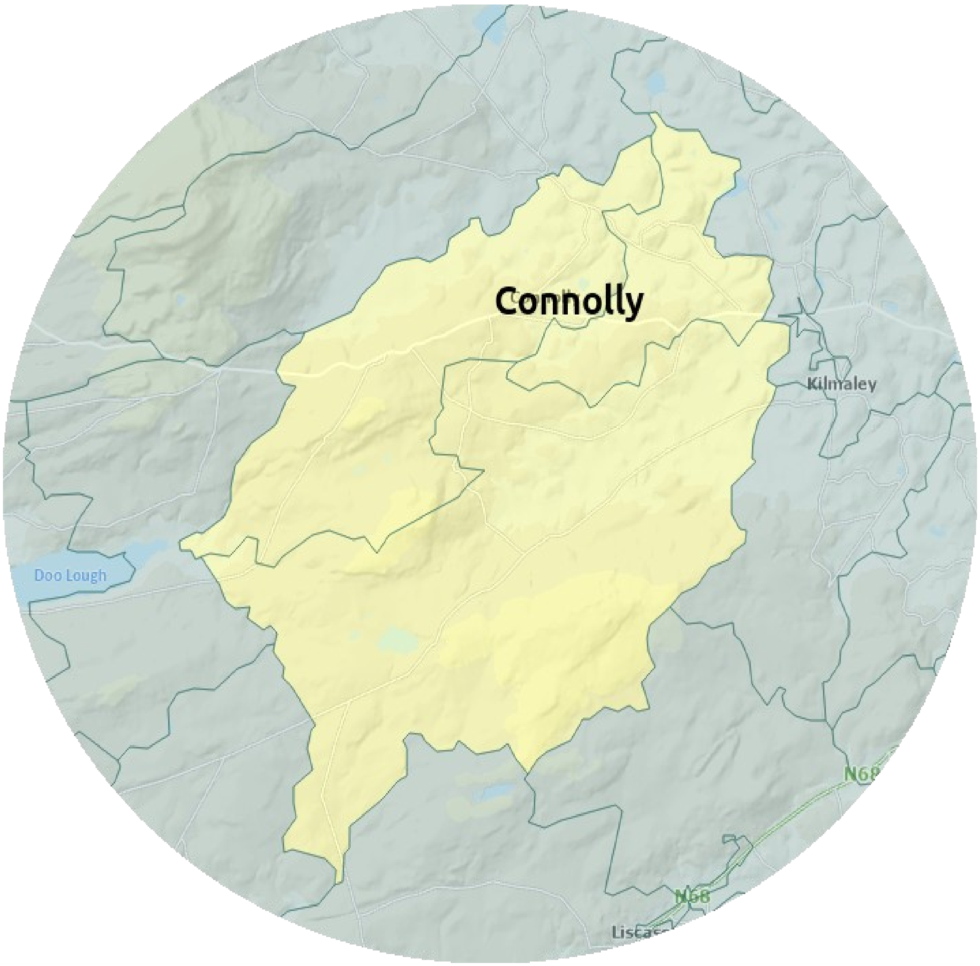
Energy Master Plan for Connolly SEC , Co. Clare



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1. Glossary of Terms

Throughout this document a number of abbreviations/terms are used repeatedly. This sectins serves to define the meaning of such abbreviations/terms.

- **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 CO2 you will release to heat your home to a comfortable level. The BER rating goes from A to G. See the specific SEAI BER webpage for more details.
- **Carbon Dioxide/ CO2** - 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 CO2 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.
- **Climate Action Plan** : The 2023 government strategy for the overall reduction of Ireland's greenhouse gas emissions by 50% in 2030. See gov.ie
- **Energy Efficiency** - It is energy efficient when we use less energy to achieve the same result.
- **Energy Savings** - Energy in whatever format it is being consumed usually costs money (€). By reducing the amount of energy consumed you are also reducing the cost associated with providing that energy.
- **Greenhouse Gas Emissions (GHGs)** - Gases that trap heat from the Earth's surface causing warming in the lower atmosphere and slowing down loss of energy from Earth. The major greenhouse gases that cause climate change are carbon dioxide, methane and nitrous oxide.
- **Kilowatt hours (kWh)** - One kilowatt-hour is equivalent to 1000 watts of energy used for 1 hour. For example, a 100-watt lightbulb switched on for 10 hours uses one kWh of electricity.
- **Megawatt hours (MWh)** - A megawatt hour is equivalent to 1 million watts of electricity being used for an hour. 1 MWh is equivalent to 1,000 kWhs. For example, a megawatt hour could be 2 million watts (2 megawatts) of power being used for half an hour
- **Net zero emissions** - This refers to achieving an overall balance between greenhouse gas emissions produced by human activity and greenhouse gas emissions taken out of the atmosphere
- **Renewable Energy** - Renewable energy comes from renewable resources like wind energy, solar energy, or biomass. These resources can regenerate naturally, and we can use them repeatedly without reducing their supply.
- **Renewable Electricity Support Scheme (RESS)** - This Government scheme provides financial support to renewable electricity projects in Ireland to help us achieve our renewable electricity goals. It also aims to increase community participation in, and ownership of, renewable electricity projects. It aims to make sure electricity consumers get value for money and to improve security of our electricity supply
- **Sustainable Energy Community (SEC)** - An SEC is a community in which everyone works together to develop a sustainable energy system. To do so, they aim as far as possible to be energy efficient, to use renewable energy where feasible and to develop decentralized energy supplies. See the specific SEAI SEC webpage for more details.
- **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 CO2/annum. Energy costs are presented in euro spent on energy per annum

2. Executive Summary

This Energy Master Plan has been developed to allow Connolly Sustainable Energy Community (SEC) to look at the existing and future energy needs of the parish of Connolly.

The development of the plan has been led by a steering group that includes representatives from the Connolly SEC and initial assistance from the SEAI county mentor, the development of the plan has been funded as part of the SEAI Sustainable Energy Community program.

The objectives of the Energy Master Plan are to:

- Establish an energy baseline for the area through analysis of existing data and energy audits
- Create a Register Of Opportunities (RoO) with twin aims
  - Identify the potential to reduce overall energy usage through increased energy efficiency
  - Identify the potential to increase the use renewable energy in the most cost-efficient and realistic manner

2.1. Summary of Energy Baseline

The Energy Baseline shows where the energy in the EMP area comes from, the costs to the community and the associated emissions. It is based on the population based proportion of national figures provided by SEAI[1] which give the population of Connolly parish as 778. (See Annex 9.1. Annex 1 : Population calculation)

Table 1: Baseline Energy Usage

Sector	Electricity	Fossil Fuel	Renewable	Total
Residential	1260 MWh	3369 MWh	201 MWh	4830 MWh
Community	5 MWh	25 MWh		30 MWh
Transport	34 MWh	5081 MWh		5116 MWh
Total Energy	1299 MWh	8476 MWh	201 MWh	9976 MWh

[1] SEAI National Energy Balance Summary 2022 and Energy Balance Full Data

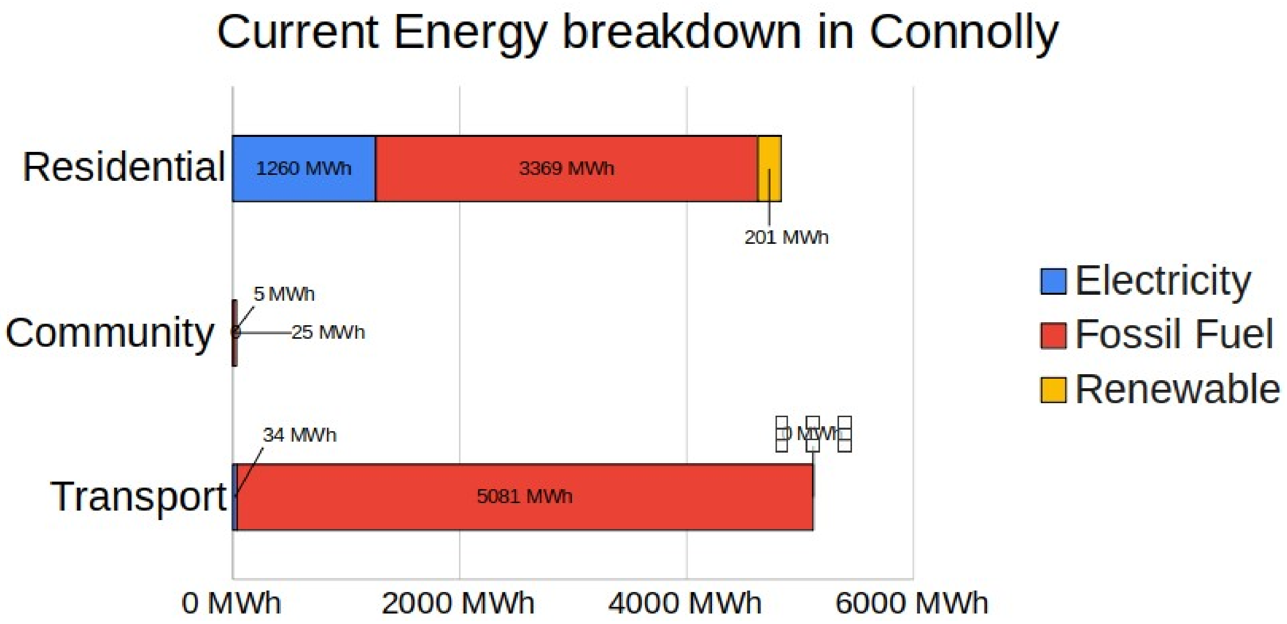


Figure 1: Annual energy usage in Connolly by sector and energy source

From the chart above we see that the residential sector and the transport sector are broadly equal in terms of energy usage.

The community sector, which is limited to the school in Connolly at the moment, is negligible by comparison.

Table 2: Baseline Emissions & Cost

	Electricity	Fossil Fuel	Renewable	Transport	Total
CO_2 Emissions	433 tCO_2	1012 tCO_2	6 tCO_2	1193 tCO_2	2644 tCO_2
Total Cost	€428,725	€563,365	€10,059	€821,288	€1,823,437

The following charts show the breakdown in emissions sources and total energy cost for Connolly.

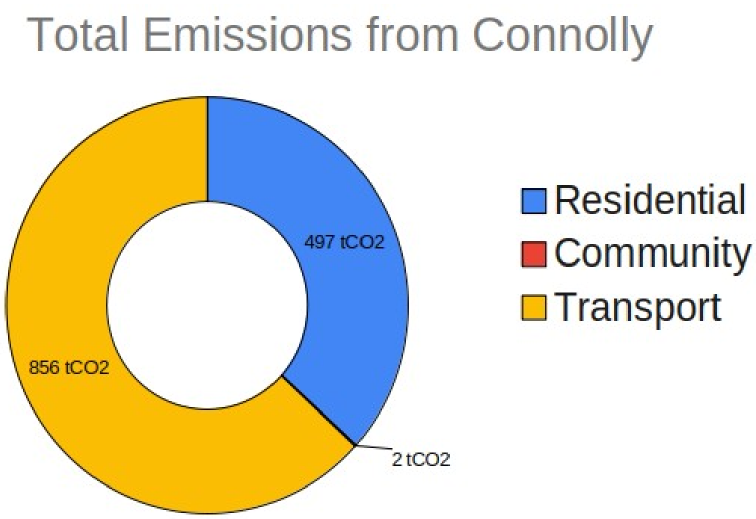


Figure 2: Total Emissions breakdown for Connolly

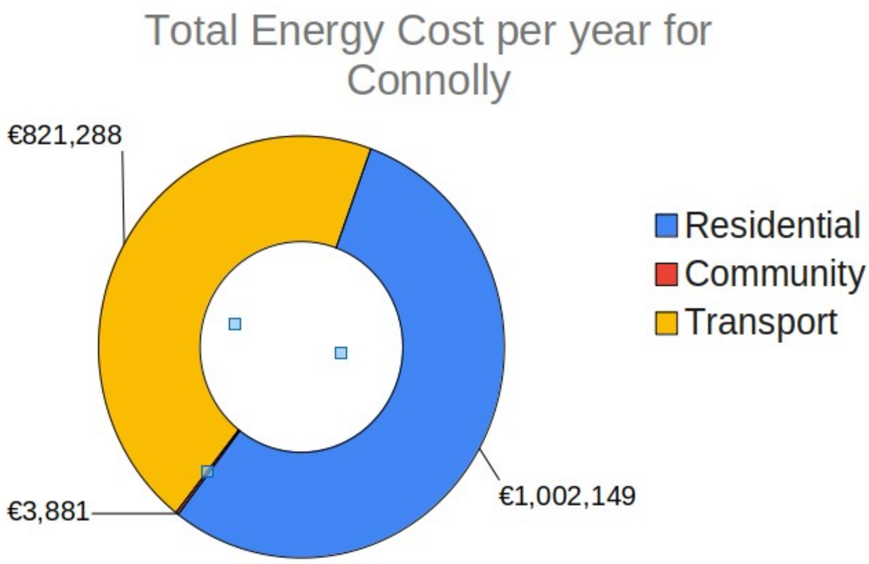


Figure 3: Total Energy Cost per year for Connolly

2.2. Summary of Register of Opportunities

- Residential Sector Actions
  - Specific focus on Fully Funded Energy Upgrades for energy-poor homes (potentially target of 50 home or more, i.e. 20% of homes)
  - Support energy upgrades of a further 35% of the homes of the EMP area (~90 homes) to bring to them to a B2 standard
  - Support the rollout of Solar PV on 50% of domestic homes/farms

- Community
  - Ensure future Community Building integrates energy efficiency, energy production and energy storage

    - Expand Solar PV installation for school
    - Insulation upgrades and air-to-air heatpumps for School
    - Community woodland/fruit forest (integrated with future Community Building)

- Transport
    - Promote public transport in Connolly
    - Promoting EV uptake and a Public EV charging point in Connolly

See Section 7 for full details

3. Introduction

To assist in achieving the Connolly SEC's goals, an Energy Master Plan study has been conducted. This Energy Master Plan (EMP) has been funded by SEAI to assist in the various actions that can realistically be carried out by the Connolly Sustainable Energy Community.

The EMP 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 EMP is based on a mixture of desktop research utilising publicly available information sets from a range of sources CSO, SEAI, County Council, etc.

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

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.

Finally, the EMP will conclude with a 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.

3.1. Connolly SEC

The Connolly SEC was formed in 2023 by the Connolly Tidy Villages in order to improve energy resilience, reduce the reliance on fossil fuels and reduce overall energy costs in the area.

The Connolly SEC has the following ambitions for the Energy Master Plan:

- Connolly SEC wants the community to increase energy efficiency by retrofitting, insulating and producing sustainable energy.
- By doing the EMP, we will use local evidence to show people how to reduce their fuel costs. We hope that local evidence and community learning will increase people's desire and ability to implement changes.
- We will use the EMP to help people understand where the best opportunities for reducing fossil fuel use are and where there are grants to help them reduce energy use and increase sustainable energy production. We may identify an agricultural renewable energy initiative to use as a local pilot project.
- Having established current energy use, we will use the EMP process to establish a system where people will inform the SEC of actions they have taken to reduce energy consumption and/or produce sustainable energy
- These outputs will benefit our SEC's future ambitions by increasing local knowledge about greenhouse gasses and, in turn, increase ideas for actions to reduce emissions. We hope our SEC's future ambitions will come from the community itself.

The SEC Steering Group's Strengths:

- The group brings together people with knowledge and/or experience of new, more sustainable energy options for heat / electricity production, passive house construction, carbon sequestration, anaerobic digesters.
- The SEC also has practical skills that will be useful; engineering, project management, developing and delivering community projects.
- The group represents many of the interests in the area, e.g., residential, community, tourism business, agriculture.
- The group is well connected to all the other community groups and sectors in the area. When there is local information or support needed, the group will know who to contact.
- The SEC Steering Group is a subgroup of the local development group – there is no need to form a new legal entity or open a new bank account.
- The community may be more interested in reducing fossil fuel use in light of recent increase in fuel prices.
- The Master Plan process will coincide with increasing government grants to reduce the use of fossil fuel – this should help to increase local interest.

The SEC Steering Group's Challenges:

- The group is newly formed and hasn't experience of implementing community projects. (BUT several of the members have extensive experience of implementing and managing community projects and facilities.)
- While the group has started enthusiastically, its commitment hasn't been tested over an extended period of time.

3.2. Sustainable Energy Communities

The Sustainable Energy Community Programme engages and enables energy citizens with over 750 communities who are working together to achieve their energy goals.

This is an SEAI funded programme that provides the following supports for each SEC

- Assignment of a local SEAI mentor who will work with you and your interests/needs.
- Access to dedicated SEAI funding (€10,000-€25,000) to develop an Energy Master Plan.
- Kept up to date on network activities through the community platforms, e-zine, network only groups.
- Opportunities to attend regional/national training, events and webinars.
- Signposts to further funding opportunities

The expected benefits for the SEC and their community are :

- Achieve financial and energy savings.
- Improve public wellbeing and comfort from energy efficient buildings.
- Boost local knowledge, skills and employment.

