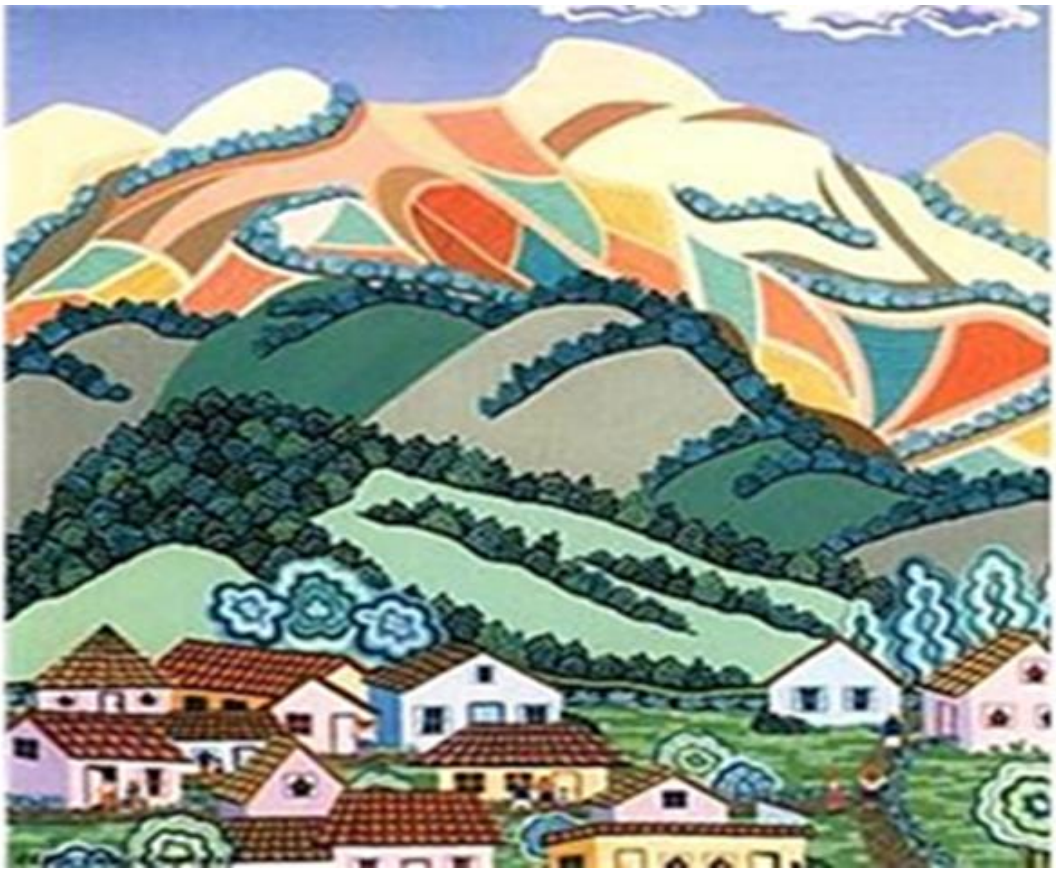
Granagh Development Association (SEC)

Energy Master Plan

Baseline Energy Balance

January 2021



seai SUSTAINABLE ENERGY AUTHORITY OF IRELAND

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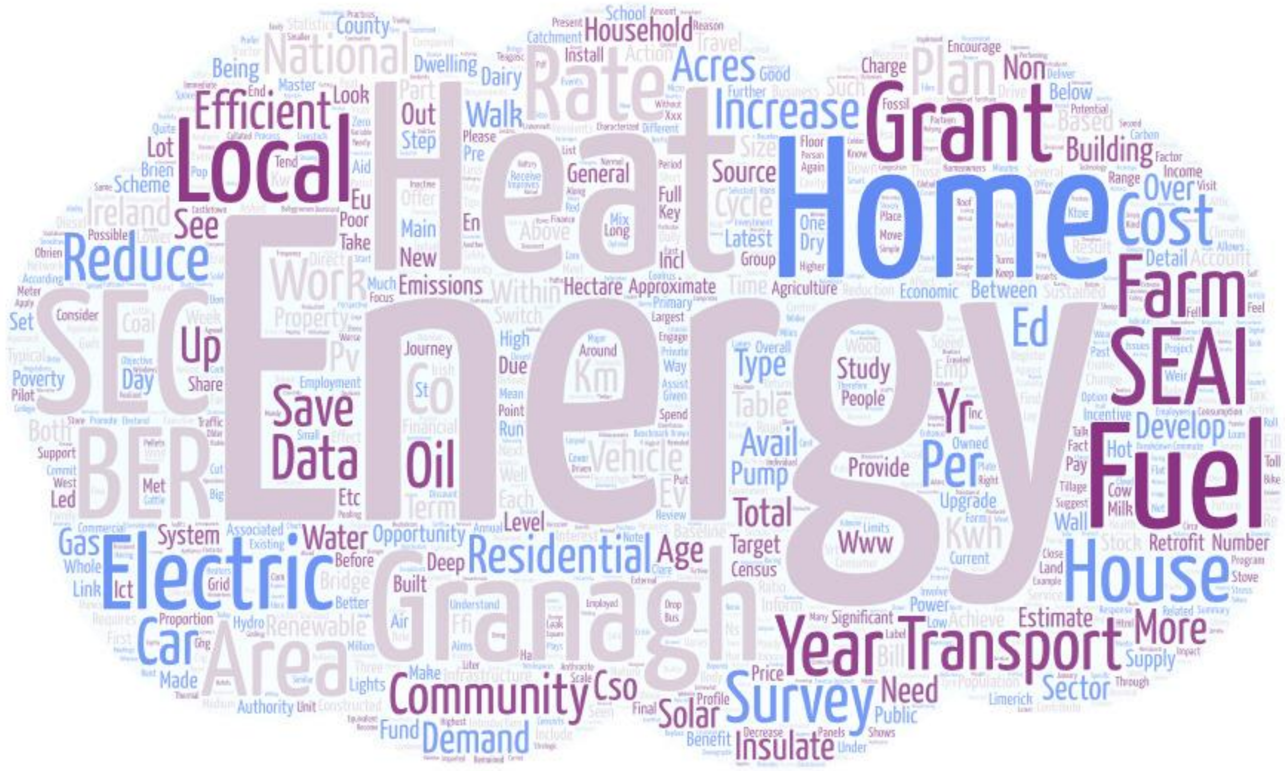

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Executive Summary

November 2020

This local Energy Plan has been developed to enable the community to look at its existing and future energy needs in terms of power, heat, and transport and to determine where it sees priorities and opportunities for action.

The development of the plan has been led by a steering group that includes representatives from the Granagh Development Association (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.

Granagh Development Association, a registered member of the Sustainable Energy Authority of Ireland's (SEAI) Sustainable Energy Community (SEC) Network, has entered into a three-year Partnership Agreement with SEAI. The objectives of the SEC program are to:

- Increase energy efficiency
- Use renewable energy
- Develop decentralized energy supplies

Step 2 of this 5-step process involves the preparation of an Energy Master Plan (EMP) for the SEC territory (Study Area) to establish the baseline energy consumption for an agreed year, and the formulation of a Register of Opportunities that will deliver significant energy demand reductions and contributions from renewable energy sources. In this particular case, the Study Area consists of the Coolrus electoral divisional (ED), Ballygreenan ED, the townland of Graigbeg (Castletown ED), and townlands of Ballyguiletaggle and Ballyguilebeg both of which are in the Ballynoe ED. The total population of the Granagh catchment area according to the latest Census data is estimated to be 800 persons.

The baseline year for the EMP is 2016. The Granagh Development Association would like to commit to an ambitious energy demand reduction in buildings with a target of 50% and to develop community-owned renewable energy projects to over 80% of energy usage by 2030. From the analysis detailed in this document

The Register of Opportunities (ROO), results from Energy Audits and recommendations will be included in the full EMP Report.

In this milestone report is has been estimated that the total energy usage in the catchment area is approximately 18,717 MWh/yr and produces 4,819 tCO_2/yr (carbon dioxide) with a total spend in the purchase and use of energy estimated to be €2.1 Million/yr.

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1.0 Introduction

1.1 What is an Energy Master Plan?

An Energy Master Plan (EMP) enables the local community to look at its existing and future energy needs (in terms of power, heat, and transport) and state where it sees priorities for action. It also identifies opportunities that the community determines offer practical action to support its current and future energy system developments.

