs to assemble various projects and submit an application which when aggregated, meets the schemes criteria.

For the SEAI Community grant, the minimum post works BER is B2. (Building Regulations also require a minimum BER of B2 where >25% of the total building fabric is upgraded). Individual measures can still be funded through the Better Energy Homes scheme.

Connecting Cabra SEC has hopes to apply for a communities grant in the future. This will require commitment from businesses and householders. As that commitment is achieved the RoO should be updated and an application form and workbook completed.

[8] https://www.seai.ie/grants/community-grants/project-coordinator/

[9] https://www.seai.ie/grants/national-home-retrofit/one-stop-shops/

9.2 One Stop Shop

The idea behind the One Stop Shop service is to offer homeowners all the services required for a complete energy upgrade. A One Stop Shop is a registered private operator who manages the entire process of a home energy upgrade from the initial BER assessment to the post-works assessment. Other benefits unique to the One Stop Shop service include a wider range of grants offered and grant values are deducted from the cost of the works up front.

Here is a brief summary of the process if you chose to carry out retrofits through a One Stop Shop:

- After contacting a One Stop Shop, you will be asked some basic questions to determine if your home is suitable for an energy upgrade and what supports are available.
- Onsite review carried out by One Stop Shop
- A BER assessor will visit your home and carry out a BER and technical assessment, energy bills will be requested (SEAI grant available of €350 towards the cost of a Home Energy Assessment)
- If you are happy with the assessment and recommendations, the One Stop Shop will apply and accept all SEAI grants for your project and deduct the values upfront from the cost of your works.

	Private Homes			
Measure	**Detached**	**Semi-Detached / End Terrace**	**Mid Terrace**	**Apartment**
Heat Pump	€6,500			€4,500
Central Heating System for Heat Pump	€2,000			€1,000
Heat Pump Air-to-Air	€3,500			
Heating Controls only	€700			
Launch bonus for reaching B2 with a Heat Pump	€2,000			
Ceiling Insulation	€1,500	€1,300	€1,200	€800
Rafter Insulation	€3,000	€3,000	€2,000	€1,500
Cavity Wall Insulation	€1,700	€1,200	€800	€700
External Wall Insulation	€8,000	€6,000	€3,500	€3,000
Internal Wall Insulation	€4,500	€3,500	€2,000	€1,500
Windows (Complete Upgrade)	€4,000	€3,000	€1,800	€1,500
External Doors (max. 2)	€800 per door			
Floor Insulation	€3,500			
Solar Thermal	€1,200			
Solar PV	0 to 2 kWp €900/kWp 2 to 4 kWp €300/kWp			
Mechanical Ventilation	€1,500			
Air Tightness	€1,000			
Home Energy Assessment	€350			
Project Management	€2,000	€1,600	€1,200	€800

Table 7 – Grant amounts available under One Stop Shop and Community Grant Scheme

9.3 Individual energy Upgrade Grants

SEAI's Better Energy Homes Grants provide grants for selected individual measures as an alternative to the combined measures approach in the Communities and National Retrofit grants.

Homeowners are well within their right to choose to manage their own energy upgrades. These upgrades can still receive grant funding if they fall under certain criteria. This option is suitable if you are looking to carry out individual upgrades. If you are selecting this option you must manage your own project and pay for full cost of works and claim grants after. To qualify for funding, a BER assessment must be carried out and the contractor you employ must be from the SEAI register who must be registered for the type of work that they are carrying out and put a contract for works in place with you before work begins. Finally, you must have grant approval before you begin works. The specific works for which you can receive funding can be seen in Tale 2.

Some homeowners can avail of free energy upgrades. This scheme targets homes built and occupied before 1993 and have a pre-works BER of E, F or G. The specific criteria you must meet to be eligible for a free energy upgrade is as follows:

- You must own and live in your own home
- Your home was built and occupied before 2006
- You receive one of the following welfare payments.
    - Fuel Allowance as part of the National Fuel Scheme.
    - Job Seekers Allowance for over six months and have a child under seven years of age.
    - Working Family Payment

The upgrades offered under this scheme include:

- Attic insulation
- Cavity wall insulation
- External wall insulation
- Internal wall insulation
- Secondary work such as lagging jackets, draught proofing and energy efficient lighting
- New heating systems and windows are occasionally recommended.