- Build capacity and leverage funding.
- Contribute to climate change targets.
- Support an equitable transition to a low carbon society.

Full information, including how to join the SEC network can be found on www.seai.ie/SEC/

3.3. Clare Community Energy Agency

Clare Community Energy Agency is a social enterprise that assists community groups,small businesses and individuals to create, support and manage energy-efficiency and renewable energy projects.

4. Energy Master Plan

4.1. Scope and outputs

- The Connolly SEC indicated in the scoping documents that their current scope is residential and community facilities in the parish of Connolly.
- These electoral districts will be referred to as “the EMP area” for the remainder of the document.
- The areas covered do not contain any sizeable industrial activity and commercial activity is limited.

4.2. Methodology

The data for the residential sector in EMP area was retrieved from the Central Statistics Office website, the SEAI publications website and the Energy Survey carried out as part of the EMP.

5. SEC Baseline Analysis

5.1. Analysis of Residential Sector

5.1.1. Summary of Residential Sector

- There are 360 homes in the Connolly parish, of which 289 are permanently occupied
- Oil is by far the most common residential heating fuel (71.1%)
- 40% homes already use at least one form of renewable energy
- 36% of houses in the community were built pre-1971
- The average estimated heating and electricity cost is €3613 per year
- The estimated annual household CO_2 emissions from heating and electricity is 5.1 tons
- €984,397 is spent on heating and electricity in houses in the community each year

5.1.2. Number, Age and BER rating of the EMP area houses

The area covered by the EMP consists of 360 houses of which 62 are vacant and a further 9 are semi-vacant i.e. used periodically as holiday homes. We see the impact of the number of vacant home in the available statistics as some data sources will be based on the number of Census forms (i.e. 287) returned and others data sources will use the total number of houses (i.e. 360)

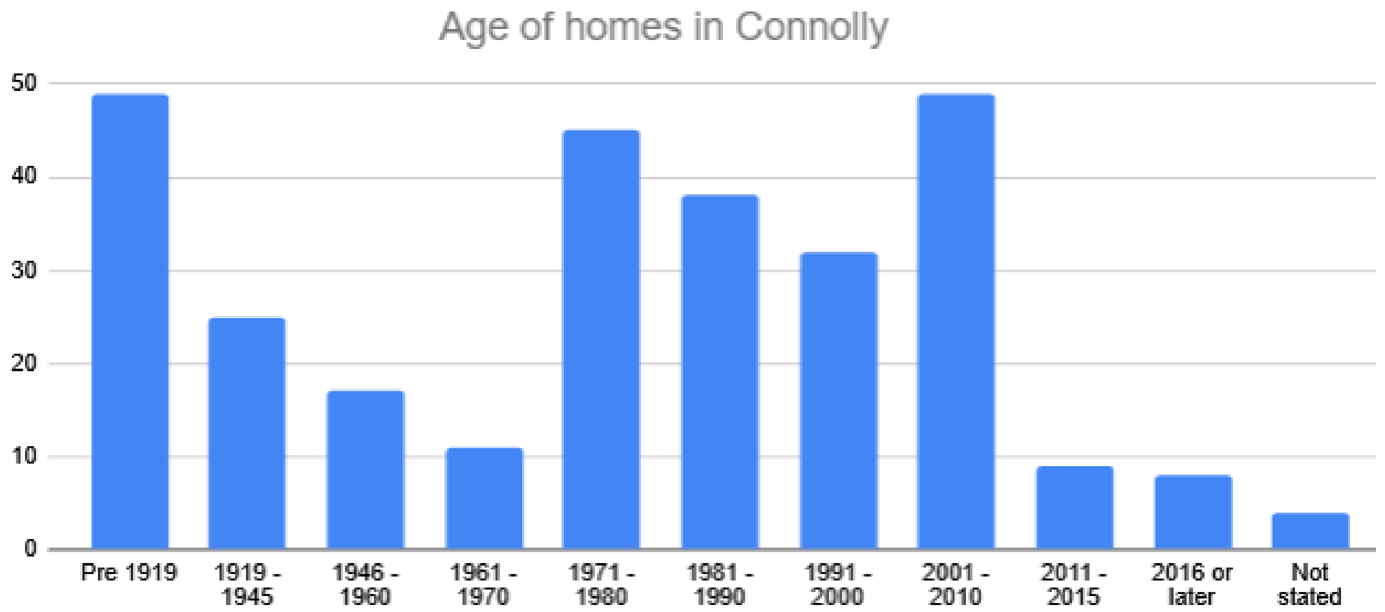
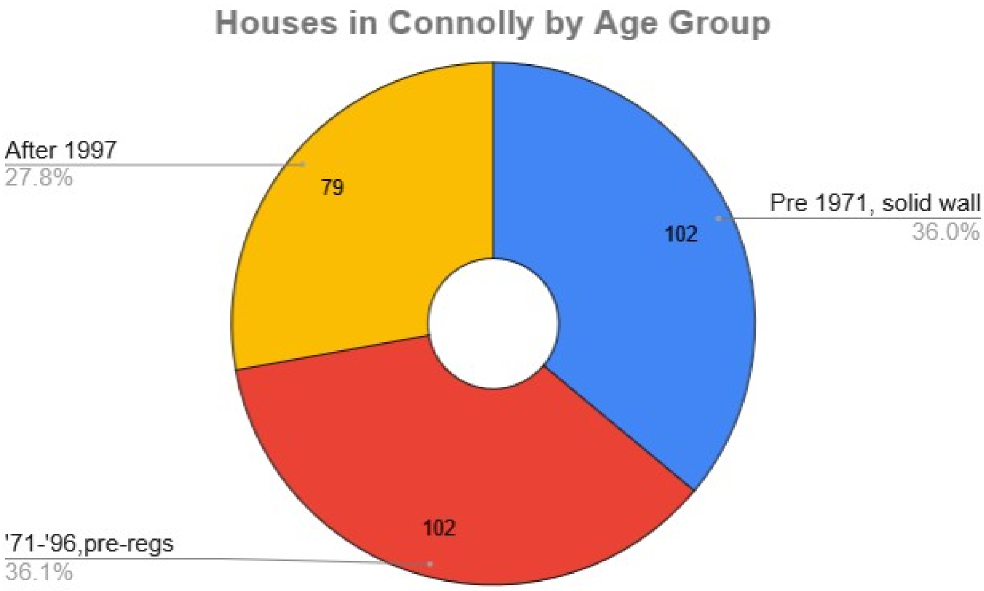


Figure 4: Age of homes in Connolly

In the chart below we see that a large number of houses were built during the Celtic Tiger era but it is also worth noting the relatively high number of houses that were built pre-1945.

From the perspective of identifying the types of retro-fit actions that will be relevant, it is useful to re-group the houses into larger group. The vast majority of houses built pre-1970 are either of stone, solid concrete or hollow block construction. The majority of houses built post 1970 are cavity wall construction and it is also worth noting the introduction of building regulations in 1997.

In the chart below we see that roughly equal number of houses were built in the periods pre-1971 and pre 1997 (before building regulations were introduced).



If we now look at the spread of BER ratings, which is the yardstick by which progress in the Climate Action Plan is measured, we see that there is huge potential for improvement .

NB : A note of caution is that currently 33% of homes in the EMP area have a BER rating so the table below does not necessarily reflect the entire EMP area.

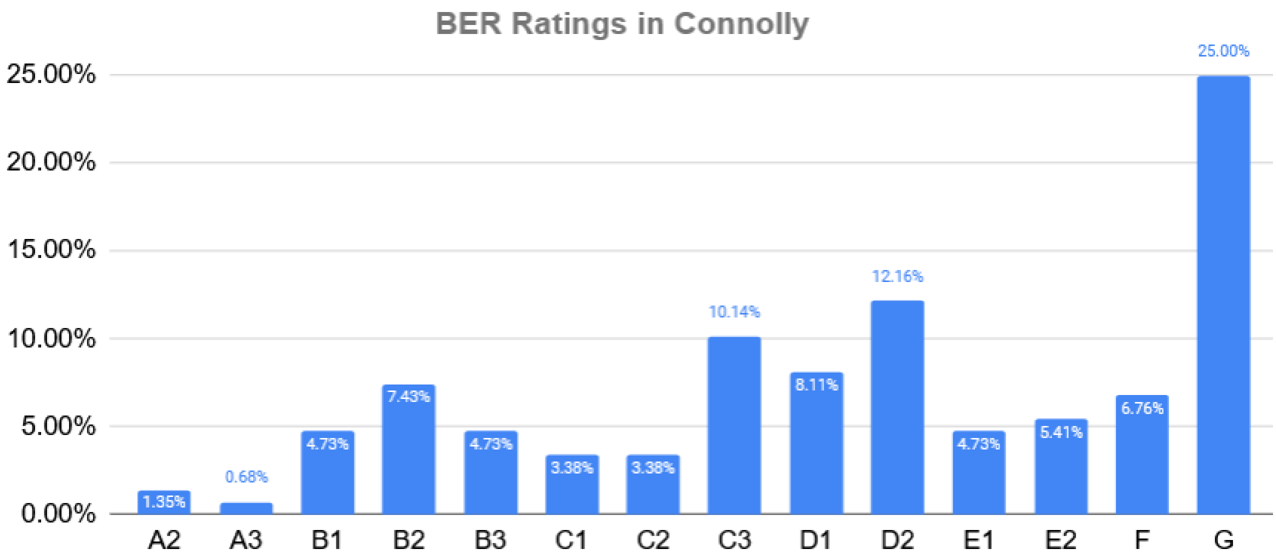


Figure 6: BER Ratings in Connolly

As a reminder, one of the national goals is to get 500,000 homes (~25%) to a B2 or better by 2030.

If we compare this to figures for Clare and Ireland we see the following

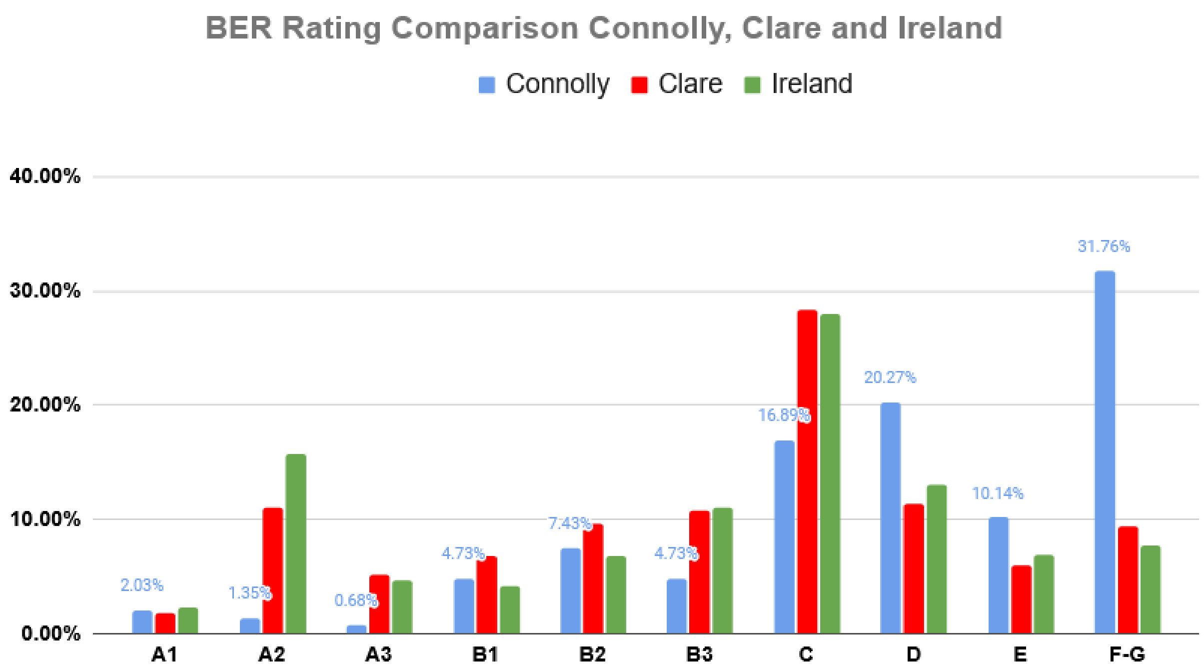


Figure 7: Comparison of BER in Connolly parish, Clare & Ireland

This chart again shows the potential that exists in the EMP area, specifically if the houses with BER in the range D to G are targeted. Such home can be considered the low-hanging fruit and the specific measures to improve these homes will be detailed in a later section.

It also shows that 42% of the homes in the Connolly parish are in the BER B3 to D category, meaning that relatively minimal measures would be required to get them to the B2 target.

We see that 41.9% of homes in the EMP area are in the E-G zone. This indicates that the greatest overall energy/cost/emission savings could be made by focussing on this zone.

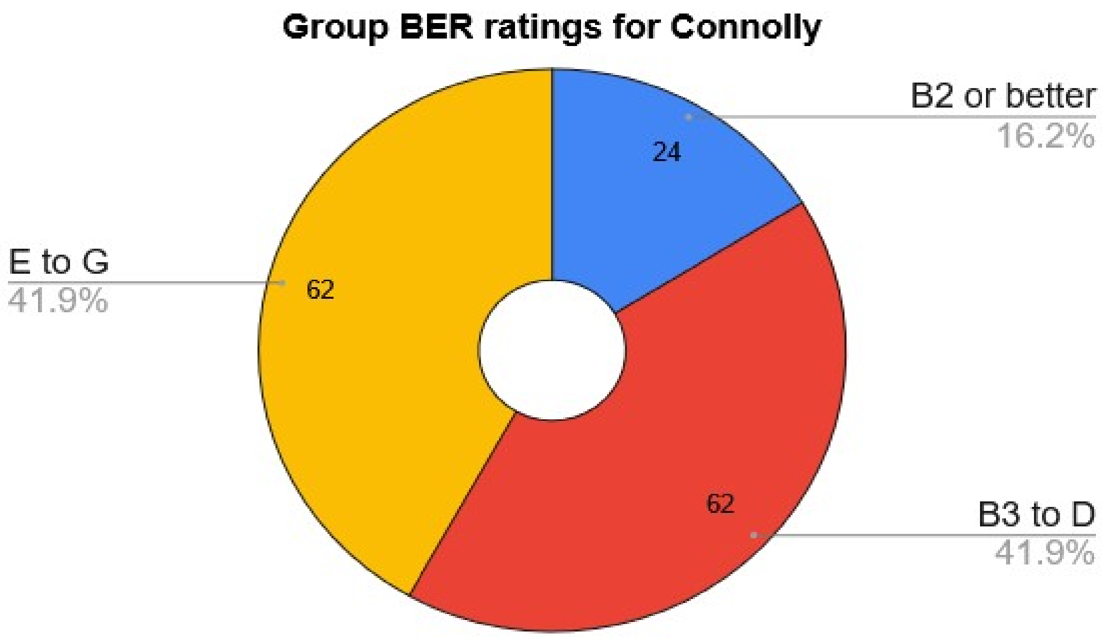


Figure 8: Grouping BER categories in the Connolly parish

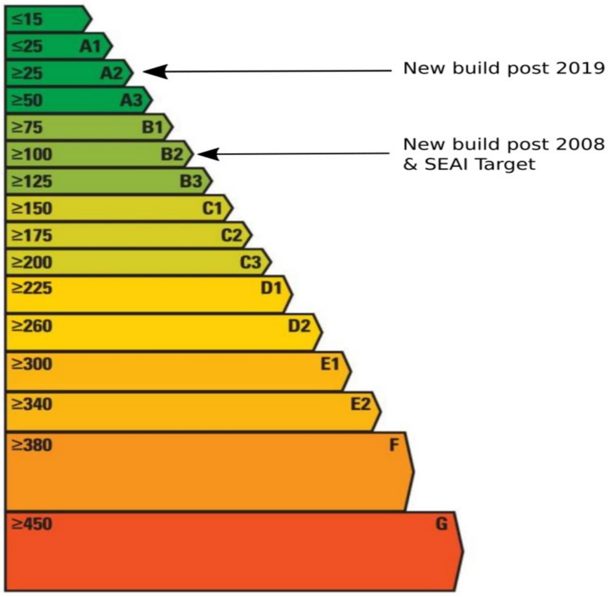


Figure 9: BER Ratings, full scale

5.1.3. Current Heating and Renewable Energy Sources in Connolly

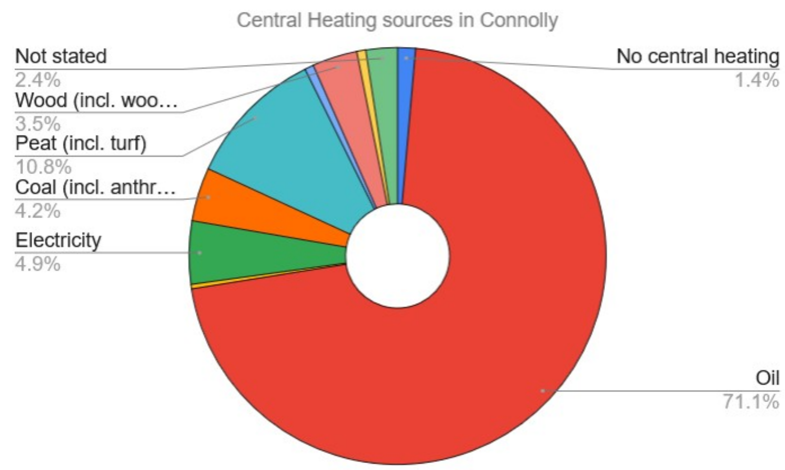


Figure 10: Energy used for central heating in Connolly parish, 2022

- Oil is the predominant source of heating (71.1%) which is a common feature across Ireland. All other heating fuels are relatively insignificant when compared to oil.