Energy Master Plans are co-created by local communities rather than being developed for them by other bodies (e.g., local authorizes or National Government). They set out key priorities and opportunities identified by the community, assisted by a range of other organizations who have an interest in this community. These include residents, businesses, community organizations, local authorities, distribution network operators, and local generators.

A key aspect of the development process is the ability of the local community to understand its energy and transport systems, but also place them in context within the wider changes taking place across Ireland. It can therefore look for opportunities that offer local benefits consistent with national low carbon targets. These benefits can be:

- Direct - such as the generation of electricity or heat for local use displacing more expensive imported grid-supplied electricity or fossil fuel.
- Economic - developing employment opportunities associated with energy supply (e.g. micro-hydro generation) or enhanced efficiency (e.g. insulation and glazing work on homes or medium to deep retrofit projects).
- Social - Production of local energy to supply homes in fuel poverty can reduce stress and enhance health outcomes for residents.
- Strategic – using energy storage mechanisms to maximize outputs from community-owned generators or use of technology to enable better trading of locally produced energy offers the community more effective use of its local resources.

The EMP provides a start in the community's engagement with its energy needs. It offers a focus for immediate opportunities that can be developed in the short term. It also provides scope for longer-term planning for further changes in the future.

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1.2 Granagh and its Local Energy System

The supply of power and heat to homes and businesses is viewed strategically at a national level. However, the local community in Granagh also plays a pivotal role in shaping their energy needs. From a demand perspective, householders and businesses can look to reduce their energy needs through, for example, better insulation of buildings and using more efficient lighting and appliances. The roll-out of smart meters will also enable a better understanding of actual energy consumption, rather than relying on periodic meter readings (and estimated Bills).

From a supply perspective, Granagh Development Association can look to develop local Renewable energy electricity generation to support their energy needs. This can be, for example, at an individual consumer level (e.g., solar panels on the roof) or a community scale such as investment in a wind turbine or hydro scheme.

Understanding the use of power, heat, and transport energy in the community is the first step to being able to develop local energy systems. This has several benefits:

- End users can better understand the amount of energy they use (and the mix of requirements for power, heat, and transport)
- The community as a whole can understand the size of energy demand and how this is proportioned between homes and businesses
- How much of this aggregate demand is met by the existing local generation can be more easily understood
- Future energy requirements (e.g., new housing or business development) can be considered and compared with the size of the existing demand
- Affordability and reliability of energy supply can be examined
- All these details can be collated in a single information source shared by everyone

This EMP provides a summary of detail collated from the community in Granagh through several engagement routes and events.

1.3 Overview of 'whole system' approach

Our energy needs, and how these are met reliably, cost-effectively, and without long term environmental consequences are one of the key considerations for every community. The Irish government has committed to global efforts to reduce greenhouse gas (GHG) emissions and this commitment will mean significant changes to how we supply., store and use energy. For this reason, the present and future energy needs of a community are most usefully considered in a 'whole system' approach. In this way, the overlapping impacts of how we use power, heat, and transport can be considered at the same time, rather than being seen in isolation.

To apply a 'whole system' approach there needs to be a study boundary drawn to provide a primary area of focus. This does not exclude the linkages with neighbouring areas or opportunities that may be available within proximity of the study area (e.g., land available for energy generation). The study boundary selected for use in the present plan for Granagh SEC is shown in Figure1.

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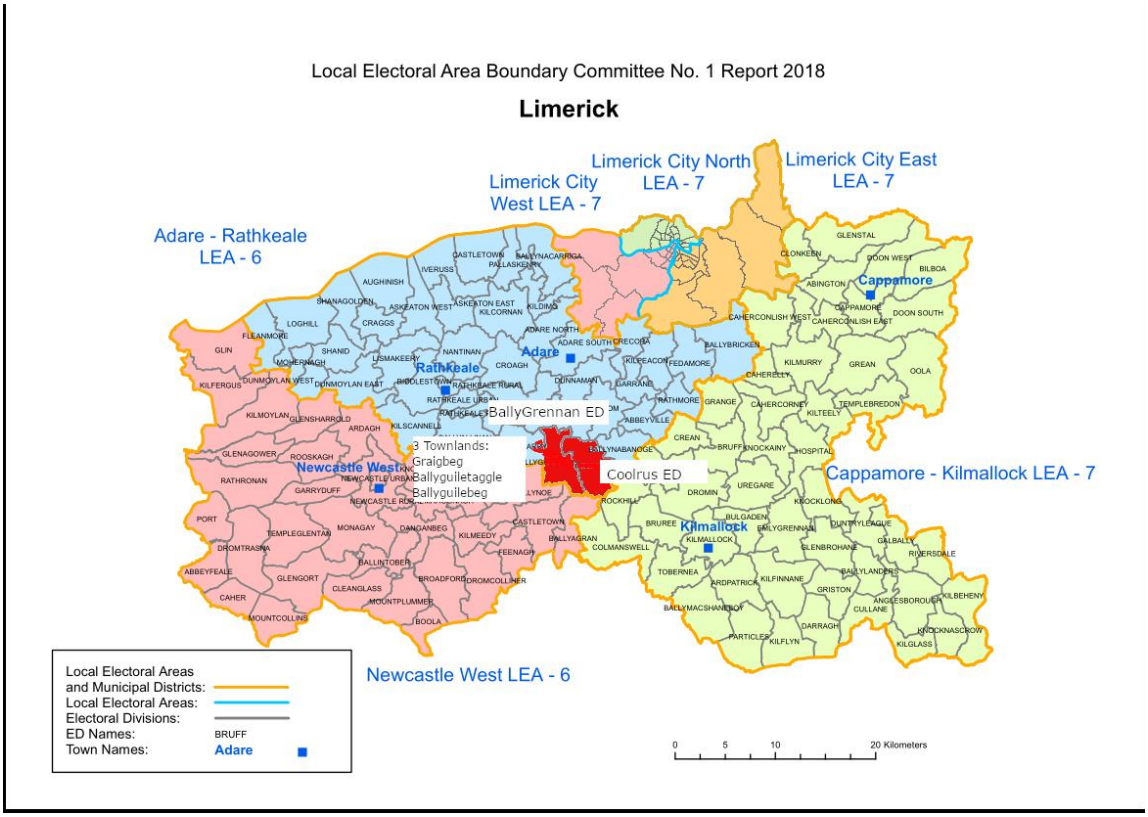

Figure 1: Local Energy Plan Boundary Granagh SEC

The Area highlighted in red in the figure1 above is the geographical location of the Granagh SEC catchment area. Granagh SEC has an area of 39 km² (9702 Acres or 15.2 square miles) and consists of 19 Townlands spread over 4 electoral divisions (ED) in Co. Limerick.

Coolrus ED

Granagh	365 Acres
Doorlus	171 Acres
Coolrus	1034 Acres
Kingsland	214 Acres
Kilmore	968 Acres
Kilmore Demense	110 Acres
Liskennett East	236 Acres
Liskennett West	300 Acres
Kilmacanearla North	462 Acres
Kilmacanearla South	119 Acres

Ballygreenan ED

Ballygreenan	953 Acres
Ballyvologue	281 Acres
Ballynashig	150 Acres
Graigacurragh	611 Acres
Killoughty	205 Acres
Lisduane	675 Acres

Castletown ED

Craigbeg	219 Acres

Ballynoe ED

Ballyguiletaggle	484 Acres
Ballyguilebeg	95 Acres

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1.4 Aims and Objectives

The wider consultation with the community on Granagh, in combination with the views of the Steering Group, has developed an initial set of priorities that should be addressed within the EMP. There was a good response to the home energy survey so a bottom-up approach will be taken where possible, coupled with accessing census CSO data for 2016, SEAI BER mapping data to correlate and estimate the results in this study and it is envisioned to demonstrate the benefit of that ongoing good awareness of behaviours that assist in reducing the overall energy requirement within homes and businesses (demand management) can have.