Measure	Detached House	Semi-Detached/ End Terrace	Mid Terrace House	Apartment
Heat Pump Systems	€6,500			€4,500
Heat Pump Air to Air	€3,500			
Heating Controls	€700			
Solar Hot Water	€1,200			
Attic Insulation	€1,500	€1,300	€1,200	€800
Cavity Wall Insulation	€1,700	€1,200	€800	€700
Internal Insulation (Dry Lining)	€4,500	€3,500	€2,000	€1,500
External Wall Insulation	€8,000	€6,000	€3,500	€3,000
BER	€50			
Technical Assessment	€200			

Table 8 – Grant amounts for individual home energy upgrades

9.4 Solar PV Grants

Homeowners can also avail of individual grants for solar PV. All homes built and occupied prior to 2021 can apply. The process is very similar to the other individual grants. Firstly, appoint a registered SEAI solar PV company. Apply for the grant, installer applies to ESB networks then install the PV. A post works BER must be carried out again which the cost for is included in the grant.

The breakdown for the solar PV grant is as follows:

- €900 per kWp up to 2kWp
- €300 for every additional kWp up to 4kWp
- Total Solar PV grant capped at €2,400

9.5 EXEED Grant Scheme (Commercial)

The EXEED grant scheme is appropriate for larger energy users and is designed for organisations who are planning an energy investment project. Grant support of up to €1,000,000 per project is available. SEAI provide grant support for projects which are following the EXEED Certified standard for Excellence in Energy Efficient Design. 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. The percentage of funding received is based on the size of the company with large companies receiving up to 30%, medium up to 40% and small up to 50%.

9.6 Project Assistance Grants

For a company spending over €250,000 per year on energy bills, SEAI offers grants to develop energy saving projects. The aim of these projects should be to achieve significant energy savings and build good procurement practices. Applications are taken from the public and private sector. A business can first get up to 50% funding for a feasibility study of up to €15,000. A grant of up to 75% can be attained for the final business case and project delivery.

10 Energy Management Action Plan

Community Engagement

Community Engagement on sustainability in Cabra is the cornerstone of success of the initiative to achieve behavioural change that can result in energy and environmental gains within the community. There is an opportunity to leverage and build on the current interest in environmental issues: plastic waste, climate change and sustainable energy and to plan and implement a path to a sustainable community.

The SEC is led by Connecting Cabra which has a significant reach into the community demonstrated by the successful energy show held in October 2022 and responses received to the community survey. Connecting Cabra SEC intends to build on, and extend, this engagement.

Generic Energy Audits

The approach in the EMP has been to develop energy audits that provide examples of energy audits for typical houses, community buildings and businesses in the area. This will then be a source of information for residents considering energy retrofits and will provide a path to action. It also helps to spread the message of the benefits of sustainable retrofits in the community.

Website & Social Media

The www.connectingcabra.ie website will be used to promote the SEC as more initiatives are taken, more projects are completed, and the SEC expands and develops.

Following completion of the EMP and energy audits and delivery of the first exemplar SEC projects, the marketing of the SEC via social media and other routes will be accelerated. The social media campaigns will build on existing community social media groups on Facebook and Twitter. As with other areas, the specialist expertise of community members will be utilised in social media campaigns.

Workshops and Events

A very successful Energy showcase and workshop was held on 22nd October 2022. It included stands with suppliers of sustainable energy technologies and talks on opportunities for sustainable energy.

Register of Opportunities

Through the workshops, promotional activity and dissemination of exemplar projects the SEC will continue to build and develop the pipeline of projects for the Register of Opportunities. Connecting Cabra will continue to engage with organisations in the area such as local sports clubs, local businesses, other community groups and schools.

The 10 dwellings for which residential audits were caried out and the 60 community members who responded to the survey is a significant start to a register of opportunities that has the potential to lead to projects and exemplar case studies.

Path to Carbon neutrality and Sustainable Energy in Cabra.

Figure 24 shows pathways to sustainable energy in the CC SEC area by sectoral measures. As noted previously, the predominant energy use is in the residential sector and the main opportunity is for improved efficiency in the residential sector through retrofits. For example, carrying out a deep retrofit in all houses in Cabra would save over 77 million kWh per annum. In comparison, installing 2 MW of solar PV would provide 1.8 million kWh per annum. Transitioning to EVs would provide savings of 14 million kWh per annum of savings. All the energy consumption data is expressed in delivered energy.