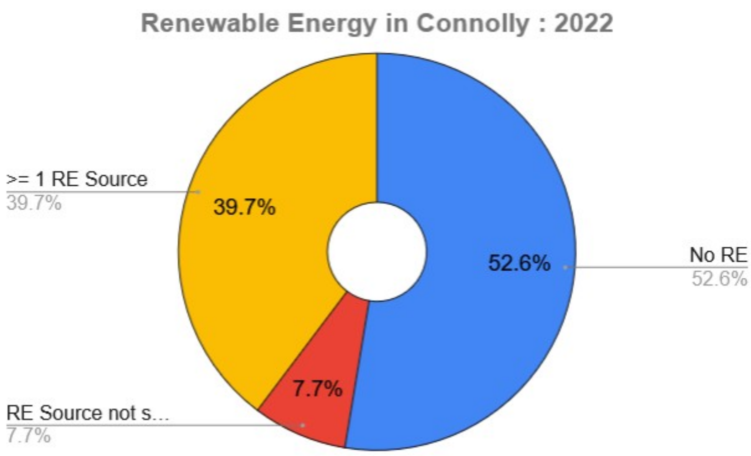


Figure 11: Renewable Energy in EMP area homes, 2022

- At least 46% of homes have some form of renewable energy already installed. Note that this data is from 2022 and does not include the rapid increase in Solar PV installations over the past 3 years.

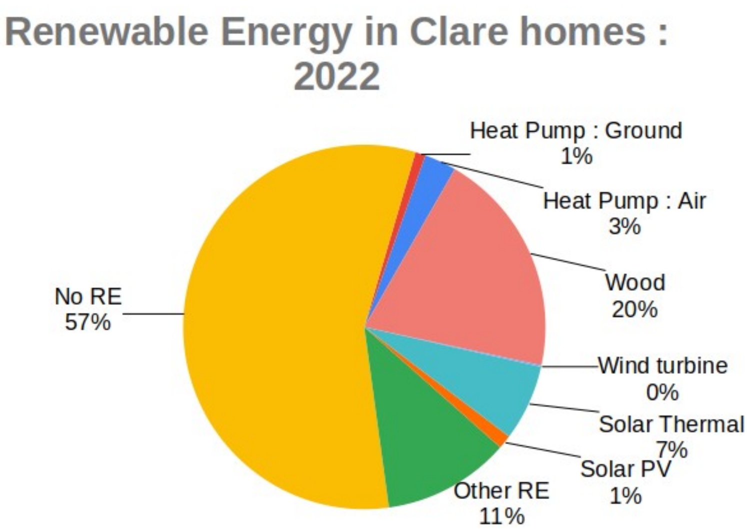


Figure 12: Renewables in Clare homes

- When compared to the county statistics we see that the EMP area is broadly similar (in terms of homes with/without a Renewable Energy Source)
- Note again that Solar PV and Heat Pumps are both underrepresented due to the large takeup since 2022

5.1.4. Local Energy Survey Analysis

A survey has been carried out of local homes with the participation of the SEC members.

The survey can be seen here.

The main points to be taken from the survey are :

- 40 replies from 287 occupied homes. This is a constant issue with surveys of this type.
- Of the 40 replies, 100% were homeowners
  - Given that 89% of homes in Connolly are owner-occupied this means that 17% of owner-occupiers answered the survey
  - The results of the questions on heating-type & transport usage were broadly similar to the CSO statistics in sections 5.2 and 5.4 and did not provide further useful information.
  - 80% of replies indicated that the homeowner was interested in an energy survey. This indicates that the appetite for further information is out there.

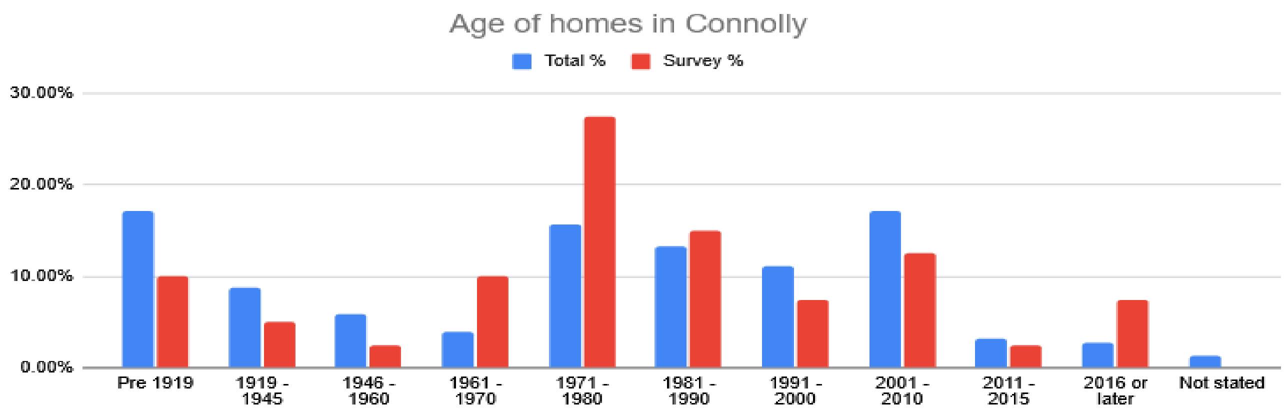


Figure 13: Comparing age of homes in survey responses to full parish

5.1.5. Local Energy Clinics

In addition to the standard features of the EMP, Clare Community Energy Agency also held energy clinics.

- These clinics allowed individuals or groups to book a 30 minute slot in-person with CCEA . Homeowners were free to ask any energy related questions.
- A total of 12 hours of clinics was divided by grouped clinics and visits to individual houses.
- The house visits were more focussed on the needs of the specific household while the group clinics were ona broader topic.
- Of the 24 slots proposed, 14 were taken up. It was noted that interest was very strong at first and then lapsed, potentially due to the need for further communication. This pattern has also been seen in other communities.
- The breakdown of the topics covered were
  - 50% were most concerned about their electricity bills, how to understand them and how to address their energy use. These people all showed high interest in Solar PV.
  - 30% were most concerned about improving the energy efficiency of their homes
    - In these cases the main support provided were as follows
      - Explain the different energy upgrades routes available
        - Individual home grants

        - One Stop Shop
        - Fully Funded Energy Upgrade (conditions apply)
    - Identify the grants available from SEAI
    - Show where the SEAI approved contractors could be found

- 20 % were concerned equally by both electricity usage and overall energy efficiency.

The good initial take-up of the energy clinics, and the engagement of the homeowners, shows that there is an unanswered need for personal advice when people are undertaking energy upgrades to their home.

While all information is available on the SEAI website, the website itself can be daunting insofar as it presents too much information. It must also be accepted that not all people are comfortable with the use of websites for gathering information.

Another feedback from the clinics is that people were concerned about information received from salespeople from the various energy contractors and felt that they were being told what the salesperson wanted to sell, not necessarily what was in the best interests of the homeowner. The need for independent advice was expressed repeatedly.

5.1.6. BER Assessments

This report presents an anonymised analysis of Building Energy Rating (BER) assessments completed within the community during 2025. Rather than focusing on individual dwellings, the report draws out common patterns across house types, construction eras, and heating systems. Its primary objective is to help households and community coordinators prioritise retrofit actions that are likely to deliver the greatest benefit in terms of comfort, energy cost reduction, and carbon emissions.

Although the dataset is relatively small, it reflects housing types that are typical of many rural and semi-rural communities. The findings should therefore be read as indicative signals rather than definitive conclusions, and used to inform further investigation and community-led action.

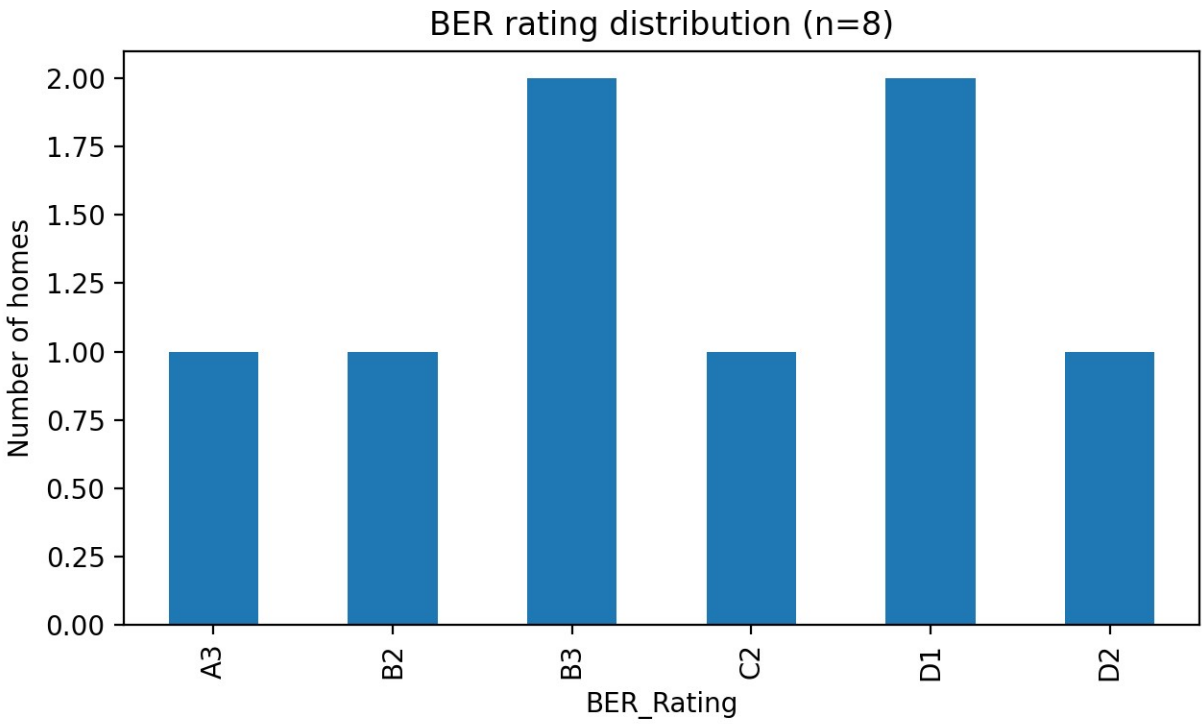
Headline messages:

- Energy performance varies widely between homes, even where house types appear similar.
- Many homes have already completed one or more major upgrades, meaning future effort should be more targeted
- Heating systems, particularly oil boilers, remain a major opportunity for improvement.
- A staged approach—fabric first, then systems, then renewables—emerges as the most robust pathway.

Dataset overview and BER outcomes

Eight homes were included in this analysis, covering detached and semi-detached dwellings across a range of construction periods. While this represents only a small subset of the community housing stock, it already highlights significant variation in energy performance.

The chart below illustrates the spread of BER ratings across the sample. Higher-rated homes typically combine reasonable fabric performance with modern heating systems, whereas lower-rated homes tend to show weaknesses in one or more of these areas.



An important takeaway is that house type alone does not determine energy performance. Two detached homes of similar size can sit several BER bands apart depending on insulation levels, system efficiency, and controls. This reinforces the value of targeted assessment rather than assumptions based solely on dwelling type.

Homes already upgraded – baseline measures

Before recommending additional works, it is essential to understand what measures are already in place. In this analysis, three baseline upgrades were examined: pumped cavity wall insulation, Solar PV, and attic insulation of 150 mm or greater.

The chart below shows the proportion of homes that already have each of these measures installed. This provides a quick sense of how far the community has progressed along the retrofit journey.

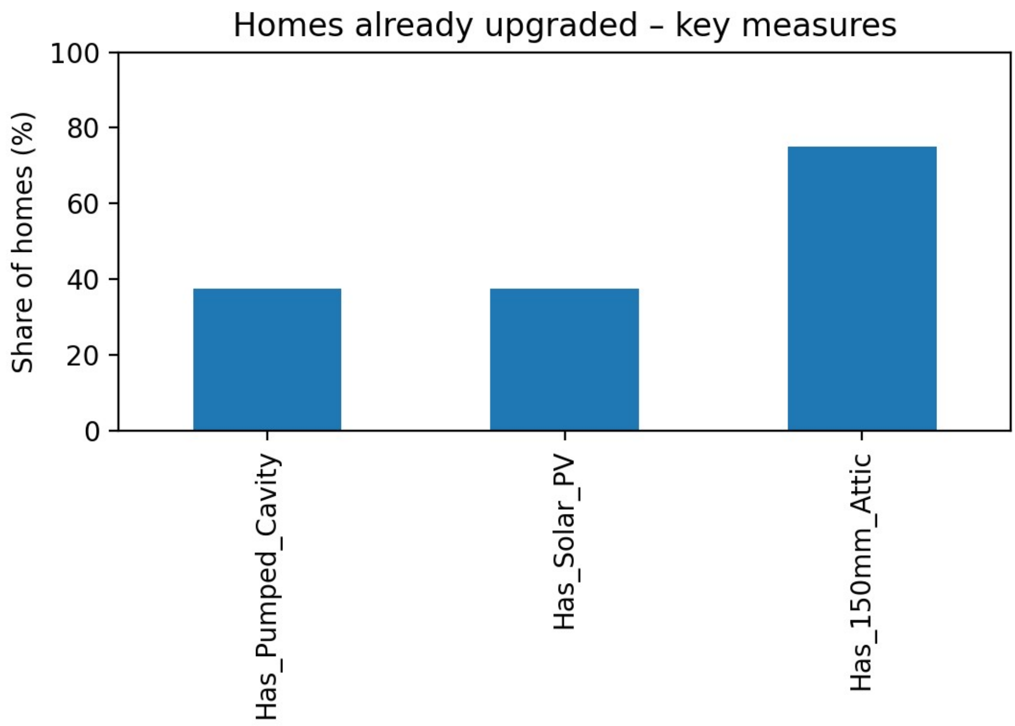


Figure 14: Existing upgrades found in homes

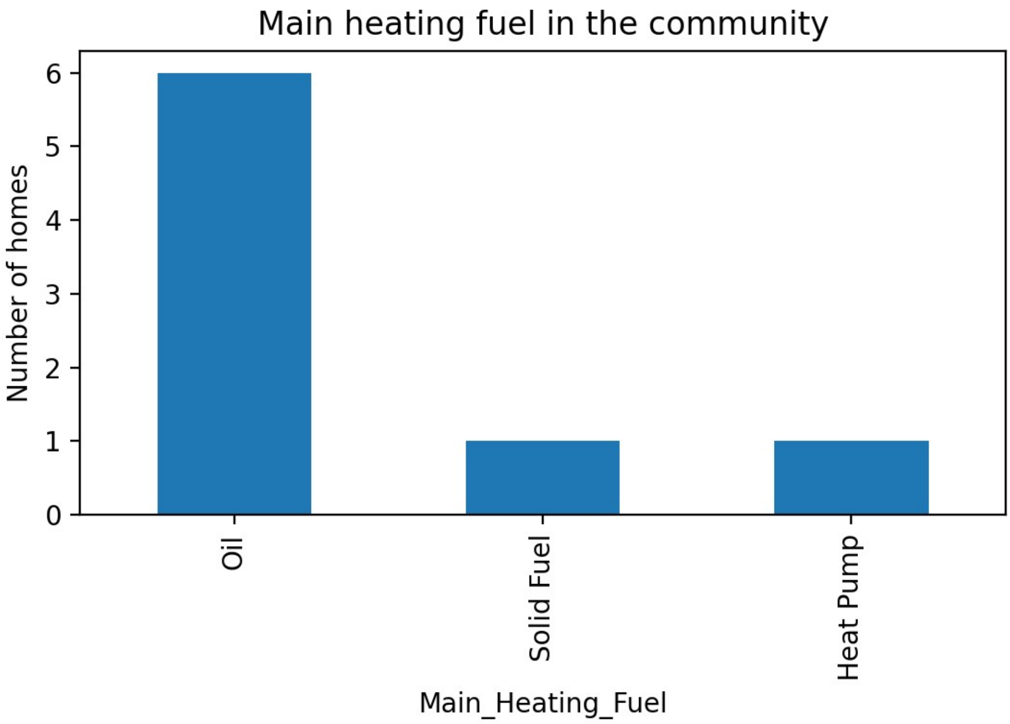
The presence of these measures has important implications for future recommendations. Where baseline insulation is already complete, repeating the same measures will yield diminishing returns. In such cases, attention should shift toward heating system optimisation, controls, and user behaviour.