Building on this, issues relating to home energy use that were prioritized within the consultation are:

- Deep Retrofitting from a BER D or lower to a BER B2
- Medium retrofitting from a BER C to a BER B2
- Insulation and draught-proofing
- Upgrading of heating systems

In terms of transport three major areas of interest were:

- Support for the uptake of Electric Vehicles
- Support for a community minibus
- Development of more walking and cycle paths

As for community-scale energy projects, the areas of priority were:

- Renewable energy supplying homes and businesses
- Community-owned Renewable energy generation i.e., Solar-PV farm

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2.0 Characterization of the local area

2.1 Population of Granagh Sustainable Energy Community

Population and Employment – Summary

- The population has increased by 89% since 2002 (2016 Census figures)
- Under-14 comprise 18% of the total population; 15 – 64 years olds 66%; Over 64s 16%
- 68% of the overall population are economically active and 65% typically travel to work by car
- 28% of the workforce are employed in professional service sector
- 21% of the workforce are employed in the agriculture, forestry, and fishing sectors
- 16% of the workforce are employed in the commerce and trade industries

Introduction

The 2016 Census data provides a population estimate of 800 within the Granagh SEC. This is a 89% increase on the 2002 total population of 421. In this section, the demographics of age benchmarked against Co. Limerick averages and national averages are outlined along with the percentage of the local population who are economically active, and how the population move and works are presented.

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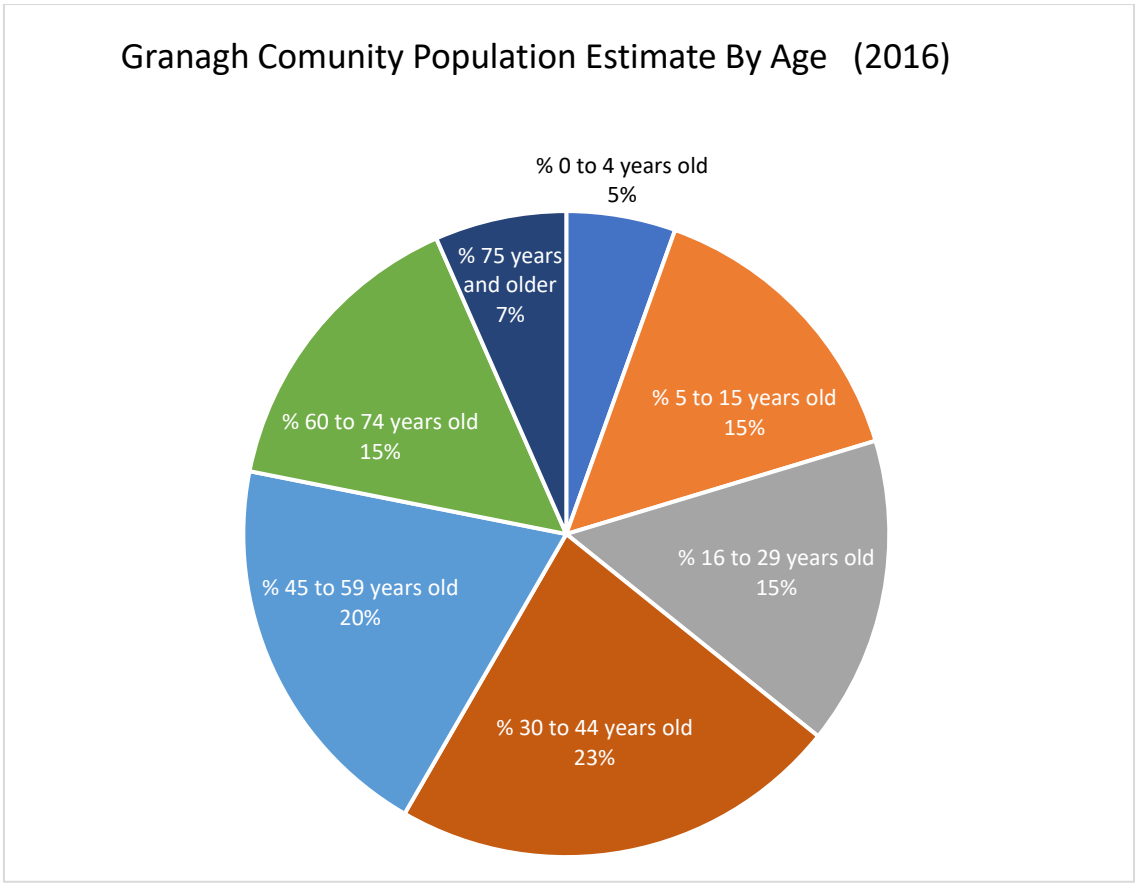

Figure 2: Age profile of residents within Granagh Community

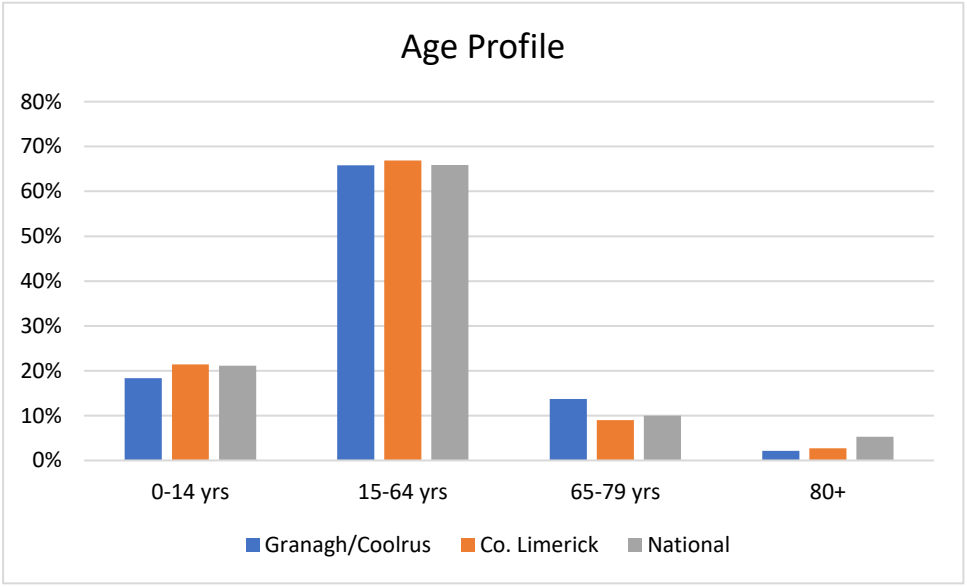

Figure 3: Demographic Profile (Granagh, Co. Limerick and national)

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The demographic profile of the Granagh SEC community in comparison to county and national data suggests that the Granagh community has a lower younger population than the county or national averages, a comparable working population compared to Co. Limerick and national data, and a higher-than-average population of retirement age.

2.2 Employment and journey to work

Of the local population, 68% are economically active; 31% economically inactive and other accounts for 1%. In terms of economic activity, the majority (83%) are in full-time employment, while 11% are full-time students/employed and approximately 6% are unemployed.

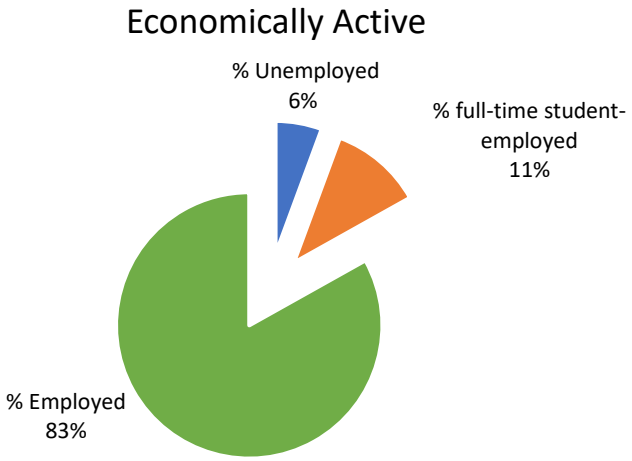

Figure 4: Economically active population

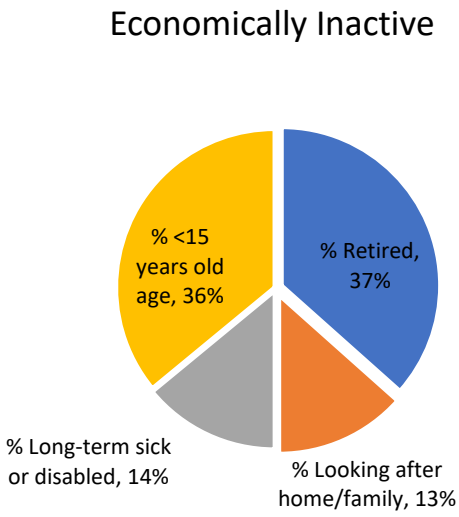

Figure 5: Economically inactive population

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Of the economically inactive, 36% are under the age of 15, 37% are retired, 13% are taking care of home/family and 14% are long-term sick or disabled. In respect of employment, the main employment sectors employing people from the Granagh community (based on Census data) are summarised in table1.