In order to meet the objectives of decarbonising the energy consumption in Cabra these gains in energy efficiency must happen in parallel with decarbonisation of energy supply. Government

policy is to retrofit housing and to electrify heat and transport energy demands while decarbonising the supply of electricity. Aligning plans with this policy is most likely to achieve success in the CC SEC area.

Other options for decarbonising energy supply in the area would include a district heating scheme connected to a geothermal/heat pump system. This would require significant investment and buy in from National and Local Government.

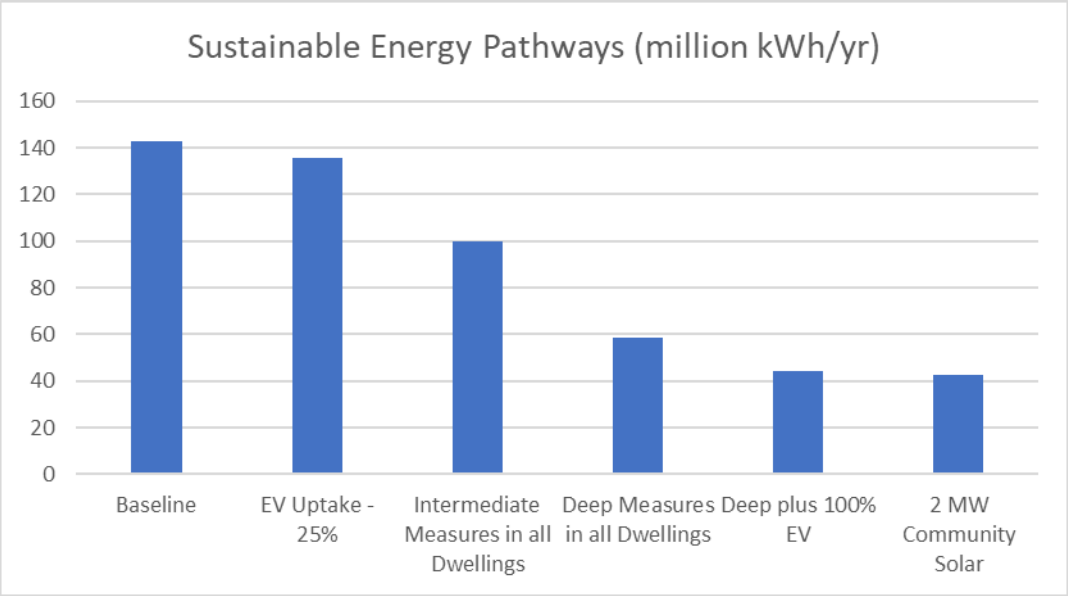


Figure 24 – Sustainable Energy Pathways for Connecting Cabra SEC (by Sectoral Measure)

Figure 25 shows the potential energy consumption and related CO_2 emissions to 2030, 2040 and 2050. The potential energy saving is over 50% which when combined with decarbonisation of electricity supply leads to zero carbon emissions by 2050.