Conversely, homes that lack these baseline upgrades represent the clearest opportunities for cost-effective improvement, often with relatively low disruption and payback periods that are attractive to homeowners.

Heating systems in the community

Heating systems are one of the most significant drivers of both energy consumption and running costs in homes. Understanding the dominant fuel types and the age profile of boilers therefore provides critical context for upgrade decisions.

The first chart below shows the main heating fuel used across the homes analysed. Oil is clearly predominant, reflecting the limited availability of gas infrastructure in many communities of this type.



While discussions around decarbonisation often focus on fuel switching, **it is important to recognise that substantial efficiency gains can still be achieved within the same fuel type**. This is particularly relevant where oil remains the most practical option in the medium term.

The second chart shows the distribution of boiler age bands across the sample.

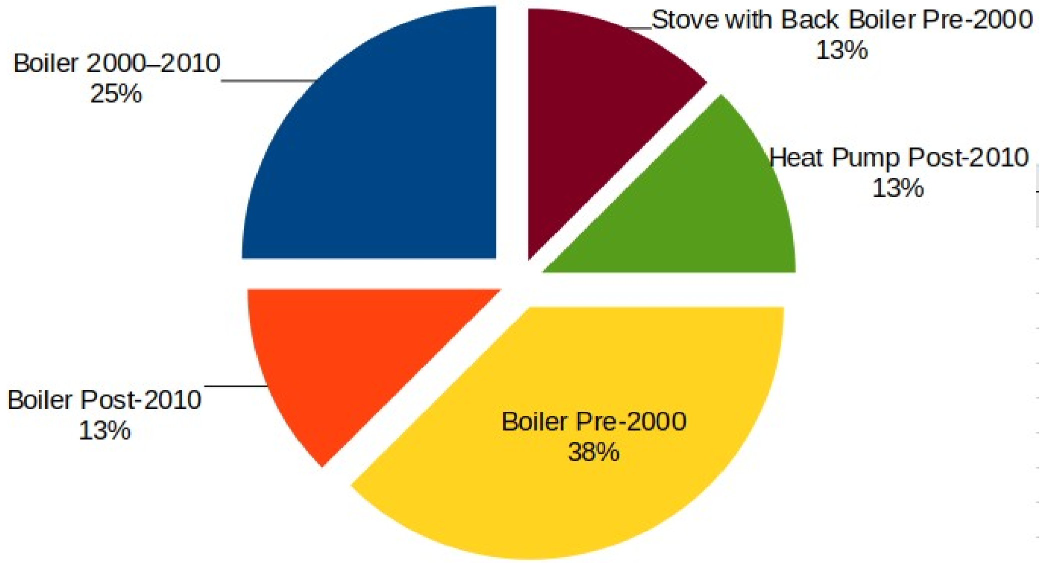


Figure 15: Age of Boiler in BER assessed homes

Older oil boilers typically operate at significantly lower efficiencies than modern condensing models. Replacing an older boiler with a high-efficiency unit can therefore reduce fuel consumption, lower running costs, and improve comfort, even without changing fuel type.

Implications and next steps for the community

Taken together, the findings point toward a pragmatic, staged approach to improving home energy performance across the community. Rather than pursuing a single solution for all homes, the evidence supports tailoring actions to each dwelling's starting point.

At a community level, this suggests three broad priorities:

- Completing baseline fabric upgrades where they are still missing.
- Improving heating system efficiency through controls and boiler upgrades.
- Planning for longer-term transitions, such as renewables or alternative heating technologies, once homes are sufficiently insulated and prepared.

There is also potential value in coordinated, community-led action. Group procurement of similar measures, shared technical guidance, and peer-to-peer learning can all help reduce costs and build confidence among homeowners.

As additional BER data is collected in future years, this report format can be reused to track progress, measure the impact of interventions, and refine priorities over time.

5.2. Analysis of Community Sector

5.2.1. Connolly National School

- The complete Energy Audit is available online
- The summarised actions/impact and current baseline are included below

Energy & Emissions

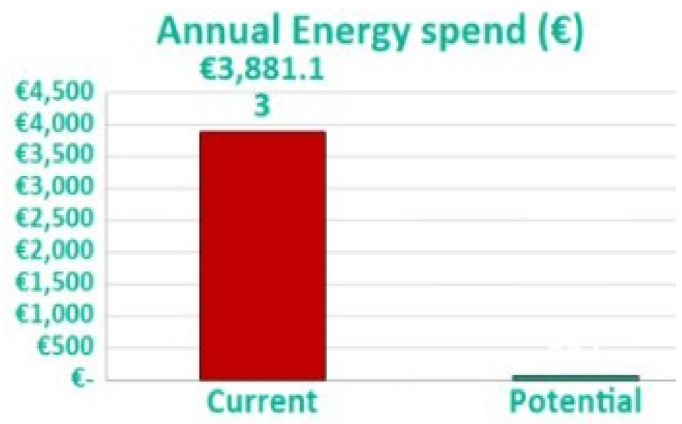


Figure 16: Current/Potential Energy Cost Connolly NS

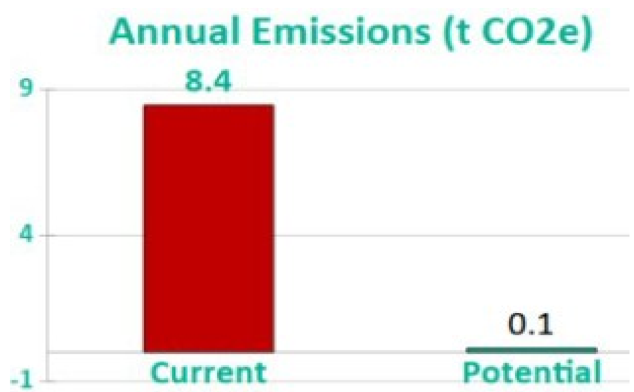


Figure 17: Current/Potential Emissions Connolly NS

Table 3: Recommended actions for Connolly NS

Description	Energy saved (€)	Emissions reduction (t CO2e per year)	Cost of Action (€)	Payback period (years)	First Steps
Solar PV 4 kW + 20 kWh battery	€1,203	1.5	€5,600	4.7	* Engage with a Project Coordinator
Pump the cavity on all walls	€625	1.7	€2,000	3.2	* Engage with a Project Coordinator
Improve attic insulation an airtightness over two classrooms	€375	1.0	€2,000	5.3	* Engage with a Project Coordinator
Replace all 58W lightbulbs in classrooms	€116	0.1	€129	1.1	* Engage with a Project Coordinator
Multiple air-to-air heatpumps for classrooms	€1,125	3.1	€9,000	8.0	* Engage with a Project Coordinator
Replace all external doors and windows dating from 1994	€375	1.0	€10,000	26.7	* Engage with a Project Coordinator
Total	**€3,820**	**8.6 tCO2e**	**€28,729**	**NA**	

Table 4: Current Energy baseline for Connolly NS

Reference Period: 07/2023-06/2024

Energy source	Annual Cost (€)	Annual Use (kWh)	Annual Emissions (t CO2e)	Information source
Oil - Fuel Oil	€2,500.00	25,423 kWh	7.0 tCO2e	Bill
Electricity - imported	€1,381.13	4,604 kWh	1.5 tCO2e	Bill
Electricity -Self Generation	€-	2,814 kWh	0.0 tCO2e	Bill
Total	€3,881.13	32,840 kWh	8.4 tCO2e	

5.2.2. Connolly Community Centre

- The community has begun work on a future Community Centre for Connolly.
- Plans have been drawn up and ground works have commenced as of December 2025

Figure 18: Rendering of Connolly Community Centre

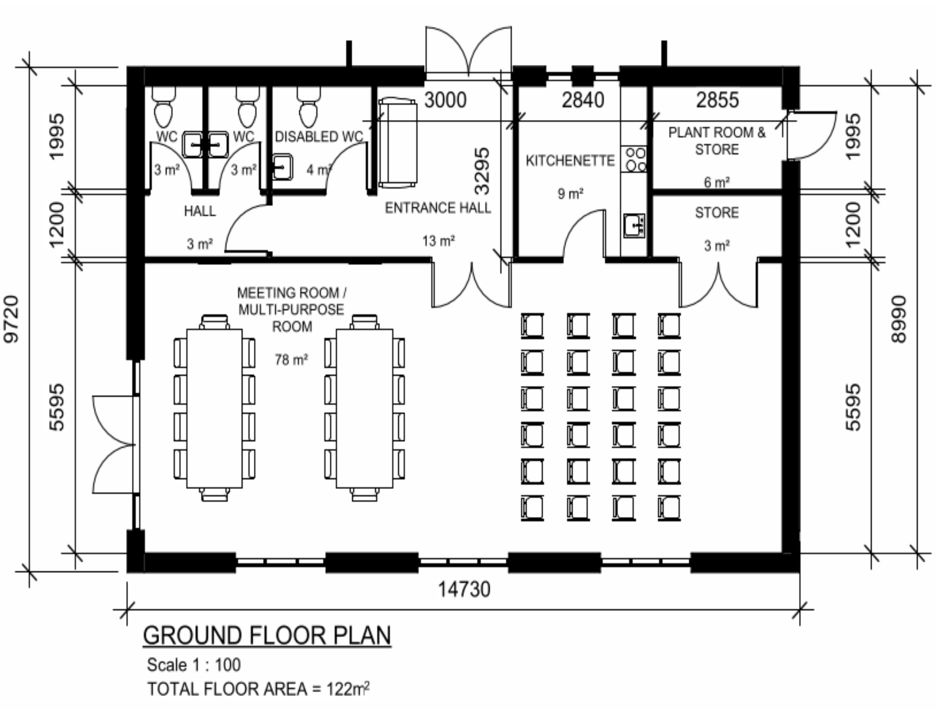


Figure 19: Floorplan of Connolly Community Centre

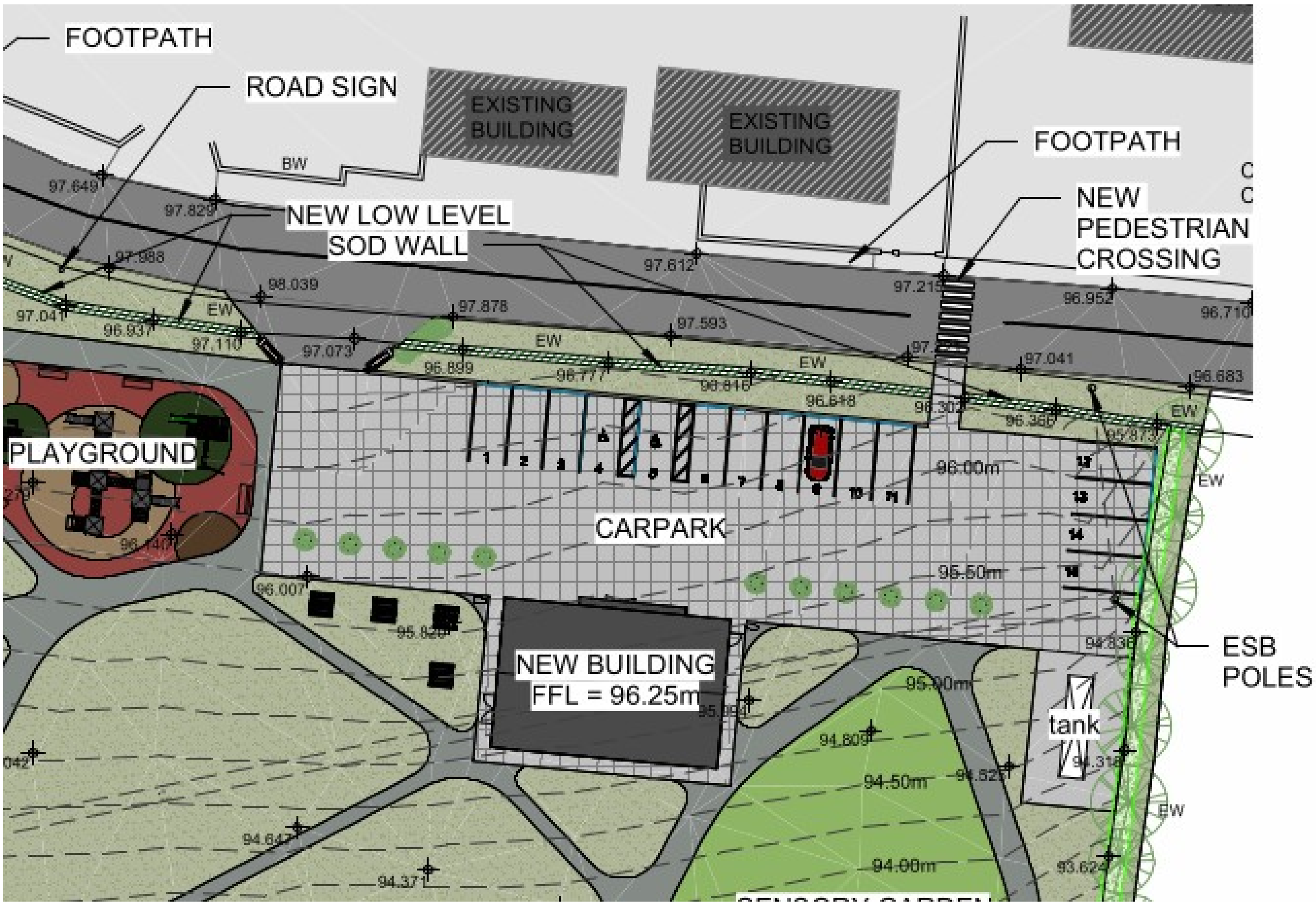


Figure 20: Partial site-map of Community Centre

- Overall comments on design
  - From an energy perspective, the design is excellent. The simple layout is by definition energy efficient
  - The entrance lobby to the north is very beneficial from the point of managing heat loss.
  - The south facing rear , with large glazed areas, will allow a maximum of passive heating
- Recommendations
  - Insulation
    - A new building will already have good insulation as per Building Regulations. For the main roof/walls/floor insulation, the architect could propose to go beyond building regulations as the cheapest time to improve insulation is at the initial build.
    - Ensure that the wall between the “plant room and store” are insulated as if they were external walls. This room has an external door and is a potential source of heat loss.
    - The large glazed areas to the south and west will be good for passive heating from the sun but will also be sources of heatloss when the sun isn’t shining. If thermal curtains could be included in the initial build, this would help to minimise heat loss.
    - If there is the potential to have a partitioning system in the main hall, to give the flexibility of two separate spaces, this would also be beneficial from a heating point. Only the space being used would need to be heated. This is not a major issue as the hall is not excessively large.
  - Ceiling heights
    - Ensure that ceiling heights are not excessive, rooms with high ceilings are slower and more expensive to heat.
    - Potential for different ceiling heights over the main hall area and all other areas.
  - Heating system

- An air-to-air heat pump would be recommended.
- This removes the need for radiators and piping.
- Given the irregular usage patterns of a community centre, an air-to-air heat pump is far cheaper to install, easier to control, more responsive.
- The units, which are wall mounted, provide warm air to the building from multiple points. Each point can be individually controlled.
- Am air-to-air heat pump would reqauire a single outside unit which woul dthen be linked to multiple points of hot air distribution inside the centre

- Solar PV
  - The building is a prime candidate for a Solar PV system with batteries
  - In the image below, we see that the south facing roof has an availabel area of ~55m2 which would allow for the installation of ~ 11 kW of Solar PV Panels.