Table 1 ***Main employment sectors (Granagh community)***

Employment sector	% of Local workforce
Professional services	28%
Agriculture, forestry and fishing	21%
Commerce and trade	16%
Manufacturing industries	11%
Building and construction	8%
Transport and communications	4%
Public administration	3%

Those in employment typically use the car to travel to work with 65% of commuting journeys are made by car with 16% made by bus. It is noted that 10% work mainly from home, which again suggests demand for electricity and heat will be sustained in numerous homes throughout each day.

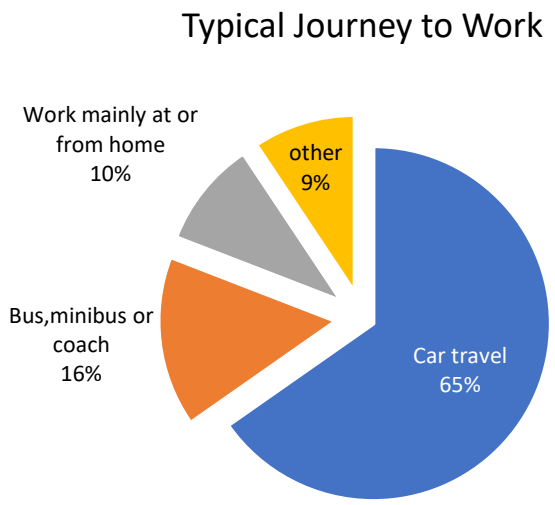

Figure 6: Typical journey to work (Granagh Community)

56% of daily commuters spend 30 minutes or less per journey, with 23% of daily commuters spending between 30-45 minutes per journey and 13% spend between 45 minutes to 120 minutes each day per journey.

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2.3 Residential

Residential Property – Summary

- 85% of domestic properties in Granagh Community are privately owned
- There are a broad mix of solid wall, cavity wall and timber frame construction types
- 74% of properties were built prior to 2000
- Oil heating is used by 68% of dwellings within Granagh SEC; Coal (inc. Anthracite) makes up 13%; Wood fuel 9%; electric heating 3% Peat (inc. turf) 1%
- Average fuel poverty rates are estimated at 30% (probability;10% of income threshold used)
- Total residential energy demand per year is estimated 8,004 MWh (43% of total Energy)
- 73% (204 homes) of homes in the Granagh catchment area have a BER-D or lower

Introduction

In this part the homes in Granagh SEC are reviewed, the BER rating for all homes is correlated and compared to both Limerick county and national BER data. Granagh SEC area has approximately has 281 houses according to the latest CSO figures. In analyzing the CSO statistics Granagh SEC has a high percentage of old houses with 16% (44 houses) of the houses built before 1919. Any house built before 1997 will have a considerably poor BER rating. 175 houses (62%) were built before 1991 and therefore may be poorly insulated. New building regulations were introduced in 1997.

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Looking at national figures, the residential sector had the second-largest final energy demand in 2017 at 24%. As can be seen in the figure below the energy demand in the residential sector decreased every year from 2007 to 2012. This may be due to several reasons such as high energy prices and reduced household expenditure due to the recession which would have resulted in colder homes. An increase in fuel such as turf and wood which may not be entirely captured in the results as well as increased efficiency of new dwellings and upgrades of older dwellings may also account for the reduced energy use. Energy use has been increasing since 2015 and this may be due to an increase in household income as the economy improves reduced oil prices, and households switching from wood and peat to oil, gas, and electricity.

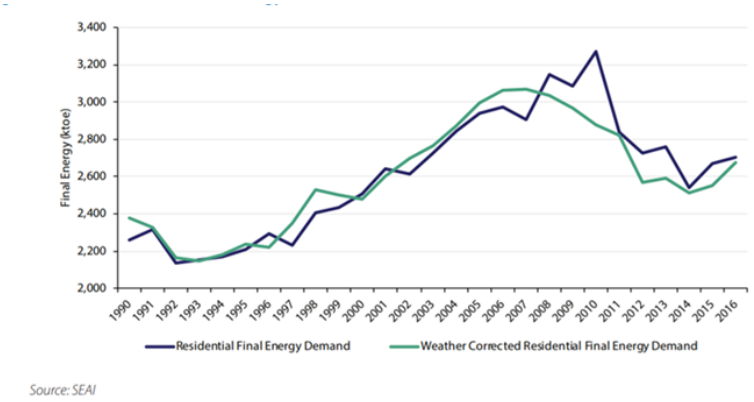

Figure 7: Residential Energy Demand

The average house uses approximately 17,211 kWh of energy which comprises 74% of direct fuels and 4,503kWh (26%) of electricity. Direct fossil fuels account for over 70% of the energy use in the house and renewables only account for 3% according to the latest CSO figures.

Interestingly, as the final energy demand is increasing the CO2 emissions are falling. This is due to the reduced amount of coal and peat been used as residents switched over to natural gas or oil. Electricity generation is also cleaner as more renewables are brought onto the grid and less oil and coal are being used to generate electricity. Renewables such as PV and the use of heat pumps to heat our homes will decrease our residential emissions even further. In 2017, the average dwelling emitted 5.1 tonnes of energy-related CO2 (3.2 tonnes direct fuel,1.9 tonnes from electricity use).

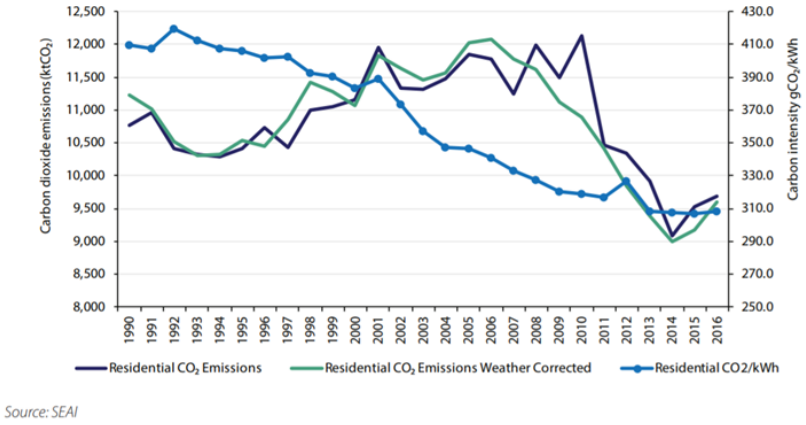

Figure 8: Residential Emissions

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2.3.1 Climate Action Plan 2030

The Irish Government recently published its Climate Action Plan. The objective of the Plan is to enable Ireland to meet its EU targets between 2021 and 2030 to reduce its carbon emissions by 30 % and lay the foundations for achieving net-zero carbon emissions by 2050. The Plan has 180 actions that cover all sectors that need to be implemented to achieve these targets. Under this plan, the government in the Climate Action Plan has set a target of improving home energy efficiency through the retrofitting of 500,000 buildings to a BER B2 or cost-optimal carbon equivalent and moving buildings to more renewable heat sources with a target to install 600,000 heat pumps (400,000 into existing buildings).