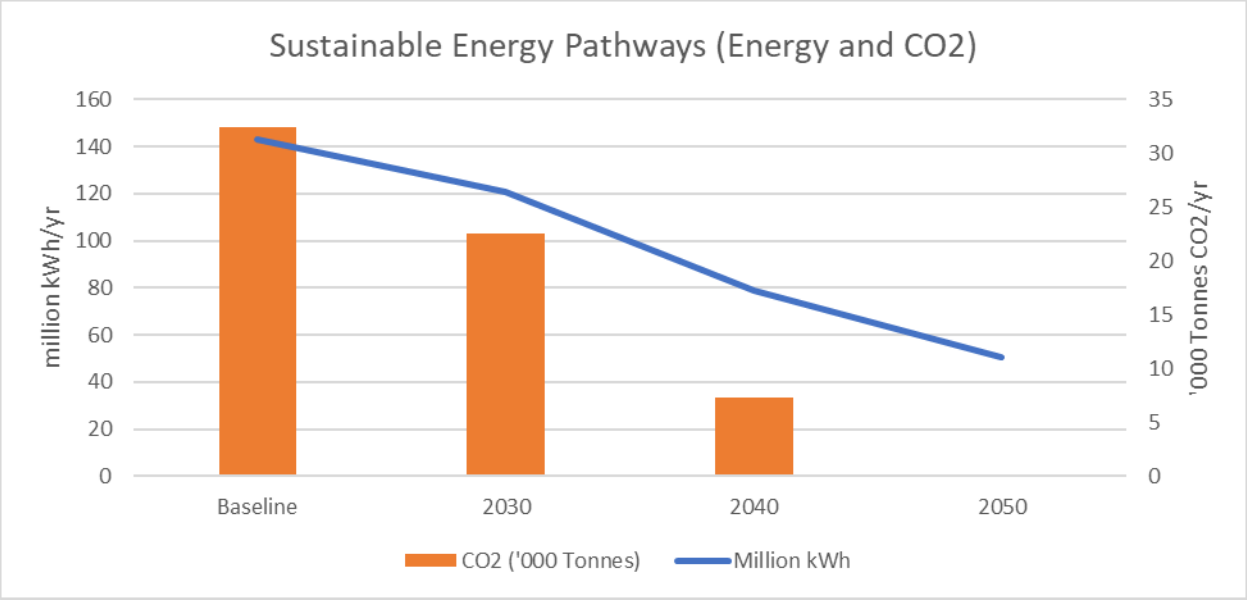


Figure 25 – Sustainable Energy Pathways for Connecting Cabra SEC (by year -combined sectoral measures)

The scenarios include:

- *2030*. 25% domestic retrofit to B2 and installation of heat pump. 10% energy efficiency gains in the commercial sector. 25% shift to EV and active travel.
- *2040*. 75% domestic retrofit to B2 and installation of heat pump. 25% energy efficiency gains in the commercial sector. 50% shift to EV and active travel. 2 MW community solar
- *2050*. 100% retrofit to B2 and installation of heat pump. 50% energy efficiency gains in the commercial sector. 100% shift to EV and active travel. 4MW community solar.

The above scenarios are based on retrofit to heat pumps in the domestic sector for efficiency and decarbonisation. A heat pump based district heating scheme would be an alternative potential measure and would yield similar energy and CO_2 savings.

Appendix 1 Glossary of Terms

Term	Definition
Delivered Energy	Delivered energy is the amount of energy consumed at the point of sale (e.g., that enters the home, building, or establishment) without adjustment for any energy loss in the generation, transmission, and distribution of that energy.
Dwelling Energy Assessment Procedure (DEAP)	The Dwelling Energy Assessment Procedure (DEAP) is Ireland's official method for calculating the Building Energy Rating of new and existing dwellings.
Energy Master Plan (EMP)	The aim of an EMP is to allow a community or business to understand its current and future energy needs (in electricity, heat and transport) in order for the community or business to make informed decisions and prioritise actions.
Feed in Tariff	A payment for excess electricity generated and exported to the network. Arrangements for a feed in tariff are currently being finalised under the microgeneration scheme which is due to be launched in June 2021.
Kilowatt-Hour (kWh)	The kilowatt-hour is a unit used by energy companies to determine how much you are charged. It is equivalent to the energy used in a single bar electric heater in one hour.
Kilowatt-Peak (kWp)	kWp is the peak power of a PV system or panel.
LED Lighting	LED stands for light emitting diode. LED lights are more efficient than traditional lamps (incandescent and fluorescent) and also have a longer lifespan.
Level 1 Audit	The Level 1 audit is alternatively called a simple audit, screening audit or walk-through audit and is the most basic. It involves minimal interviews with site operating personnel, a brief review of facility utility bills and other operating data, and a walk-through of the facility, all geared toward the identification of glaring areas of energy waste or inefficiency. The data compiled is then used for the preliminary energy use analysis and a report detailing low-cost/no-cost measures and potential capital improvements for further study. Typically, a Level 1 audit will only uncover major problem areas. Corrective measures are briefly described, and quick estimates of implementation costs, potential operating cost savings, and simple payback periods are provided. This level of detail, while not sufficient for reaching a final decision on implementing proposed measures, is adequate to prioritise energy efficiency projects and to assess the need for a more detailed investigation.
Primary Energy	Primary energy is an energy form found in nature that has not been subjected to any human engineered conversion process. It is energy contained in raw fuels, and other forms of energy received as input to a system.
Register of Opportunities (RoO)	A RoO is for recording all opportunities for energy savings at a facility or in a community.