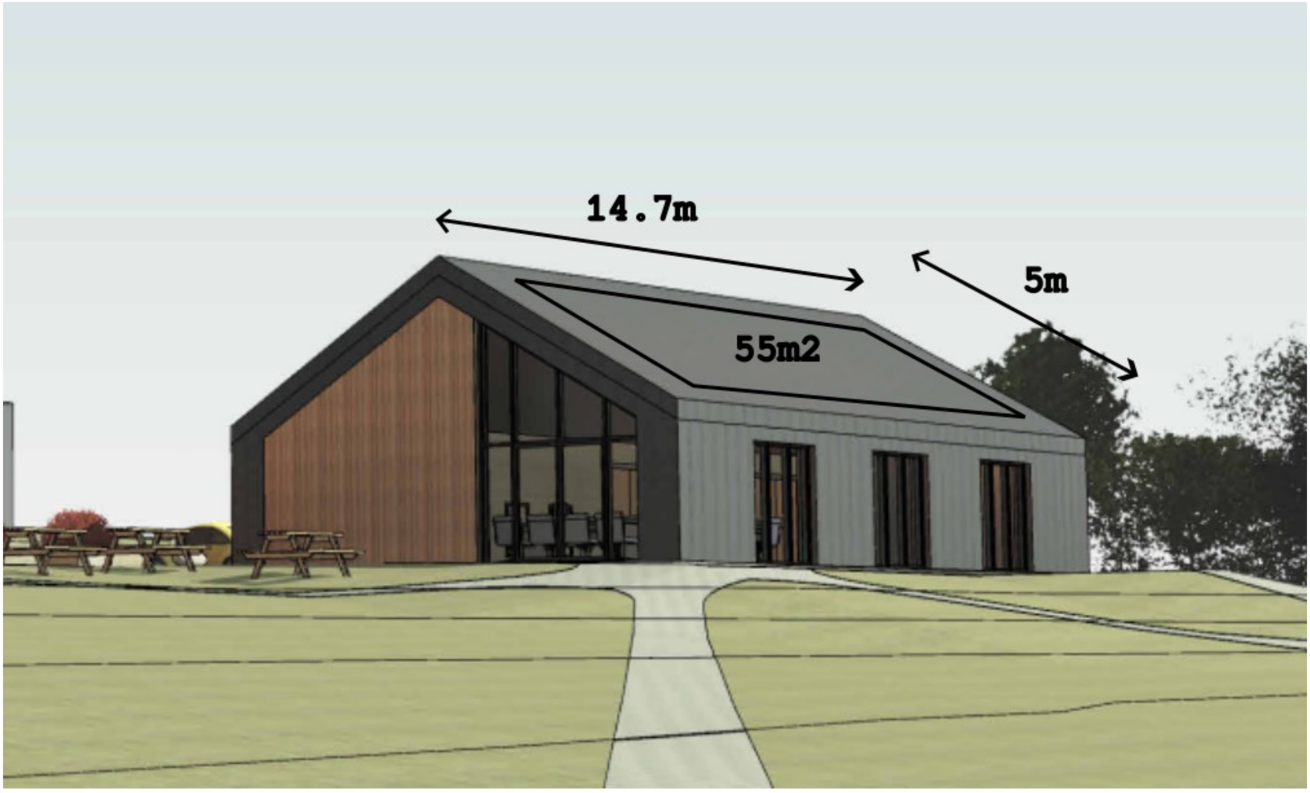


Figure 21: Solar PV potential space

- 11 kW of PV panels would produce ~10000 kWh of electricity per year which should more than cover the electricity need of the Community Centre

Eircode:	V95NX56
System Size:	11 kW
Roof Direction:	180°
Roof Slope:	35°
Annual Production:	**10212 kWh**

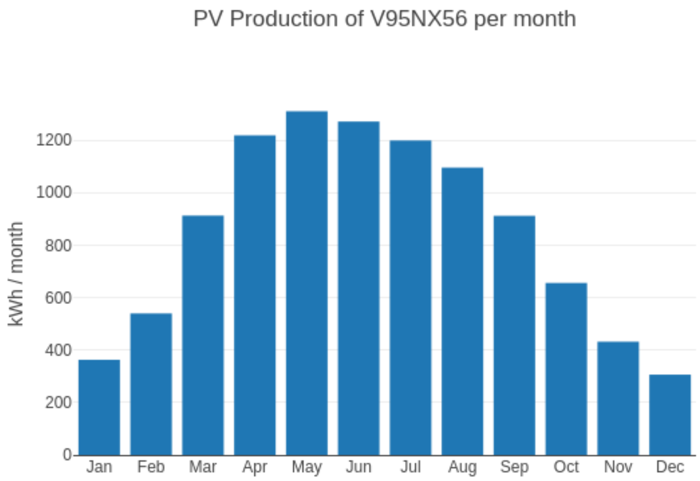


Figure 22: Potential production from an 11 kW Solar PV system

- For an 11 kW Solar PV system, the recommendation would be to also have a 20 kWh battery
  - This would allow the centre to store and use more of its produced electricity, to improve the resilience of the centre in the case of grid outages
  - This would also provide an energy resilience point for the community i.e. in the case of a sustained grid outage, the community could still have access to electricity, access to a working kitchen and access to hot water.
- EV Charger
  - Include an double EV Charger. Further details are provided in the Register of Opportunities section. Note that this is more of a community service and a reason for passing traffic to stop in Connolly than a money earner for the community.

Table 5: Summary of recommendations for Community Centre

Topic	Description
Insulation	Go beyond Building Regulations Thermal curtains Separation of “cold areas” Mindful of ceiling heights
Solar PV	11 kW of PV Panels + 20 kWh battery
Heating System	Air to Air Heatpump.
EV Charger	Double EV Charger

5.3. Transport

Since the scope of the EMP is limited to the residential and community sector, the analysis in this section will be limited to use of private cars and public transport.

5.3.1. Private Cars

Current CSO figures for the EMP area show the following in terms of car usage/ownership.

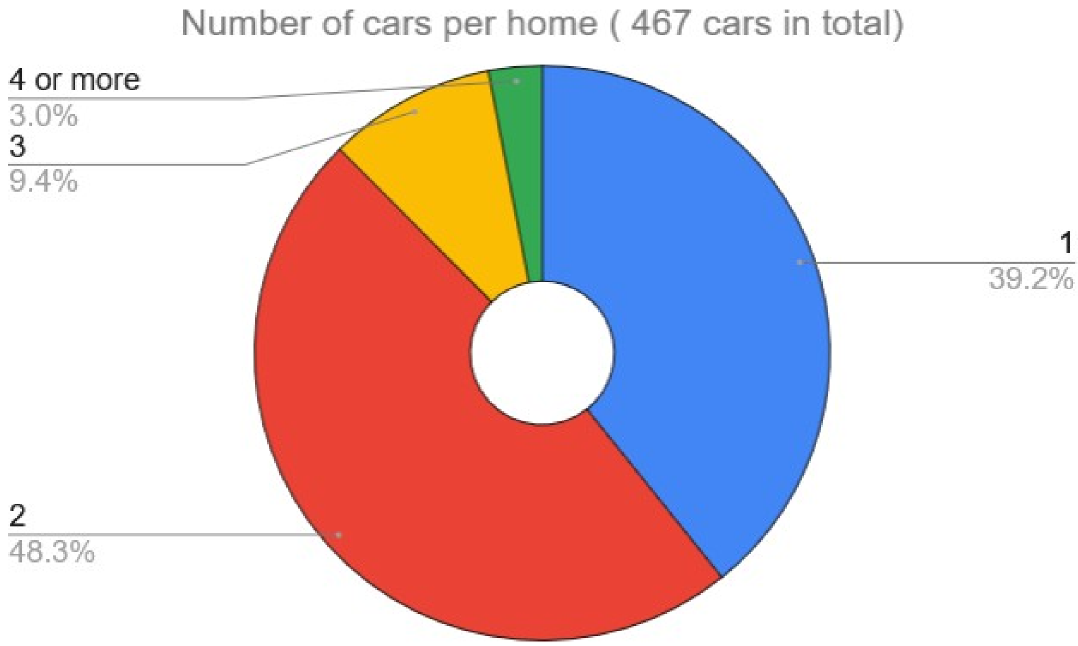


Figure 23: Number of private cars in Connolly

We can take the national figures for car usage although, in reality, car usage in the EMP area is probably higher given the rural context. We will also assume the national breakdown of car-type (56.9% diesel, 42.7% petrol, 0.4% EV).

It should be noted that there are no public EV charging points in the EMP area at the moment.

We will use the SEAI figures from the table below to calculate the related emissions and kWh used.

Table 6: Energy and emissions intensity of various forms of transport

Car type	National average annual km	kWh/km (TPER)	gCO2/km
Petrol	12,113	0.73	167
Diesel	19,681	0.70	167
EV	12,958	0.38 (Grid) or 0.15 (renewables)	65 (Grid) or 30 (renewables)
Bus Éireann		0.129	31
E-bike		0.009	2
Walk		0	0
Cycle		0	0

This gives a current transport baseline as follows

Table 7: Transport Baseline in Energy, emissions and cost

	Electricity	Fossil Fuel	Renewable	Total
Total Primary Energy (kWh)	30443	4484720	0	4515163 kWh
Total CO2 (tonnes)	5.2	1047.9		1053.1 tCO2
Total Spend (€)	€7,306	€717,555	0	€724,862

5.3.2. Public Transport

- There is a public bus line, the C12 , operated by Local Link that passes through Connolly. The service operates from Monday to Saturday

Departs	Stops	Mon-Fri	Sat	Mon-Fri	Sat	Mon-Fri	Sat
Ennis	Friars Walk Bus Stop Clare Museum	06:30	08:00	11:00	12:30	18:20	18:20
Ennis	Bus & Train Station	06:32	08:02	11:02	12:32	18:22	18:22
Ennis	Pairc na Coille, Showgrounds Road	D.R.	D.R.	D.R.	D.R.	D.R.	D.R.
Ennis	Opposite Ballymacaula View Entrance	06:40	08:10	11:10	12:40	18:30	18:30
Connolly	Opposite X Press Stop Service Station	07:00	08:30	11:30	13:00	18:50	18:50
Connolly	Opposite Carney's Pub	07:01	08:31	11:31	13:01	18:51	18:51
Miltown Malbay	Tom Malone's Pub	07:39	09:11	11:51	13:21	19:11	19:11

Departs	Stops	Mon-Fri	Sat	Mon-Fri	Sat	Mon-Fri	Sat
Miltown Malbay	St.Joseph's Church	07:40	09:12	13:00	15:00	19:12	19:12
Connolly	Opposite Carney's Pub	07:58	09:30	13:20	15:20	19:57	19:57
Connolly	Opposite X Press Stop Service Station	07:59	09:31	13:21	15:21	19:58	19:58
Ennis	Opposite Ballymacaula View Entrance	08:20	09:52	13:42	15:42	20:19	20:19
Ennis	Pairc na Coille, Showgrounds Road	D.R.	D.R.	D.R.	D.R.	D.R.	D.R.
Ennis	Bus & Train Station	08:26	09:58	13:48	15:48	20:26	20:26
Ennis	Friars Walk Bus Stop Clare Museum	08:28	09:59	13:50	15:50	20:28	20:28

Figure 24: C12 Bus timetable in Connolly

-
    - Further details are available on the [Local Link Website].

5.3.3. Cycling , Walking infrastructure

- There are no cycle paths in the EMP area.
- A number of cycle routes are signposted in the EMP area but no specific facilites are provided.
- There are no secure or sheltered bike parking areas in the EMP area.
- There is no e-bike charging point in the EMP area

5.4. Overall Energy Figures

Table 8: Residential Sector Performance Indicators

Table XX – Residential Performance Indicators				
Source	**Total number of Dwellings**	**% B rated or better**	**% of Fossil Fuel Heating Systems**	**% with Renewable Energy**
BER + CSO	289 + 71 vacant	21%	86%	48%
EMP Survey	37	0	100%	8%

Table 9: Energy source by Sector

Sector	Electricity	Fossil Fuel	Renewable	Total
Residential	1184 MWh	3164 MWh	189 MWh	4537 MWh
Community	5 MWh	25 MWh		30 MWh
Transport	34 MWh	5081 MWh		5116 MWh
Total Energy	1223 MWh	8271 MWh	189 MWh	9683 MWh

Table 10: Energy related Cost and Emissions by source

	Electricity	Fossil Fuel	Renewable	Transport	Total
CO2 Emissions	407 tCO2	951 tCO2	6 tCO2	1193 tCO2	2557 tCO2
Total Cost	€403,464	€530,842	€9,448	€821,288	€1,765,042

6. Sustainable Energy Roadmap

Table 11: Targets for Domestic Energy Upgrades

Type	Group	% houses to be upgraded	Num houses to be upgraded	Energy Reduction per house	Reduction overall
Shallow	E-G	30.00%	36	40%	7.64%
Deep	E-G	50.00%	60	75%	23.86%
Shallow	C-D	30.00%	43	20%	1.77%
Deep	C-D	40.00%	43	50%	5.91%
Solar PV	All	50.00%	143.5		12.98%
Total Reduction in Emissions					**52.15%**

Table 12: Current Energy & Emissions Scenario per sector

Sector	Electricity	Fossil Fuel	Renewable	Total	Emissions
Residential	1184 MWh	3164 MWh	189 MWh	4537 MWh	1356 tCO2
Community	5 MWh	25 MWh		30 MWh	9 tCO2
Transport	34 MWh	5081 MWh		5116 MWh	1193 tCO2
Total Energy	1223 MWh	8271 MWh	189 MWh	9683 MWh	2558 tCO2

Table 13: Target Energy & Emissions Scenario per sector in 2030

Sector	Electricity	Fossil Fuel	Renewable	Total	Emissions
Residential	466 MWh	1314 MWh	906 MWh	2687 MWh	464 tCO2
Community	0	0	15	15 MWh	0 tCO2

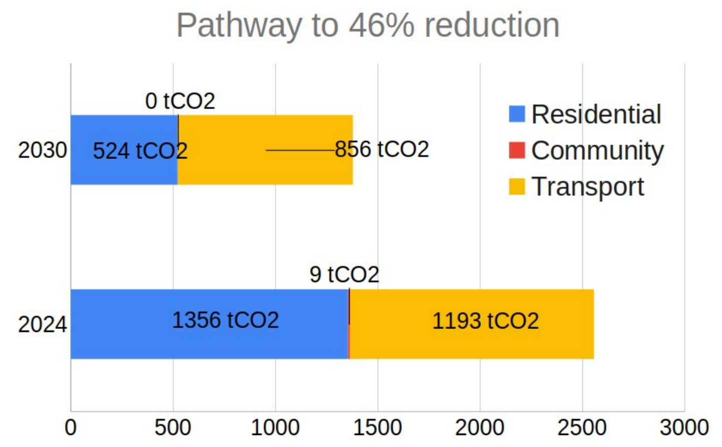


Figure 25: Reductions per sector to 2030

Transport	1016 MWh	2541 MWh		3557 MWh	856 tCO2
Total Energy	1482 MWh	3855 MWh	921 MWh	6259 MWh	1320 tCO2
CO2 Emissions	143 tCO2	1149 tCO2	28 tCO2	1320 tCO2	

7. Register of Opportunities

7.1. Summary of Register of Opportunities

Table 14: Summary of Register of Opportunities

Sector	Description	Timespan	Final Cost	SEAI Grants	Energy Savings	% Energy Savings / Sector	Cost Savings/year	Emissions reduction
Residential / All	Specific focus on Fully Funded Energy Upgrades for energy-poor homes (potentially target of 57 homes or more, i.e. 20% of homes)	Continuous	0	€2,009,000	399.3 MWh	8.8%	€67,239	119 tCO2
Residential / All	Support energy upgrades in 30% of homes in the EMP area via individual grants or groups	Continuous	€1,772,225	€954,275	582.4 MWh	12.8%	€98,076	174 tCO2
Residential / Electricity	Support the rollout of Solar PV on 50% of domestic homes/farms	Continuous	€968,625	€322,875	588.9 MWh	49.8%	€141,331	178 tCO2
Community / Electricity	Expand installation on School Roof and add batteries	Medium term	~ €1000 / kW installed	~ €250 / kW installed	TBC	TBC	TBC	TBC
Community / Electricity	Solar PV installation of 11kW+ 20 kWh battery on the future Community Centre	Medium term	~ €1000 / kW installed	~ €250 / kW installed	TBC	TBC	TBC	TBC
Community / Electricity	Community Solar Project	Medium term	~ €1000 / kW installed	~ €250 / kW installed	TBC	TBC	TBC	TBC
Community / Bio-diversity	Community woodland/fruit forest	Medium term	See details	See details	NA	NA	TBC	CO2 sequestration
Community / Agriculture	Farmscale Anaerobic Digestion	Medium term	See details	See details	See details	See details	See details	128 kgCO2 / cow
Transport	Promoting EV uptake and a Public EV charging point in Connolly	Medium term	See details	See details	See details	See details	See details	See details
Transport	Promoting Public Transport in Connolly	Medium term	See details	See details	See details	See details	See details	See details

7.2. Residential Sector Opportunities

7.2.1. Fully Funded Energy Upgrades (Warmer Homes Scheme)

There is an existing Warmer Homes scheme from SEAI that provides fully funded energy upgrades for eligible homes. The scheme is fully managed by SEAI appointed contractors who take care of every aspect of the scheme once a homeowner is deemed eligible.

The upgrades that are available are :

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

The criteria for eligibility are shown in Table 15 below.