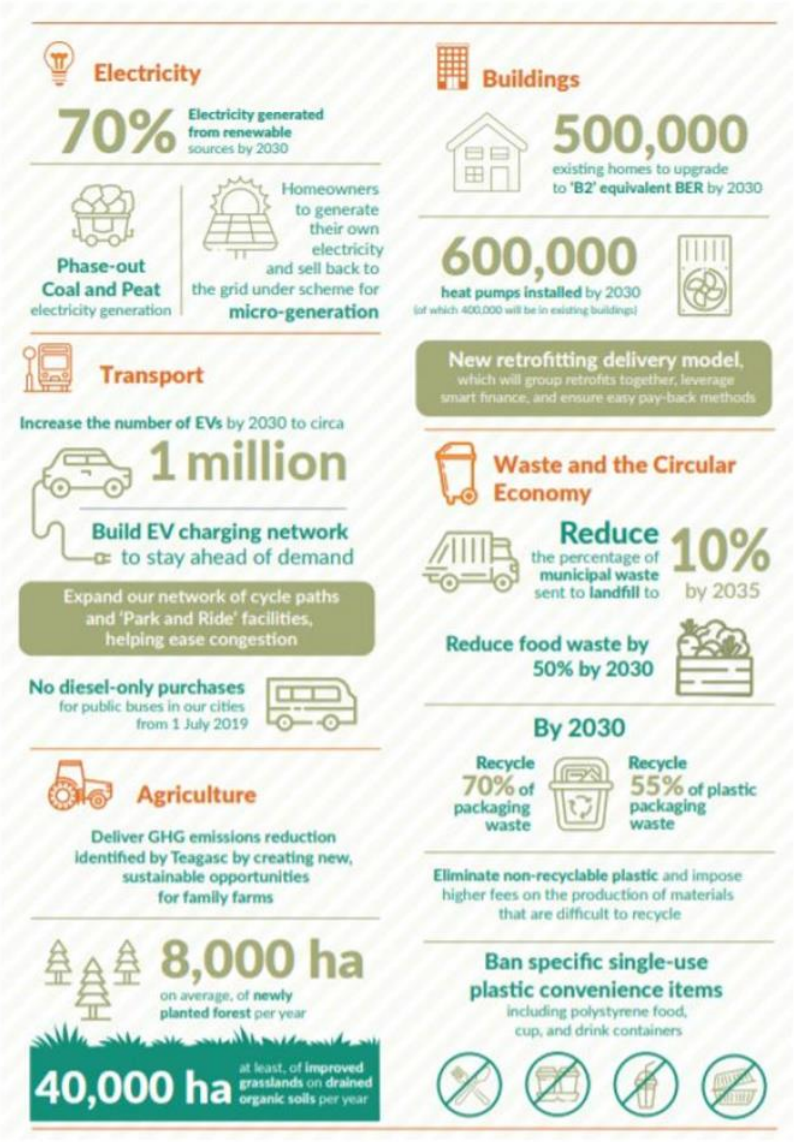

Figure 9 National Climate action plan Infographic

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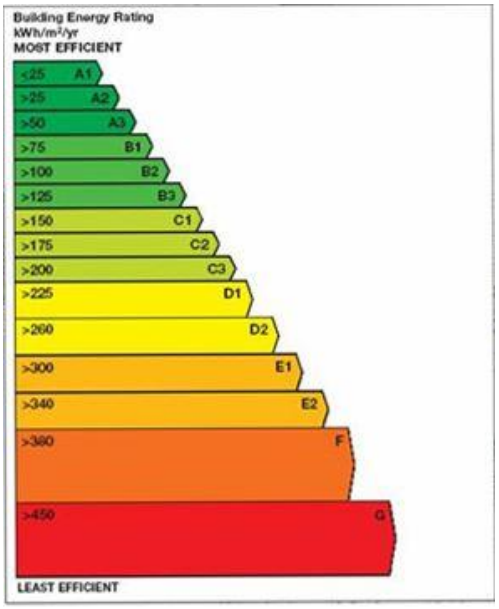
2.3.2 Building Energy Rating

A Building Energy Rating or BER is an energy label like the energy label on your fridge. The rating is a simple A to G scale. A-rated homes are the most energy-efficient and will tend to have the lowest energy bills. From 1st January 2009, a BER certificate became compulsory for all homes being sold or offered for rent. The BER is an indication of the energy use in your home and covers energy use for space heating, ventilation, lighting, and associated pumps and fans. The energy performance is expressed as primary energy use per unit floor area per year (kWh/m2/yr).



Looking at the overall BER ratings for Co. Limerick for example the average BER rating is 278 kWh/m2/yr which is equivalent to a BER rating of a D2. According to SEAI the cost to heat this type of house to a comfortable level is approximately €4,100 based on a detached 200m2 house.

2.3.3 How Might My Home Rate?

Table 2 Indictive Building Energy Rating for Typical dwellings

Oil/gas central heating	
Year of construction	Typical energy rating
2012+	A3
2010-2011	B1
2008-2009	B3
2005-2007	C1
1994-2004	C3
1978-1993	D1
Pre 1978	D2/E1/E2

Standard electric heating	
Year of construction	Typical energy rating
2012+	A3
2010-2011	B1
2008-2009	C3
2005-2007	D1
1994-2004	E1
1978-1993	E2
Pre 1978	G

Solid fuel central heating	
Year of construction	Typical energy rating
2012+	A3
2010-2011	B1
2008-2009	B3
2005-2007	C2
1994-2004	D1
1978-1993	D2
Pre 1978	F

These tables indicate the typical BER Rating for houses by age for various fuel types. The data reflects typical building regulations and practices at the time of construction. (Source: SEAI)

The average Building Energy Rating (BER) in Co. Limerick in 2016 is 278 (D2) kWh/m²/yr, which is approximately 7% or 18kWh/m2/yr above the national average of 260 kWh/m²/yr. The average in Granagh SEC is 281 (D2) kWh/m²/yr which is 9% above the national average and 1% above the county average. This suggests that the energy efficiency of homes in the Granagh catchment area is of a less standard than the county and national averages.

Data available from the latest CSO Census suggests that there is a total of 281 residential properties in Granagh SEC.

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Table 3 Summary of residential archetypes (Granagh SEC)

Characteristic	Details
Archetype	House/Bungalow (98%) flat/Apartment (0.7%)
Age	Around 74% of the housing stock is at least 40 years old; 51% were built in the pre-1980 era. The largest proportion of housing stock was built during the period 2001-2010 (22%)
Tenure	85% of properties are owner-occupied; a further 1.2% are owned by the housing authority.
Construction Type	Solid wall construction predominates in pre-1950 properties; cavity and timber frame wall 1950-present construction in the period
Primary Heating Fuel	Oil is the primary heating fuel in 68% of properties; coal/anthracite a further 13%; wood fuel 9%
Estimated Energy Efficiency	Around 39% of all properties have an energy efficiency rating between E-G. 37% of properties have a BER-D rating, 21% have an energy efficiency rating of BER-C (post-2000) and only 4% with an efficiency rating of BER-B1