Smart Meter	A smart meter offers the client more detailed information on their energy consumption as well as reducing the need for estimated electricity bills. Smart Meters provide 1/2 hourly consumption data and allow for time of use tariffs. ESB Networks started a 4 year program to install smart meters at every connection point in 2020. It is scheduled to finish in 2024. Refer to ESB Networks for more information. https://www.esbnetworks.ie/existing-connection/meters-readings/smart-meter-upgrade
Smart Meter Device	A device, other than an ESB Networks Smart Meter, installed to provide smart metering data.
Solar PV	A solar photovoltaic (Solar PV) system is one which converts light into electricity.

Appendix 2 Register of Opportunities

Cabra Sustainable Energy Community
Register of Opportunities - Summary

Residential	Total Savings
Status	Primary Energy Saving (kWh/m2/yr)
Identified	177,562
Discussed with site	0
Owner commited	0
In progress	0
Complete	0

Non-Residential	Total Savings		
Status	Electrical (kWh/yr)	Thermal (kWh/yr)	Total Primary (kWh/yr)
Identified	78,278	41,240	198,162
Discussed with site	0	0	0
Under consideration - short term	0	0	0
Under Consideration - long term	0	0	0
Not under consideration	0	0	0
In progress	0	0	0
Complete	0	0	0

Ref	Address	Type	BER Before (kWh/m2/yr)	BER After (kWh/m2/yr)	Floor Area	Primary Energy Saving (kWh/yr)	Energy Cost Saving (€/yr)
CC1	Cuala Road	3 Bed, Mid Terrace House	291	47	65	15,860	3,711
CC2	Carnlough Road	2 Bed, End of Terrace House	381	71	82	25,420	3,845
CC3	Rathoath Road	2 Bed, Mid Terrace House	256	52	62	12,648	1,987
CC4	Carnlough Road	3 Bed, End of Terrace House	320	57	73	19,199	2,498
CC5	Swilly Road	3 Bed, Mid Terrace House	188	0	129	24,252	2,739
CC6	Annamoe Terrace	2 Bed, Mid Terrace House	153	0	66	10,098	821
CC7	Pine Hurst	4 Bed, Semi Detached House	154	47	139	14,873	1,030
CC8	Annamoe Road	4 Bed, Detached House	224	72	176	26,752	3,382
CC9	Cabra Drive	3 Bed, Detached House	97	52	107	10,379	987
CC10	Glenbeigh Road	3 Bed, Semi Detached House	218	71	123	18,081	2,015

Ref	Organisation	Opportunity	Electrical Savings kWh	Thermal Savings kWh	Value of Savings (€)	CO2 Savings	Cost (€)	Cost After Grant	Payback in Years (after grant)	Status
	Christ the King Boys	Retrofit Lighting	6,687		€1,587	2	€7,200	€5,040	3.2	Identified
	Christ the King Boys	Solar PV	13,500		€2,700	4	€19,750	€13,825	5.1	Identified
	Christ the King Boys	Energy Awareness Campaign	1,136	3,347	€518	1	€1,000	€700	1.4	Identified
	Christ the King Boys	Heating control		3,347	€248	1	€1,000	€700	2.8	Identified
	Christ the King Girls	Retrofit Lighting	7,801		€1,852	3	€8,400	€5,880	3.2	Identified
	Christ the King Girls	Solar PV	13,500		€2,700	4	€19,750	€13,825	5.1	Identified
	Christ the King Girls	Energy Awareness Campaign	1,216	3,347	€537	1	€1,000	€700	1.3	Identified
	Christ the King Girls	Heating control		3,347	€248	0.7	1,000	€700	2.8	Identified
	Naomh Fionnbarra GAA	PV Panel	27,000		€5,400	9	€38,500	€26,950	5.0	Identified
	Naomh Fionnbarra GAA	Energy Awareness		13,927	€1,032	3	€500	€350	0.3	Identified
	Naomh Fionnbarra GAA	Energy Awareness	3,719		€883	1	€500	€350	0.4	Identified
	Naomh Fionnbarra GAA	Control heating		13,927	€1,032	3	€4,000	€2,800	2.7	Identified
	Naomh Fionnbarra GAA	Efficient Beer Chiller	3,719		€930	1	€4,500	€3,150	3.4	Identified