Table 15: Eligibility Criteria for Fully Funded Energy Upgrades

Criteria	Description
1. Own and live in your own home	This must be your main residence, where you live most days of the week
2. Home built and occupied before 2006	This means the ESB meter was connected and property lived in prior to 2006
3. 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 • One-Parent Family Payment • Domiciliary Care Allowance • Carers Allowance and live with the person you are caring for • Disability Allowance for over six months and have a child under seven years of age

- There are no specific CSO statistics on the number of homes receiving fuel allowances but recent press releases from the government would indicate that 413,000 households will receive the fuel allowance in 2024/2025.
- With ~ 2 million homes in Ireland, that means ~20% of homes receive fuel allowance and are thus eligible for the fully funded upgrade scheme.
- If we presume the same proportion applies to the EMP area (287 homes) then it would be expected that 57 **homes could benefit from this scheme**. Note this only takes into account the receivers of Fuel Allowance so the actual number of eligible homes could be higher.
- The scheme currently takes 18-24 months from start to finish
- There is a further service provided by Clare County Council relating to this scheme for people aged 66 and over
  - The service is part of the Age Friendly programme

    - Anyone aged 66 or over can contact **Dena McGrath** (managed by Meath County Council) who will come to the person's home and help them to make the application for the scheme
    - She can be contacted by e-mail at **healthyagefriendlyhomes@meathcoco.ie** or by phone on **046 924 8899**

7.2.1.1. SEC Actions

- The role of the SEC is firstly to raise awareness of the existence of this scheme in the EMP area. Many people are not aware that the scheme exists.
    - Leaflets have been created specifically for the Connolly community and are also available online on
    - **Senior citizen groups could be specifically targeted.**
    - SEC's will have to take into account the sensitivity required when communicating people who may not be comfortable with the idea of making it publicly known that they avail of certain welfare payments.
- Another role is for SEC's to assist eligible people in making the application to allow for the fact that many people are not comfortable making applications online, scanning documents etc.
    - The application is available online or in paper/pdf format. See Figure 1 in the Annexes for a screenshot of the initial application form
    - Further guidelines are available
- Following a communication campaign, the SEC could organise an event where people would make the application under the guidance of members of the SEC.
- If a number of applications are made with the knowledge of the SEC, then the SEC could ask people to keep them informed when SEAI contacts them for the different phases of the upgrade.
    - This information could then be shared with other applicants so that everyone knows how things are progressing and to be able to spot any unexplained delays in specific cases

7.2.1.2. Impact of Actions

- Assumptions
    - 57 qualifying homes in the EMP area are able to avail of it
    - 75%, or 43 of these homes are in the BER E-G category. 25%, or 14, are in the C-D category
    - All homes attain a B2 BER after the measures.
    - Total Energy Savings (for residential sector) : 8.8 **% or 399 MWh**
    - Total Cost Savings : **€67,239/yr**

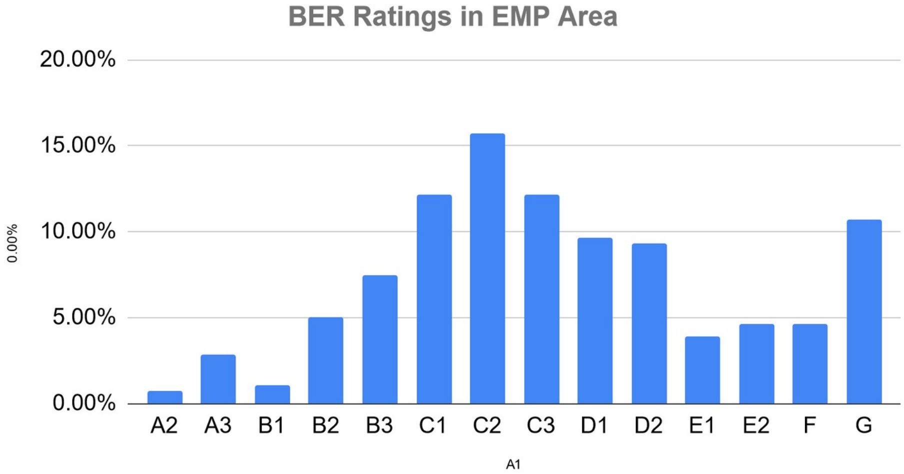
7.2.2. Support energy upgrades bvia other schemes in 30% of homes in the EMP area

Retrofitting of the homes in the EMP area is a fundamental part of the Energy Master Plan, but not the simplest part.

The benefits of retrofitting are

- Improved comfort
- Reduced cost to the homeowners over the long term
- Reduced energy usage
- Reduced related emissions

Let's look again at the BER distribution in the EMP area



<u>The average BER is a D2, or 295 kWh/m²/yr.</u> To compare, the national average BER is a C2 or 180 kWh/m²/yr.

The potential here is huge, i.e. it is easier and cheaper to bring improvements to the houses with bad BER's (D to G) than to those with already relatively good BER's (C and lower).

NOTE : Bringing a house with a G rating to a C3 rating means reducing energy usage by 60%. This is noted as a reminder that the improvement to a B2 at all costs is not the endgame, it is the reduction in energy usage and the associated emissions.

Typically examples of the low-hanging fruit, or shallow upgrades, for these houses with bad BER's are

- Improved attic insulation
- Draught-stripping of doors and windows (and blocking open chimneys)
- Improved timer/temperature control of heating systems
- Efficient wood-stoves
- Replacement of old heating systems by modern heating systems.

Once these initial actions are done, then the bigger ticket actions , or deep upgrades, can be considered.

- Internal insulation
- External insulation
- Solar PV
- Whole house ventilation
- Heat pumps
- Replacement of doors and windows
- Front/rear porches.

7.2.2.1. Different Approaches to Energy Upgrades

There are a number of ways that a community can approach energy upgrades

- The Individual approach
- The One Stop Shop approach
- The Community Energy Grant approach

<u>The Individual Approach</u> (link to SEAI webpage)

- The homeowner makes all decisions and handles everything

- Applies for grant directly with SEAI (see grants available and amounts in Annexes)
- Finds/selects the SEAI registered contractor(s)
- Pays up front and gets grant repaid (Some installers may take grant directly and thus reduce the upfront costs)

The One Stop Shop Approach (link to SEAI webpage)

- Each homeowner works with a registered OSS (One Stop Shop)
- OSS handles everything (choosing contractors, grant applications, quality control etc.)
- Homeowner pays amount less grant
- OSS is paid a project management fee (specific grant to cover this fee)
- Suitable for extensive upgrades affecting multiple elements
- Includes upgrades not available in individual grants (see grants available and amounts in Annexes)
- Typically higher cost for work but guaranteed and totally managed

The Community Energy Grant Approach (link to SEAI webpage)

- A Project Co-ordinator handles everything (choosing contractors, grant applications, quality control etc.)
- The Project Co-ordinator is paid a project management fee (specific grant to cover this fee)
- Homeowner pays up front and gets grant repaid
- Result must be B2 or minimum 100 kWh uplift on BER
- Must include multiple sectors (home / private / public / community / fuel poor)
- Includes upgrades not available in individual grants (see grants available and amounts in Annexes)
  - Taken from the Community Grant Guidelines document, specifically pages 47/48/49
- The main advantages from the community perspective are :
  - Groups of local homes managed together (mutual support)
  - Potential for Energy Credits (income for the community)

7.2.2.2. SEC Actions

The SEC has a number of potential roles

- Organising the distribution of information via leaflets and/or social media to improve the awareness of the different support paths available.
  - Again , there are leaflets available through the SEC mentor or bespoke documents can be created.
- Organising information events to explain the different approaches
  - These can be either general information evenings or focussed evenings with specific One Stops shops, project co-ordinators and contractors presenting their services
  - The model of a small-scale regular “Energy Fairs” has already been used successfully and could be repeated at yearly intervals for example.
  - These events could also incorporate feedback from homeowners in the EMP area who have already carried out energy upgrades to give some first hand experience.
  - The events can be adapted for different public types and perhaps integrated in other events (festivals / parades) that are organised in the EMP area
- Creating a publicly available register of feedback from homeowners on what has worked well for them
  - a register of SEAI contractors who have done good work in the EMP area
  - a filtered version of the SEAI Registered Contractors database showing only local/regional contractors.

- a register of typical costs for different upgrade types, the costs, the "good" suppliers and sharing that with the community
- Ensure that local SEAI registered contractors are "flagged" for involvement in any OSS / Community Grant projects, on the assumption that there is no impact on cost/quality.
    - Typically OSS and Project Co-ordinators are happy to use local contractors

7.2.2.3. Impact of Actions

- Assumptions
    - 86 homes in the EMP (30%) are upgraded in the period to 2030
    - 57 of these homes are in the BER E-G category, 29 are in the C-D category
    - All homes attain a B2 BER after the measures.
    - Total Energy Savings (for residential sector) : 12.8**% or 582 MWh**
    - **Total Cost Savings : €90,076/yr**
    - **Total Final Cost to homeowners : €1,722,225**
    - **Total SEAI grants : €954,275**

7.2.3. Support the rollout of Solar PV on 50% of domestic homes/farms

Solar PV is becoming more prevalent in Irish homes, with the number of installation practically doubling in the period June-2023 to Oct-2025, reaching ~8% of irish homes.

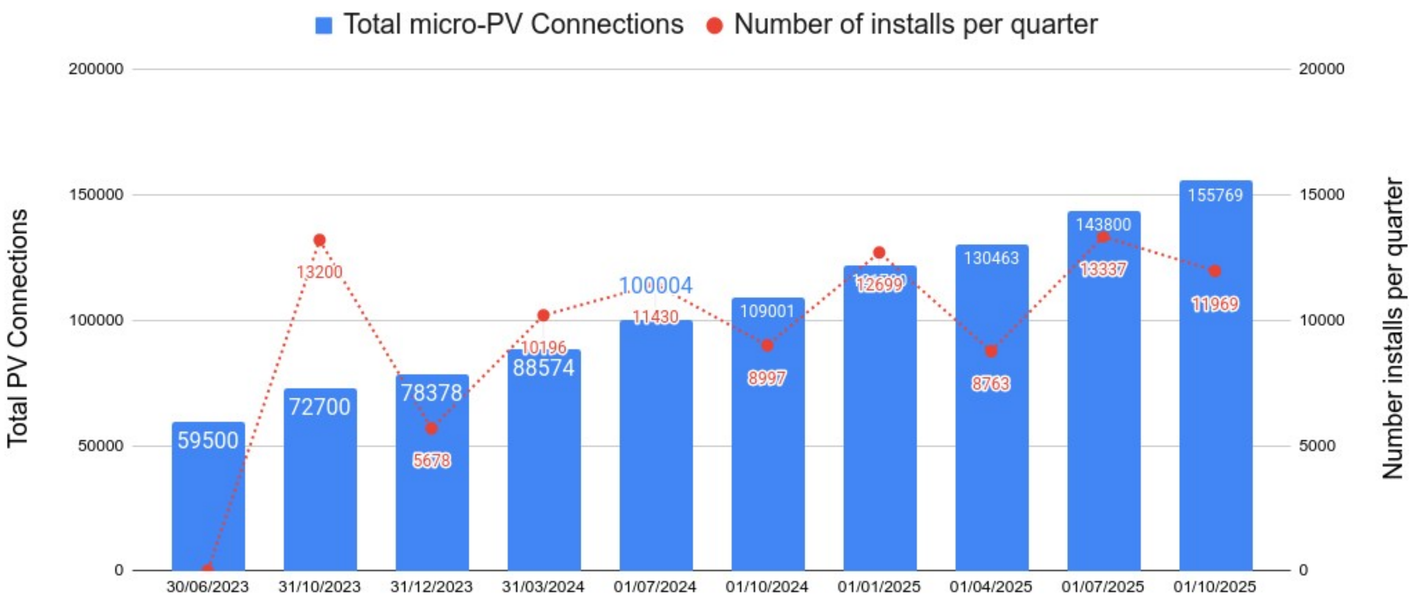


Figure 26: Growth in domestic Solar PV installations 2023-2025

Domestic Solar PV installations provide multiple advantages :

- With a payback of ~7 years, and a lifespan of 20 years, it is a real moneysavers for homeowners
- Increase the % of clean renewable electricity provided to the electricity grid
- Provide resilience to both the grid and directly to homeowners at times of grid outages, when a battery has been included in the Solar PV installation

7.2.3.1. SEC Actions

The SEC has a clear role in promoting the rollout of Solar PV installations in the area

- Organising home/farm visits where locals can see installations that are already working in the area
  - Since the installations siwes and grants differe for farm and home installations, o ne event should be organised for each case, each year
- Arrange visits to the area of Solar PV installers
  - This could be done in the context of an annual mini energy event in the hall where a number of instalelrs present their solutions and take bookings for site visits/estimates.

7.2.3.2. Impact / Cost of Actions

- Assumptions
  - 5% of homes in the area get Solar PV panels installed each year for the next 10 years
  - Average install size will be 5 kW of panels and a 5 kWh battery
    - As prices continue to drop these average sizes will tend to increase over time
  - Average install cost : €8500
  - Average SEAI grant : €1800
  - Total Energy saving from Solar PV production : **589 MWh**

7.2.4. Overall Retrofit Targets

The following targets should be realistic in the time period 2025 to 2033.

Retrofit Targets

Type of action	Current BER house type	% houses involved	Number of houses involved	Target Reduction per house	Reduction overall
WHS	E-G => B2	15.0%	43	74.9%	7.15%
WHS	C-D => B2	5.0%	14	52.0%	1.65%
Non-WHS	E-G => B2	20.0%	57	74.9%	9.53%
Non-WHS	C-D => B2	10.0%	29	52.0%	3.31%
Solar PV	All	50%	143.5		12.98%
Total					**34.62%**

Estimated Costs

Type of action	Current BER house type	% houses involved	Number of houses involved	Cost per Action type	% grant
WHS	E-G => B2	15.0%	43	€45000	100%
WHS	C-D => B2	5.0%	14	€5000	100%
Non-WHS	E-G => B2	20.0%	57	€45000	35%
Non-WHS	C-D => B2	10.0%	29	€5000	35%
Solar PV	All	50%	143.5	€9000	25%

7.3. Community Sector Opportunities

7.3.1. Solar PV roof-installation for future Community Centre and School

- As evidenced by the energy audits, the future Community Centre and the school would be ideal candidates for Solar PV installation (extension in the case of the school).
- The audits show that both projects would have a rapid payback time even if we assume that the projects proceed with the existing SEAI non-domestic Solar PV grants. i.e. assuming no further grants such as Community Centres Investment Fund are available
- While the National School got a Solar PV installation in 2024, the system was limited in size to 6 kW. Extending the system could be added to to provide further savings to the school.

7.3.1.1. SEC Actions

- Ensure that the Energy Audits are shared with the management of both the school and the committee working on the future Community Centre.
- Keep an eye out for funding opportunities that would make the project even more financially attractive
- Request pricing for the systems as specified in the Energy Audits from local/regional contractors in order to keep abreast of any price changes in the market
- Liaise with the school to check that the Green Schools committee are aware of the impact that the Solar PV system is having in terms of meeting electricity demand and reducing bills.
    - It may be relevant to increase the system size depending on the results. i.e. if there is roof space available, additional panels could be added to improve the impact of the system.

7.3.2. Community Solar Project

A Solar PV project owned by the community can provide a number of advantages

- A potential regular money-earner for the community
- Potential for part public funding as a community project
- Community crowd-funding can build community engagement and even provide an investment opportunity for residents

Note that community energy projects are well supported by SEAI in terms of technical support.

https://www.seai.ie/publications/Community-Toolkit-Grid-Connection.pdf

When we speak of community solar farms there are a number of sizes that each provide different advantages and challenges

- Micro (less than 50 kW)
    - Better to be co-located with existing electricity account in order to avoid the cost of a new connection e.g. Community Centre or existing high-load premises e.g. dairy farm or the shop.
    - To get to full 50 kW, it will be necessary to upgrade to a 3-phase supply if that is not already the case.
        - The added cost of this will depend on the distance to the nearest 3-phase connection point. See the ESB Network Capacity Map/Tool for a map of 3-phase connections in Connolly village

- Expected cost : €55k for PV installation + €7.5k for grid connection
- Existing funding : SEAI Non-domestic grant scheme (a 50 kW system would qualify for €12,600)
- Expected annual earnings : 47500 kWh annual production sold at 13.5c/kWh = €6041/yr
- A 50 kW ground-mounted solar farm would require ~1000m² of ground.