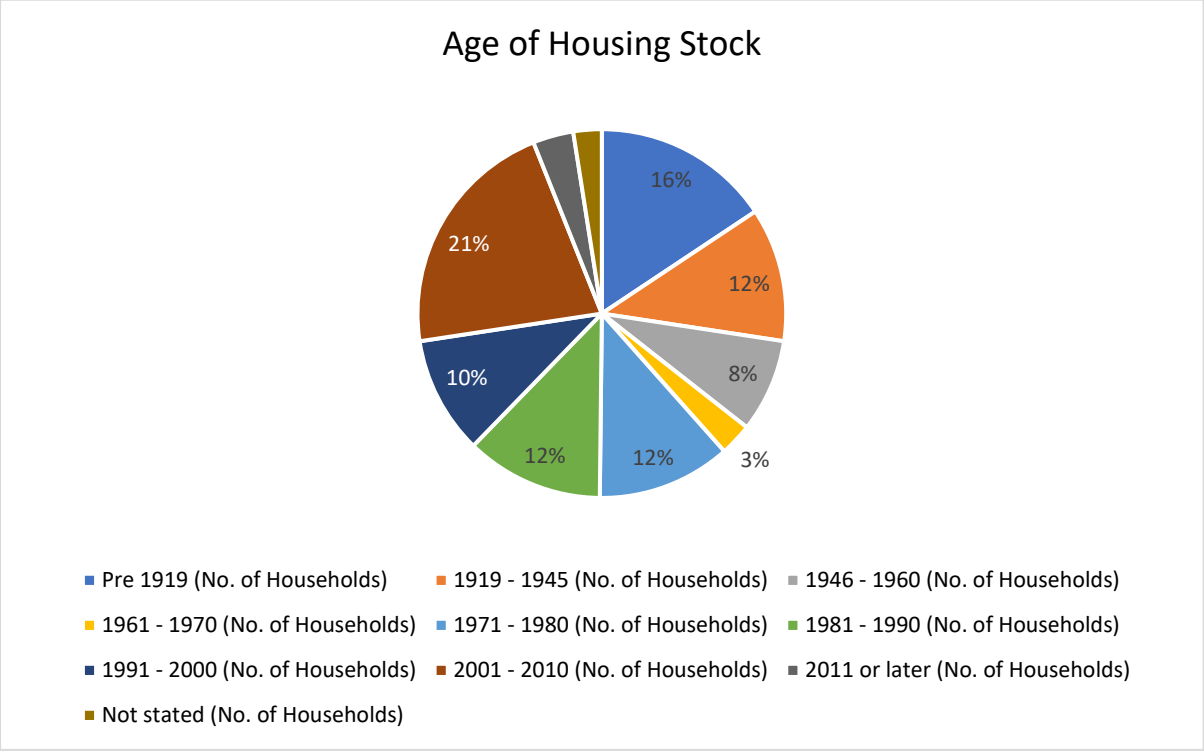

Figure 10: Age of Housing Stock

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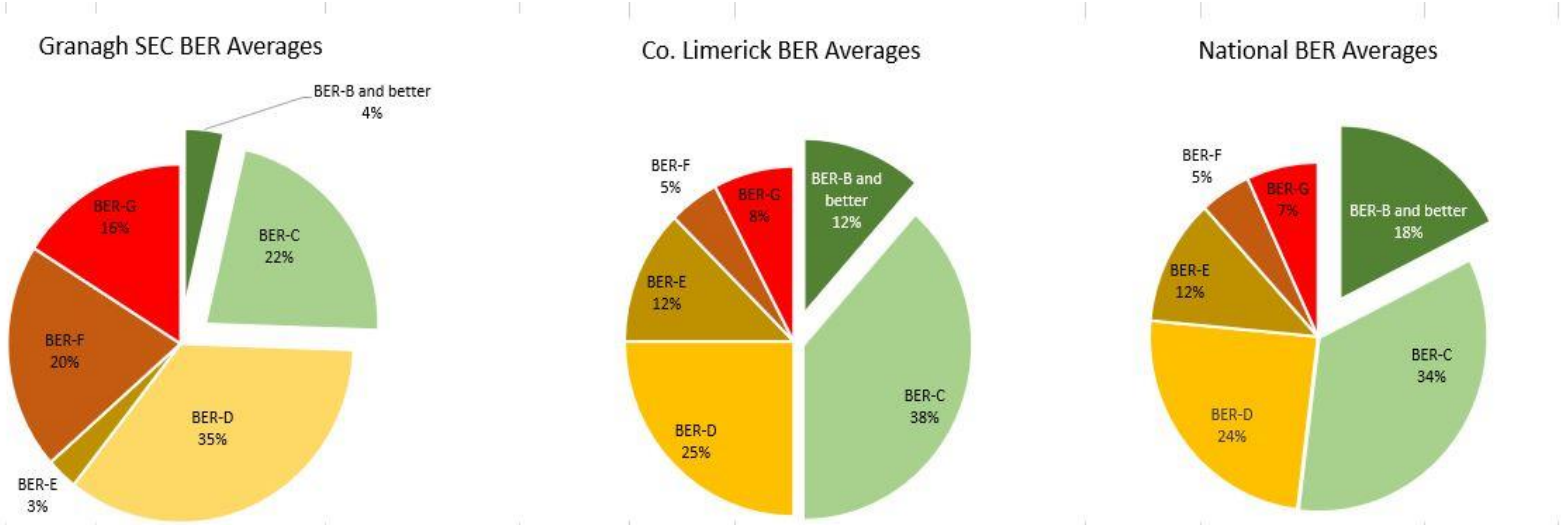

Figure 11: National County and local BER averages

Both the National BER averages and the Co. Limerick BER averages are quite similar. The Granagh SEC BER averages are somewhat different:

- Only 4% of homes in Granagh SEC have a BER-B or better compared to 12% within the county and 18% nationally
- 22% of homes in Granagh SEC have a BER-C compared with the national average of 34% and the county average of 38%
- 35% of homes in Granagh SEC have a BER-D compared to a Limerick county average of 25%, a 10% difference
- A BER-E or worse in Granagh SEC is estimated to be 39% of property compared to a Limerick county average of 25% and 24% of national figures.

It was unascertainable to quantify how many homes have had some energy upgrades since houses were built and the estimates given for Granagh SEC are based on SEAI data for a dwelling defined by its age of construction, floor area, etc.

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2.3.4 Fuel Poverty

A survey of 1,500 Irish households has found that 2 in 3 are suffering from energy 'fuel poverty'. Fuel poverty is universally defined as a household spending over 10% of its income on energy costs.

Exclusive of taxes, Ireland has the second-highest electricity prices in the EU[1]. This survey has revealed the toll these prices are having on households right around the country. The survey was conducted by Ireland's biggest consumer network; One Big Switch in response to the energy price crisis. When asked about the effect the high cost of energy has had on their homes.

- 1 in 3 households declared themselves facing 'high' or 'extreme' energy bill stress,
- 1 in 4 said they did not run heaters this winter, even when it made them uncomfortable,
- 5% of households are so fuel poor, they are spending over 40% of their income on energy costs

3 in 4 people from every county in Ireland, varying in age from 21 to 90 and household sizes of 1 – 6+ took the survey showing the effect of fuel poverty is hitting many different families. What is most alarming about the results of the survey is not so much the number of people suffering from fuel poverty, but more the fact so many are doing so needlessly.

The survey revealed that 60% of people are 'not receiving a discount' or 'don't know if they are' and just 5% are receiving discounts more than 20%, despite these being widely available in the market.

The Fuel Poverty Ratio is defined as:

$$\textit{fuel poverty ratio} = \frac{\textit{fuel costs (usage x price)}}{\textit{income}}$$

If this ratio is greater than 0.1 then the household is Fuel Poor.

The fuel poverty ratio shows that fuel poverty can be considered to be an interaction of three main factors:

•The energy efficiency of the dwelling (affecting the numerator).

•The cost of energy (affecting the numerator); and

•Household income (affecting the denominator).

Finding lower electrical tariffs by switching electricity suppliers and availing of discounts could immediately reduce the financial burden of fuel poor households.

Based on a statistical analysis of the Granagh SEC bridge housing stock an estimated 30% of households are in fuel poverty.

[1] https://www.rte.ie/news/business/2017/1129/923775-ireland-4th-most-expensive-eu-country-for-electricity/

2.3.5 Primary fuel use and overall energy efficiency

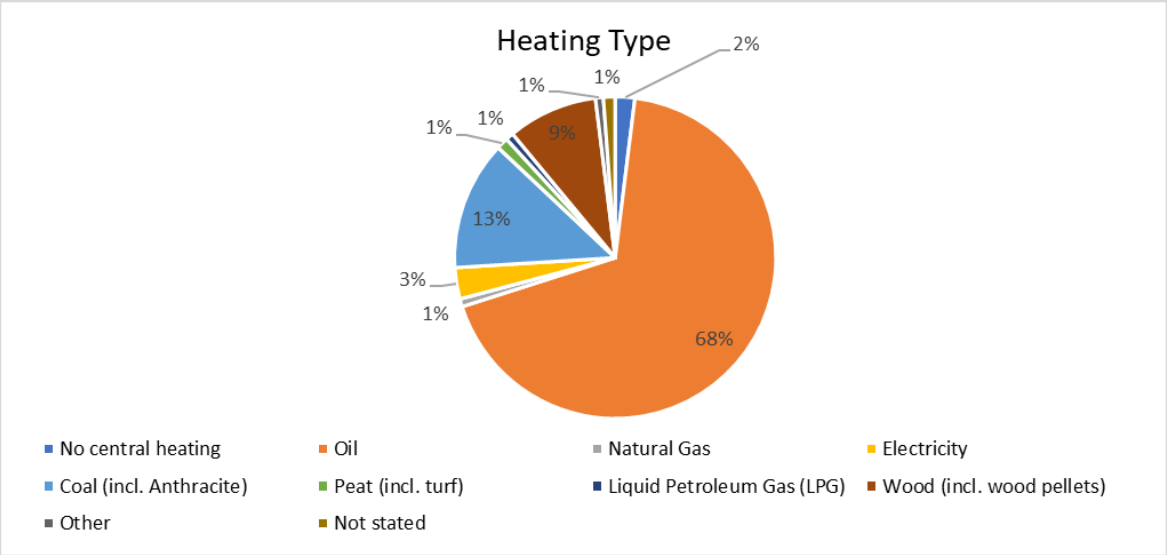


Figure 12: Household heating type in Granagh (Source: CSO Census data 2016)

In terms of primary fuel used for heating, the dominant sources in the Granagh SEC study area are oil and Coal (incl. Anthracite). As can seem from figure 12 approximately 68% of properties (173 homes) in the study area heat their homes using home heating oil (Kerosene); 13% with coal (incl. Anthracite) 9% with wood fuel; 3% with electricity.