- Small-scale (50kW to 1MW) (export-only)
  - This will be supported under the Small-Scale Renewable Electricity Support Scheme (SRESS)
  - The details of this scheme have been published in Jan 2025
  - This would require a separate 3-phase grid connection meaning additional costs.
  - Expected cost : Indicative costs would be ~€100k / 100 kW but specific costing for the grid connection would be needed.
  - Projects are made financially viable by a guaranteed tariff

SRESS Renewable Energy Communities Tariff Rates

Small Scale Solar PV (1 MW or under)	Small Scale Solar PV (greater than 1 and up to 6MW)	Wind (<6 MW)
€150/MWh	€140/MWh	€90/MWh

  - Taken from SRESS website
  - The tariff is guaranteed for 15 years and is reviewed annually according to the Index of Consumer Prices.
  - The chart below shows the potential cumulative earnings for the community on a 50 kW system over 15 years
    - The assumptions here are 100% financing at 2% loan rate and a 2% increase in the tariff per annum

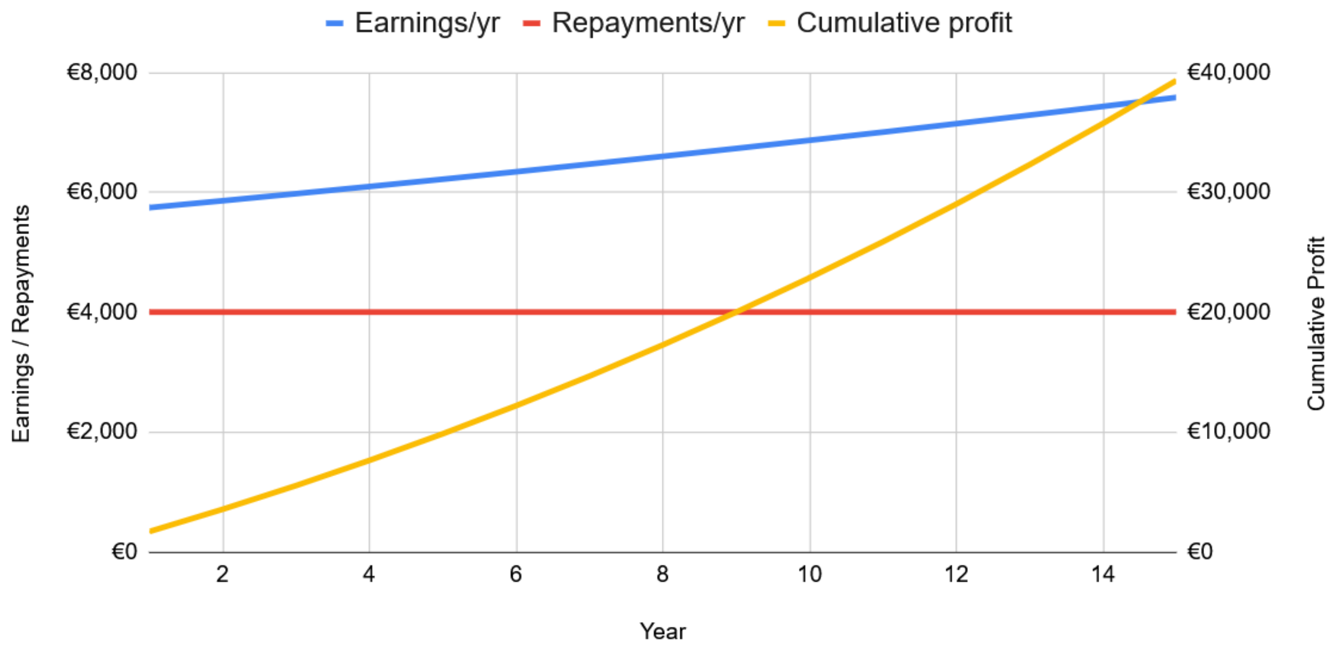


Figure 27: Finances of a 50 kW Community Solar PV scheme under SRESS

7.3.2.1. ESB Network Capacity Map/Tool

The map below has been copied from the [ESB Networks capacity map](#) which allows a quick pre-assessment of the capacity available on the grid to connect micro or small-scale generating systems.

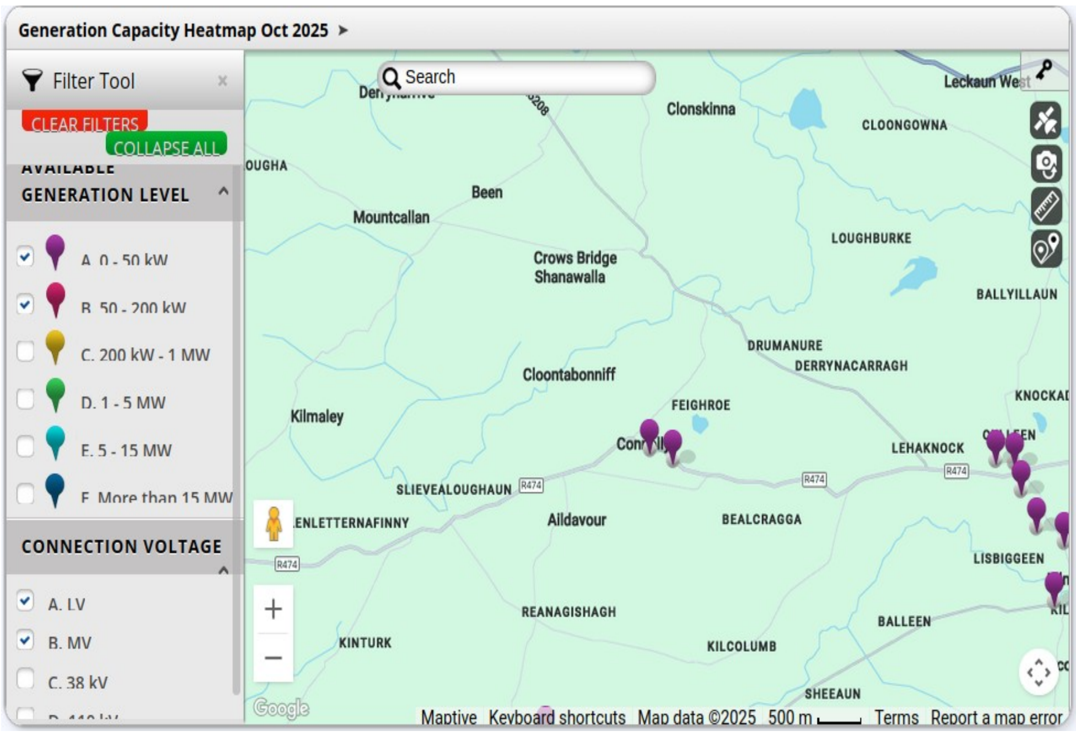


Figure 28: ESB Network capacity for 3-phase connections

7.3.2.2. SEC Actions

- Identify the location of the 3-phase transformers using the map above
- Identify potential vacant plots or roofs close to the transformers that could potentially have a Solar PV farm installed
    - Note that for every 50 kW of a Solar PV farm, roughly 1000m2 of unshaded land would be required
- Identify existing facilities that would be suitable for a Solar PV installation, either roof or ground-mounted
- Note that a community funded Solar PV installation on an existing facility would give better payback for the community.
    - The electricity from the installation could be sold to the facility owner at a higher rate that the 15c/kWh tariff
    - Installation costs would be lower since there is an existing connection.
    - This could be an option for members of the community to provide a short-term loan to a local dairy-farmer. Given the level of grant aid available, such a loan would be repaid in less than 5 years
    - It is worth noting that the 15 year guaranteed rate makes an export-only project a lower risk option.

7.3.3. Community woodland/fruit forest

- As well as addressing the energy usage, the overall sustainability and bio-diversity of the EMP area can be improved by the creation of a community woodland.
- There is a government scheme, Neighbourwoods, which provides financial assistance to create woodland amenities for local people. Funding is available to help establish woodland on greenfield sites and to support the development of existing sites.
- Neighbourwoods can be used by the community for strolling, family visits and picnics, exercising and a host of other outdoor activities.
- As well as finance for the establishment of the community forest, an annual premium, of €1142 per hectare, is payable to the community. When a community has some available land this can provide a regular, albeit small, income stream for the community to offset other costs
- See this document for full details of the scheme and this further document for details of grant and premium rates.

7.3.3.1. SEC Actions

- Identify suitable plots of land that could be bought/leased
    - The minimum site area for the Neighbourwoods scheme is 1000m2, a quarter of an acre.

7.3.4. Farmscale Anaerobic Digestion

- There is a strong farming sector in Connolly.
- All of these farms produce significant quantities of manure which could be used as feedstock for an anaerobic digestion system
- An **anaerobic digestion (AD) system** on a dairy farm is a process that breaks down organic materials, like cow manure and crop waste, in the absence of oxygen.
- This produces **biogas**, a renewable energy source that can generate heat, electricity, or fuel.
- The system also creates **digestate**, a nutrient-rich byproduct used as a natural fertilizer.
- It can provide an additional income stream, helps reduce farm waste and lower greenhouse gas emissions.

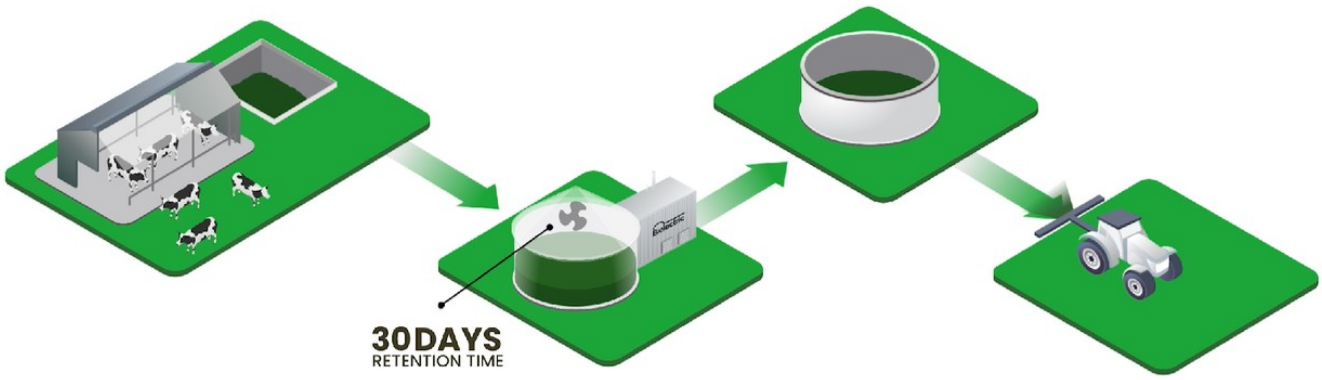


Figure 29: Anaerobic Digestion process : Store slurry, produce gas, store digestate, spread digestate

- In order to asess the viability of anaerobic digestion as a solution for farms in Connolly we need to establish a few baseline figures :

7.3.4.1. Key Figures for Anaerobic Digestion

- Slurry production : Teagasc sources indicate that each cow will produce 0.33m3 of slurry per week
  - a recent Farmers Journal article from Nov 2024 indicates that this will be revised upwards to ~0.4m3
- Each m3 of slurry can potentially produce ~20m3 of biogas (source Teagasc see Table 3 or Annexe 8.5)
- Each m3 of biogas contains ~23 MJ of 6.4 kWh of potential energy (source Teagasc)
- Before this biogas can be used in an electricity generator, it needs to be "cleaned" to reduce the level of
  - water vapour
  - CO_2 (carbon dioxide)
  - H_2S (hydrogen sulphide)
- Teagasc estimate that the "usable" energy from biogas is
  - 1.7 kWh of electricity only
  - 2.5 kWh of heat only
  - 1,7 kWh electricity and 2 kWh of heat in a combine heat and power plant (CHP)
  - source : Teagasc see Table 4 , or Annexe 8.5

To give a worked example using these figures :

- Assume a herd of 50 cattle and that they are indoors for the equivalent of 20 weeks per year (Teagasc national average is 18 weeks)
- Slurry production is : 50 * 0.33 * 20 = 330 m3 / year
- Biogas production = 330 * 20 = 6600 m3 / year
- Potential energy : 42,240 kWh / year
- Realistic energy from CHP plant : **11,220 kWh electricity and 13,200 kWh of heat**
- **Potential value of energy = 11,220 * €0.25 (equivalent grid electricity price) + 13,200 * €0.10**

- **€4125 / year**

- Other values derived from an AD plant are
  - Reduced cost of slurry management
  - Use of digestate to replace bought-in fertiliser
  - **Avoided emissions : 6.4 tCO2 or 128 kgCO2/cow**
    - Electricity : @300gCO2e/kWh, 3.4tCO2 avoided
    - Heat : @229g/kWh, 3.0tCO2 avoided

7.3.4.2. Costs of AD systems and National Strategy

- The current National strategy suports the production of bio-methane from large anaerobic digestion plants for direct injection into the national gas grid

Vision of Ireland's Biomethane Sector	
Scale of AD facilities	While the majority of AD plants are likely to be 40 GWh or similar scale, there will be a role for smaller farm scale plants.
Feedstock mix	In the initial development of a biomethane sector it likely that waste products will be utilised in the first instance, closely followed by agricultural feedstocks such as slurries and grass silage.
Regulations and policy	The majority of AD plants in Ireland will be directly connected to the gas network. Supporting policies implemented through the National Biomethane Strategy will aid the development of a successful biomethane sector in Ireland.
Financial supports	Biomethane will be supported through the implementation of the Renewable Heat Obligation and Capital Grants.
End uses of biomethane	Biomethane will be utilised in the heat (RHO), transport (RTFO) and electricity generation (Gas Purchase Agreements) sectors in Ireland.
Sustainability	Through the development of the Biomethane Sustainability Charter, sustainability will be central t the development of biomethane in Ireland.

Table 16: Summary of National Strategy for Anaerobic Digestion

- The scale of such plants, 40 GWh, are effectively 1000 times bigger than the worked example for 50 cows done above.
- A dutch company BioElectric have a turnkey CHP system which they claim is suitable for farms of 60 cows
  - The cost is €100k but requires cows to be housed year-round to ensure a regulqr supply

- ○ Their figures , as shown in the diagram below, seem optimistic compared to my calculations

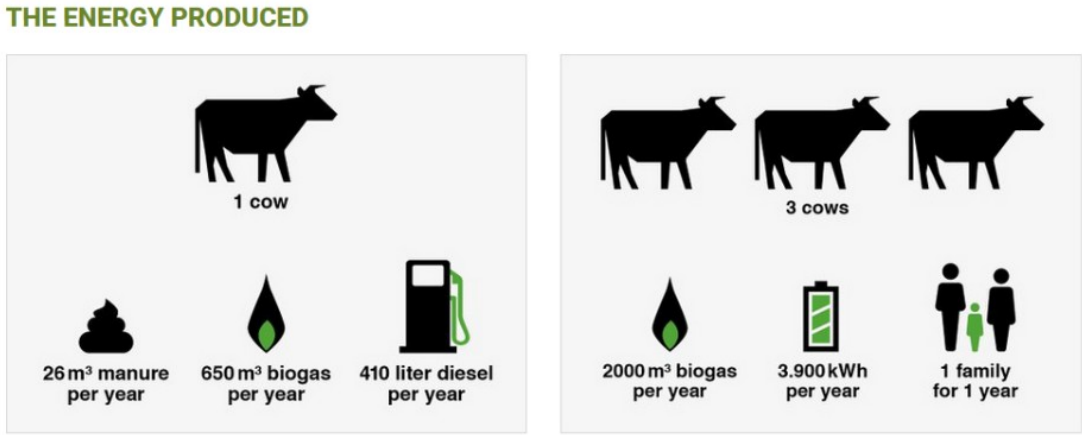


Table 17: Figures for energy production from BioElectric

- Another company CycleØ, propose AD plants in Ireland for farms of 400 cows or more.

7.3.4.3. SEC Actions

- It is the opinion of the plan, that developing an anaerobic digestion plant in Connolly is far from a simple affair
- If there is interest to raise the profile of AD in advance of a larger system, then the SEC could consider a pilot program of a domestic scale anaerobic digester.
  - ○ This might be suitable for an local homeowner or one fo the local schools, if there is a regular supply of food waste from the school meals program or other sources.
- The kind of systems that would be suitable are the following :

● MyGug Biogas system : produced in Ireland	● Home BioGas : Produced in the US/Israel
	

Both systems produce biogas that can then be used in a cooking ring.

- Each kg of food waste can be converted to the equivalent of 2.2 kWh of equivalent energy in the biogas produced.
- If we assume that this then displaces the use of 2.2 kWh of bottled gas (LPG) this gives a reduction in emissions terms of 0.51 kg CO2. See Annexe 8.2 for full figures on energy production from food waste
- LPG costs the equivalent of 20c/kWh. Each kg of food waste can then save 44c in LPG costs. (See SEAI figures)

If we take an average of 5 kg of food waste per day in the Cafe or foodshop for 4 months of the year and 2.5 kg of food waste per day for the other 8 months we have the following annual figures.

- Total food waste processed to biogas 1212 kg
- Total energy produced 2644 kWh
- Total CO2 savings/year 612 kgCO2
- Total savings on LPG equivalent €533

7.4. Transport Sector Opportunities

7.4.1. Promoting EV uptake and a Public EV charging point in Connolly.

- Government policy already strongly favours the uptake of EV's.
- The installation of one or more public EV charging points in Connolly is a recommended action.
- Connolly currently has no publicly accessible charging point and with the increase in EV's, used by both residents of the community and visitors, this lack of facilities should be remedied.
- The preferred location for EV chargers would be either at the future Community Centre or the local shop.
- The availability of EV chargers would serve to attract more people to visit Connolly and could also be used by the local community (e.g. during matches/training).
- A person who uses the EV charger will be staying in the vicinity of the charger in the short-term and this can lead to increased footfall to other businesses in the town.
- SEAI have created a register of Charge Point Operators who are licensed to install and operate EV charging points.
- If the community engages with a Charge Point Operator, the charge point is installed, operated and owned by the Charge Point Operator. Typically a revenue-split model will be agreed in advance with the community.