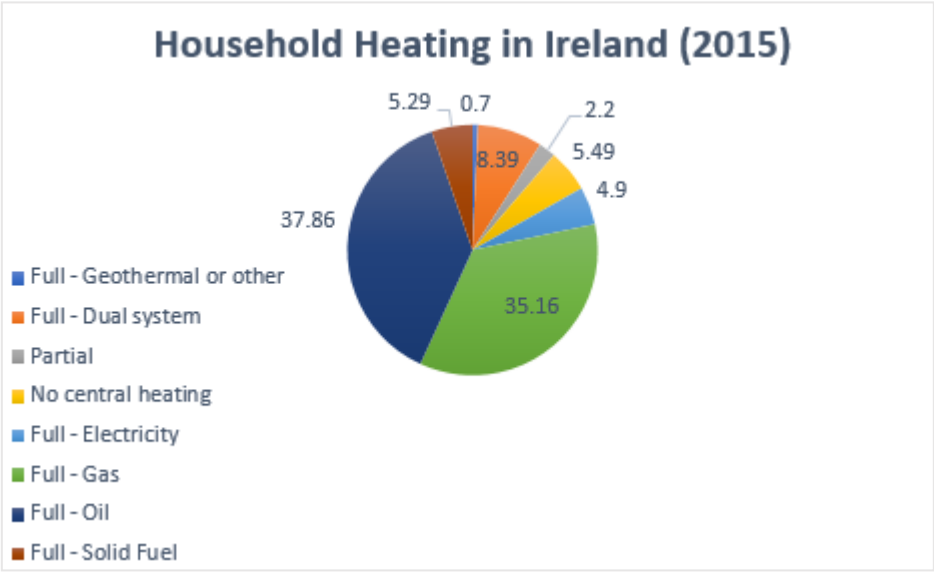


Figure 13 Household Heating type in Ireland

Figure 13 above shows the home heating type profile in Ireland (CSO) for 2015. It can be seen that oil accounts for circa 38% of home heating and gas heating account for 35% of household heating type. In Granagh oil heating accounts for 68% of home heating given that there is no natural gas infrastructure serving the catchment area, oil (kerosene) is the dominant fossil fuel used to heat homes.

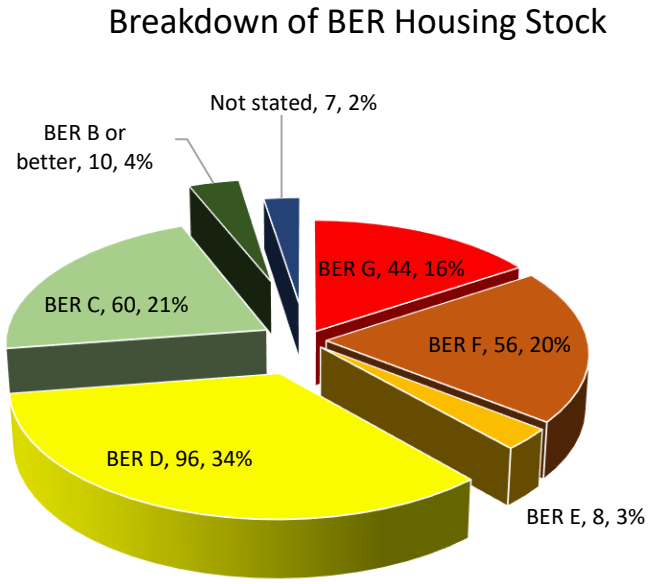


Figure 14: Breakdown of BER rating of dwellings in Granagh

The BER ratings of properties in Granagh SEC was calculated using data from the CSO Census 2016 and benchmarked against the year of construction and total floor area to discern the approximate BER Rating for each dwelling within the SEC. From this is possible to approximate the number of dwellings with specific BER Ratings. What is not known is the level of upgrades that homes would have completed down through the years. For a 2016 benchmark or baseline Figure, 13 shows the quantity and percentage of homes with their typical BER ratings. Based on this analysis 73% of residential properties in the Granagh SEC area have a BER-D rating and below with only 25% of homes having a BER-C or better and 2% not stated.

The energy efficiency of a property depends on its physical characteristics. Factors such as the age of construction, the dwelling type, the heating and hot water systems in use, and the extent to which the building fabric is insulated, all affect energy efficiency. Domestic energy efficiency ratings in the Granagh SEC study area varies greatly depending on building type and age.

2.3.6 Financial Incentives

SEAI run several schemes that homeowners can avail of:

- Insulation grant – SEAI currently has grants available for attic insulation, cavity wall insulation, drylining, and external wall insulation. Please see https://www.seai.ie/grants/home- energy-grants/insulation-grants/ for the latest insulation supports.
- Deep retrofit grants - in 2021 grants are available up to 30% for deep retrofits – individuals need to apply through a service provider to avail of these grants. Please see

https://www.seai.ie/grants/home-energy-grants/deep-retrofit-grant/ for the latest information.

- Heat pump grant – SEAI is offering grants to replace old fossil fuel boilers with heat pumps. Your house will need to be heat pump ready i.e. well insulated and good airtightness. Please see https://www.seai.ie/grants/home-energy-grants/heat-pump-systems/ for the latest details.
- Heating control grant – Heating controls can reduce your heating bills by up to 20%. Please visit https://www.seai.ie/grants/home-energy-grants/heating-upgrade-grants/ for the latest details
- Solar Electricity Grant – SEAI currently has grants available to install solar PV panels on houses built before 2011. Please visit https://www.seai.ie/grants/home-energy-grants/solar-electricity-grant/ for further details.
- Solar Water Heating Grant – SEAI currently has grants available to install solar thermal water heating panels on houses built before 2011. Please visit https://www.seai.ie/grants/home-energy-grants/solar-water-heating-grant/
- Full list of grants https://www.seai.ie/grants/home-energy-grants/

To be eligible for the deep retrofit program a residential house needs to have a BER rating of a C1 or worse. From the CSO statistics, 63% of the houses in GRANAGH SEC ED may quality for this scheme. The average cost of the works is approximately €50,000 without grant aid. If 63% of the houses received a deep retrofit the total cost of the works would be in the region of €7 million. To data 508 homes have been completed in the deep retrofit pilot program. All have achieved a BER A rating.

- 35 have achieved an A1 rating (< 25 kWh/m2/yr.)
- 172 have achieved an A2 rating (25-50 kWh/m2/yr)
- 301 have achieved an A3 rating (50-75 kWh/m2/yr)

2.3.7 Local Energy Survey

An energy survey was carried out in Granagh SEC. Survey sheets were circulated among the residents to fill out and return. The number of returned surveys was good and has stimulated interest further in the Energy Master Plan. 96% of homes are privately owned from the results of the survey group. Of the surveys that were returned the average yearly electricity bill was €1,201 per year and the average yearly heating bill was €1,242 per year. The average national electricity cost is €1,098 for a detached house so the houses surveyed are an average of 9% above this figure for a dwelling with a smaller floor area than the average household in Ireland. Concerning heating, the national average for heating is approximately 11,000kWh per year which costs approximately €928.4 per year, based on the results, the residents of Granagh SEC are paying an average of 25% more to heat their homes. The difference between the national figure and the Granagh SEC figures could be due to the fact the average house size surveyed is 148 m² with is below the national average of 160m² both heating and electrical costs are higher this could be a result of poorly performing homes with portable electric heaters and hot water immersion heating frequency used.

While the number of surveys that were returned was good this may not be a representative sample of the Granagh SEC area with the datum being 18% of total households in the catchment area.