7.4.1.1. SEC Actions

- Contact one of the existing Charge Point Operators who are registered with SEAI.
  - The full list is available on this SEAI webpage.
- Realistically, this should only be undertaken if the charging point is 100% grant funded.
  - Charging points are not money-earners for communities in the current market.

7.4.2. Promoting Public Transport in Connolly.

- Government policy has drastically increased the bus services going through Connolly village from Monday to Saturday
- There are six buses going from Ennis to Miltown and vise versa that stop in the village
- Government support has not yet extended to providing specific timetable info per village, preferring to provide info for the entire route which may not be the most accessible approaches
- The signage for bus stops is often lacking and people in communities may simply not be aware where the bus actually stops.

7.4.2.1. SEC Actions

- Create and print timetables of specific relevance to Connolly (for example using the table in section 5.3.2)
  - These could be made available in the shop and church
- Ensure that the bus stops in Connolly are well indicated
  - Create a bench/shelter to make the bus-stop more appealing

8. Annexes

8.1. Annex 1 : Population calculation

- The area covered by the EMP is included in 3 Small Areas
  - 037063001 in the Furroor Electoral Division
  - 037082002 in the Killanniv Electoral Division
  - 037105001 in the Kinturk Electoral Division
- CSO data from table F1011 gives the population per Electoral Districts

Table 18: Population of Connolly Parish

Unit	Population
037063001 / Furroor	180
037082002 / Killanniv	311
037105001 / Kinturk	287
Total Population	778

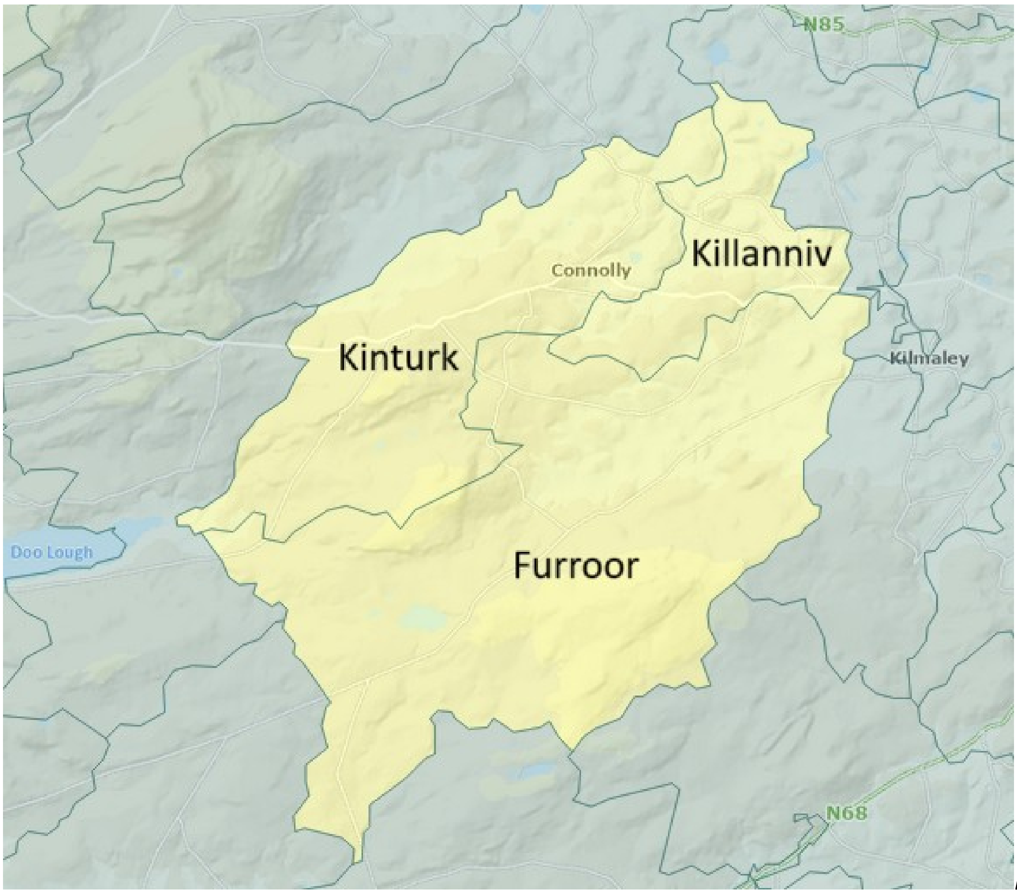


Figure 30: Small Areas / Electoral Divisions in the EMP

8.2. Annex 2 : Calculation of energy produced by anaerobic digestion of food waste

The biogas yield and its energy content from 1 kg of kitchen (food) waste through anaerobic digestion can vary based on several factors, such as the composition of the waste, digestion conditions, and the efficiency of the process. However, we can provide a general estimate.

Typically, 1 kg of kitchen waste can produce between 0.2 to 0.5 m^3 of biogas under optimal conditions. Taking a generalized average, let's say 1 kg of kitchen waste yields about 0.35 m^3 of biogas.

The energy content of biogas depends primarily on its methane (CH4) concentration. On average, biogas derived from kitchen waste contains about 50-70% methane. The energy content of methane-rich biogas is around 21-24 MJ/m^3. Using an average value of 22.5 MJ/m^3:

- Energy content from 1 kg of kitchen waste = 0.35 m^3 × 22.5 MJ/m^3 = 7.875 MJ.
- Now, to convert this to kWh, given that 1 kWh is equivalent to 3.6 MJ:
- Energy content in kWh = 7.875 MJ ÷ 3.6 = **2.19 kWh**.

So, approximately, the biogas produced from the anaerobic digestion of 1 kg of kitchen waste contains around 2.19 kWh of energy. Keep in mind that these values are general averages, and actual yields and energy content can vary based on specific circumstances and factors related to the digestion process and the nature of the waste.

The CO2 that would have been generated from the burnign of an equivalent amoutn of LPG (bottled gas) can be calculated as follows :

To determine how much CO2 is released from the combustion of LPG (liquefied petroleum gas), we need to consider the composition of LPG and the CO2 emissions for the combustion of its main components, which are primarily propane (C3H8) and butane (C4H10).

1. **Combustion Equations and CO2 Emissions**:
    - **Propane**: C3H8+5O2→3CO2+4H2OC3H8+5O2→3CO2+4H2O Propane has an emission factor of about 3.0 kg CO2 per kg of propane combusted.
    - **Butane**: C4H10+6.5O2→4CO2+5H2OC4H10+6.5O2→4CO2+5H2O Butane has an emission factor of about 3.3 kg CO2 per kg of butane combusted.
2. **Energy Content of LPG**:

LPG has an average energy content of around 13.6 kWh/kg, given a typical mixture of propane and butane. This is a generalized value; actual energy content might vary slightly.

3. **Determining the mass of LPG for 2.2 kWh**:

Mass of LPG=Energy requiredEnergy content of LPG per kgMass of LPG=Energy content of LPG per kgEnergy required

Mass of LPG=2.2 kWh13.6 kWh/kgMass of LPG=13.6 kWh/kg2.2 kWh Mass of LPG≈0.162 kgMass of LPG≈0.162 kg

4. **CO2 Emissions**:

Assuming a typical mix of 60% propane and 40% butane in the LPG:

Propane content = 0.162 kg × 0.6 = 0.0972 kg Butane content = 0.162 kg × 0.4 = 0.0648 kg

CO_2 from propane = 0.0972 kg × 3.0 kg CO_2/kg = 0.2916 kg CO_2 CO_2 from butane = 0.0648 kg × 3.3 kg CO_2/kg = 0.2138 kg CO_2

Total CO_2 = 0.2916 kg + 0.2138 kg = **0.5054 kg** or 505.4 g

So, approximately 505.4 grams (or 0.5054 kg) of CO_2 is released from the combustion of 2.2 kWh of LPG. Keep in mind that this is a general estimate based on typical LPG compositions and might vary slightly depending on the exact mixture and other factors.

Final Result

- 1 kg of food waste generates **2.2 kWh** equivalent of biogas.
- Assuming this replaces the use of LPG, this avoids the emissions of **0.51 kg of CO_2**

8.3. Annex 3 : SEAI Grants

8.3.1. Grant Types

	Individual Energy Upgrade Grants	One Stop Shop Service	Fully Funded Energy Upgrade
Home energy assessment		✓	✓
Project management		✓	
Wall and roof insulation	✓	✓	✓
Floor insulation		✓	
Windows		✓	✓
Heating controls	✓	✓	✓
Heat pump	✓	✓	✓
Solar water heating	✓	✓	
Solar electricity	✓	✓	
Ventilation		✓	✓
BER assessment	✓	✓	✓

8.3.2. Individual Grant Amounts

The table below is taken from [this SEAI webpage]which remains the final reference

Grant name	Types of home	New Grant Value
Heat Pump Systems *Homes built and occupied before 2021*	● All Houses ● Apartments	● €6,500 ● €4,500
Heat Pump Air to Air *Homes built and occupied before 2021*		€3,500
Heating Controls		€700
Solar Hot Water *Homes built and occupied before 2021*		€1200
Attic insulation *Homes built and occupied before 2011*	● Apartment (any) ● Mid-Terrace ● Semi-detached or end of terrace ● Detached house	● €800 ● €1,200 ● €1,300 ● €1,500
Cavity wall insulation *Homes built and occupied before 2011*	● Apartment (any) ● Mid-Terrace ● Semi-detached or end of terrace ● Detached house	● €700 ● €800 ● €1,200 ● €1,700
Internal Insulation (Dry Lining) *Homes built and occupied before 2011*	● Apartment (any) ● Mid-Terrace ● Semi-detached or end of terrace ● Detached house	● €1,500 ● €2,000 ● €3,500 ● €4,500
External Wall Insulation (The Wrap) *Homes built and occupied before 2011*	● Apartment (any) ● Mid-Terrace ● Semi-detached or end of terrace ● Detached house	● €3,000 ● €3,500 ● €6,000 ● €8,000
Solar PV	● €700 per kWp up to 2kWp ● €200 for every additional kWp up to 4kWp ● Total Solar PV grant capped at €1800	€1400 for 2kWp €1600 for 3kWp €1800 for 4kWp
BER		€50
Technical Assessment		€200

8.3.3. One Stop Shop Grants Amounts

The table below is taken from this SEAI webpage which remains the final reference

Grant name	Types of home	Grant Value
Heat Pump Systems	• All Houses • Apartments	• €6,500 • €4,500
Central Heating System for Heat Pump	• All Houses • Apartments	• €2,000 • €1,000
Heat Pump Air to Air		€3,500
Heating Controls		€700
Heat Pump bonus		€2,000
Solar Hot Water		€1200
Attic insulation	• Apartment (any) • Mid-Terrace • Semi-detached or end of terrace • Detached house	• €800 • €1,200 • €1,300 • €1,500
Rafter insulation	• Apartment (any) • Mid-Terrace • Semi-detached or end of terrace • Detached house	• €1,500 • €2,000 • €3,000 • €3,000
Cavity wall insulation	• Apartment (any) • Mid-Terrace • Semi-detached or end of terrace • Detached house	• €700 • €800 • €1,200 • €1,700
Internal Insulation (Dry Lining)	• Apartment (any) • Mid-Terrace • Semi-detached or end of terrace • Detached house	• €1,500 • €2,000 • €3,500 • €4,500
External Wall Insulation (The Wrap)	• Apartment (any) • Mid-Terrace • Semi-detached or end of terrace • Detached house	• €3,000 • €3,500 • €6,000 • €8,000

Windows (Complete Upgrade)	• Apartment (any) • Mid-Terrace • Semi-detached or end of terrace • Detached house	• €1500 • €1,800 • €3,000 • €4,000
External Doors (max. 2)		€800 per door
Floor Insulation		€3,500
Solar PV	• €700 per kWp up to 2kWp • €200 for every additional kWp up to 4kWp • Total Solar PV grant capped at €1800	• €1400 for 2kWp • €1600 for 3kWp • €1800 for 4kWp
Mechanical Ventilation		€1,500
Air Tightness		€1,000
Home Energy Assessment		€350
Project Management	• Apartment (any) • Mid-Terrace • Semi-detached or end of terrace • Detached house	• €800 • €1,200 • €1,600 • €2,000

8.3.4. Community Grants Amounts

The tables below are taken from this SEAI guidelines document (pages 47/48/49) which remains the final reference

Private Homes

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 PV	0 to 2 kWp €800/kWp 2 to 4 kWp €250/kWp Total Solar PV grant capped at €2,100			
Mechanical Ventilation	€1,500			
Air Tightness	€1,000			
Home Energy Assessment	€350			
Project Management	€2,000	€1,600	€1,200	€800

Approved Housing Body Homes

	Approved Housing Body			
Measure	Detached	Semi-Detached / End Terrace	Mid Terrace	Apartment
Heat Pump	€6,500			€5,500
Central Heating System for Heat Pump	€2,000			€1,000
Heat Pump Air-to-Air	€4,000			
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	€3,500	€3,500	€3,000	€2,000
Cavity Wall Insulation	€1,700	€1,200	€800	€700
External Wall Insulation	€10,000	€8,000	€4,500	€3,500
Internal Wall Insulation	€5,500	€4,250	€2,500	€2,000
Windows (Complete Upgrade)	€5,000	€3,700	€2,200	€1,900
External Doors (max. 2)	€1,000 per door			
Floor Insulation	€4,500			
Solar PV	0 to 2 kWp €800/kWp 2 to 4 kWp €250/kWp Total Solar PV grant capped at €2,100			
Mechanical Ventilation	€2,000			
Air Tightness	€1,000			
Home Energy Assessment	€350			
Project Management	€2,000	€1,600	€1,200	€800

Energy Poor Homes (CEG)

Measure	Energy Poor Homes			
	Detached	Semi-Detached / End Terrace	Mid Terrace	Apartment
Heat Pump	€6,500			€5,500
Central Heating System for Heat Pump	€2,000			€1,000
Heat Pump Air-to-Air	€4,000			
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	€3,500	€3,500	€3,000	€2,000
Cavity Wall Insulation	€1,700	€1,200	€800	€700
External Wall Insulation	€14,000	€11,000	€6,500	€4,500
Internal Wall Insulation	€9,500	€7,000	€4,500	€3,000
Windows (Complete Upgrade)	€5,000	€3,700	€2,200	€1,900
External Doors (max. 2)	€1,000 per door			
Floor Insulation	€4,500			
Solar PV	0 to 2 kWp €800/kWp 2 to 4 kWp €250/kWp Total Solar PV grant capped at €2,100			
Mechanical Ventilation	€2,000			
Air Tightness	€1,000			
Home Energy Assessment	€350			
Project Management	€2,000	€1,600	€1,200	€800

8.4. Annex 4 : Online application from for Fully Funded Energy Upgrades

Are you eligible?

Before you start your application, take a few moments to read through what you will need:

- ☑ Your PPSN
- ☑ Your MPRN – the 11-digit number located on your electricity bill
- ☑ Proof of owning your home dated within last 12 months

Provide any one of the following documents:
Mortgage statement
Home Insurance Policy
Local Property Tax Letter + utility bill with name and address of the applicant within last 6 months
Title deeds
Solicitors letter

- ☑ A qualifying Social Welfare payment

Receiving any one of the following payments:
Fuel Allowance
Job Seekers Allowance with a child under 7 years of age + child's birth certificate
Working Family Payment
One-Parent Family Payment
Domiciliary Carers Allowance
Carers Allowance + a completed Carers Allowance Form + living with the person you are caring for
Disability Allowance with a child under 7 years of age + copy of the child's birth certificate

Make sure all your documentation is clear to read. If we cannot read or validate your documents, your application will not move forward, and you will have to start again.

Do you have all your documentation ready? Let's begin your application.

Apply Online

Figure 1Figure 1 Screenshot of Online Application form for Fully Funded Energy Upgrades

8.5. Annex 5 : Figures for Anaerobic digestion from Teagasc

- All figures are taken from this Teagasc report from 2020

Table 3: Energy content of farm feedstocks.

Feedstock	Biogas potential m^3 per tonne	DM content
Cattle	19.69	8%
Pig	14.28	4%
Poultry	50-250	14-70%
Farmyard manure (FYM)	49-66	20-27%
Grass	98-189 (fresh silage)	19-37%
Maize silage	155	30%
Barley straw	383	80%
Chopped molasses	363	75%

Table 4: Energy in biogas.

	Energy value
$1m^3$ biogas	23MJ
Electricity only	1.7kWh
Heat only	2.5kWh
CHP of biogas	1.7kWh and 2kWh