2.3.8 Residential Property Profile

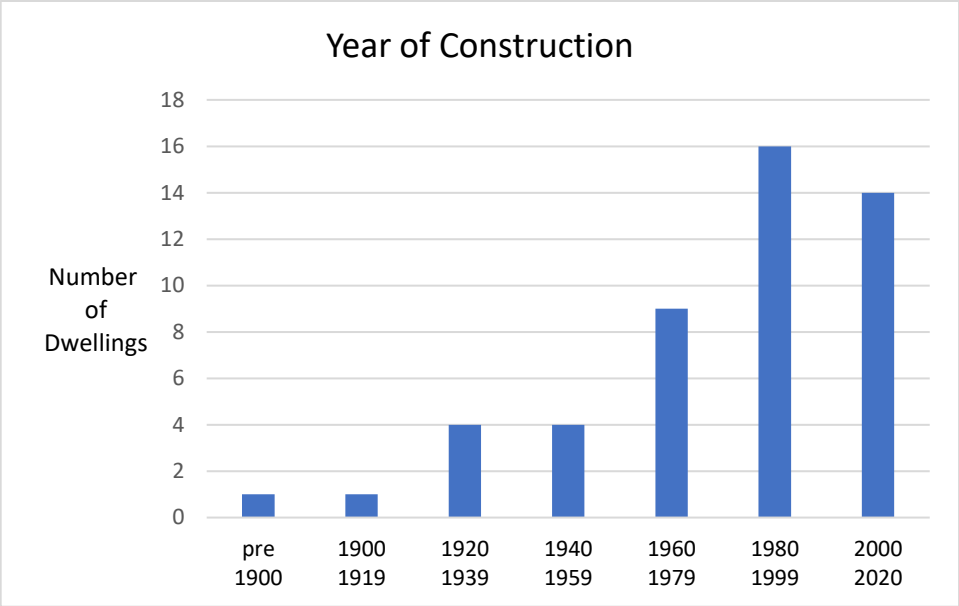


Figure 15: Year of construction from the survey

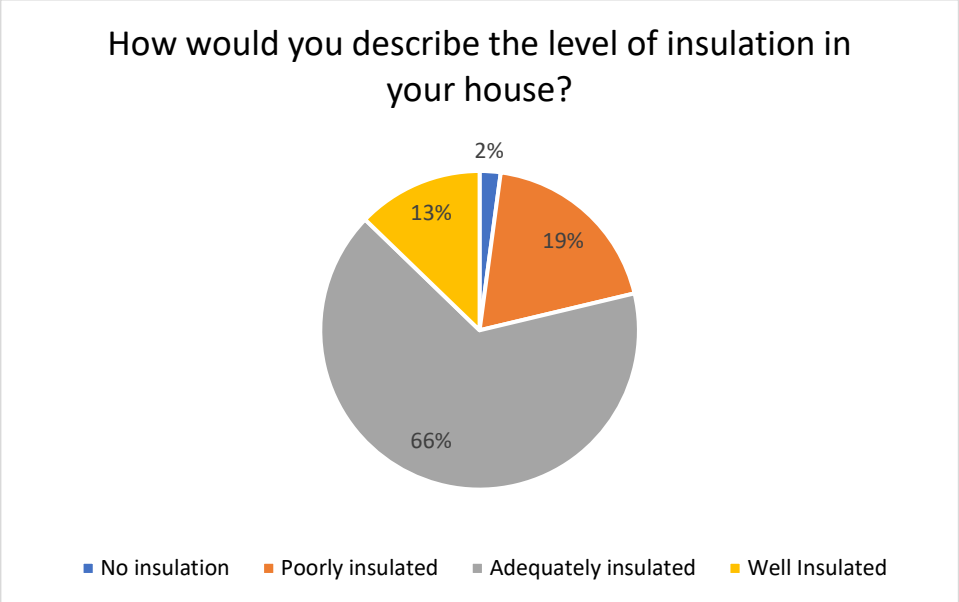


Figure 15: Home energy survey insulation levels

As we can see in the chart above, 79% of respondents feel their house is well or adequately insulated. 21% feel their house is poorly or not insulated at all. This data and the data obtained on the year of construction could suggest that a lot of properties in the SEC have had remedial energy-saving works done on them in the past. This deduction can be made as a significant proportion of properties were constructed at a time when building standards were a lot different than the standards of today.

Table 4 Preferred energy-saving methods of residents

Energy Saving Measure	Number of houses	Proportion
Wall Insulation - Cavity Fill	21	43%
High-Efficiency Boiler	13	27%
Attic Insulation	11	22%
Heat Pump	9	18%
Heating Controls	9	18%
Wall Insulation – External	6	12%
Solar	6	12%
Windows	5	10%
Wood Stove/Stove Inserts	4	8%

When asked about energy savings measures, 43% of respondents expressed interest in getting their cavity walls insulated, 27% are interested in a high-efficiency boiler, 22% are interested in upgrading attic insulation, 18% interested in heat pumps & upgrades to heating controls, 12% in external wall insulation, 12% in solar PV, 10% in upgrading windows, and 8% in installing a wood-burning stove or stove inserts.

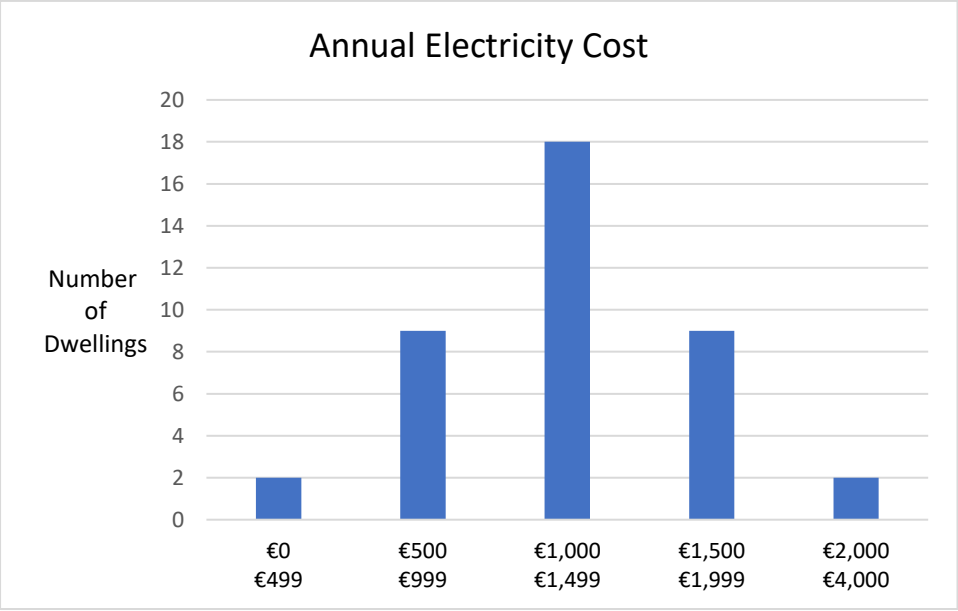


Figure 16 home energy survey annual electricity cost

A significant proportion (45%) of the survey group pay between €1,000 to €1,499 a year for electricity with the survey group average cost of electricity is €1,201 a year. According to Electric Ireland, the national average annual electricity cost is €1,098.

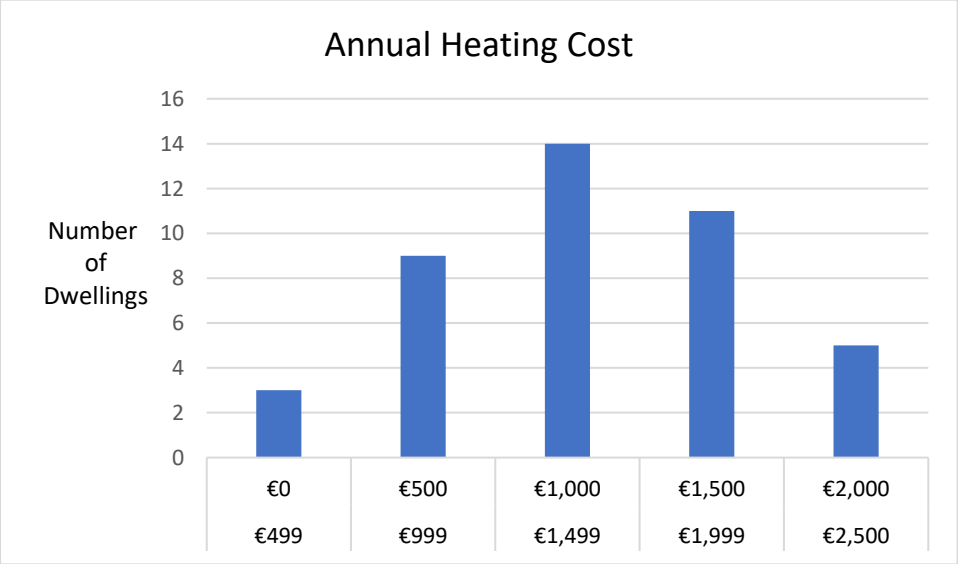


Figure 17 Home energy survey annual heating cost

A significant proportion (33%) of the survey group pay between €1,000 to €1,499 a year in home heating costs with the average cost to heat a home from the survey data collected at €1,242 per year. In Ireland, the average annual heating cost is estimated to be €928 per year using based on a household using 11,000 kWh/year of thermal energy used to heat properties.

Table 5 Heating fuel type used from home energy survey data

Fuel Type	Number of houses	Proportion
Oil (kerosene)	41	84%
Wood (incl. pellets)	14	29%
Electric (direct)	7	14%
Coal (inc. Anthracite)	5	10%
Heat Pump	3	6%
Other	3	6%

The table above shows the number of houses and the percentage of each fuel type used to heat dwellings from the results of the home energy survey. Oil heating is the prominent heating fuel used at 84%, with wood fuel (incl. pellets) at 29%, direct electric heating accounts for 14% and coal (incl. Anthracite) accounts for 10%. Heat pumps account for 6%.

Transport Profile

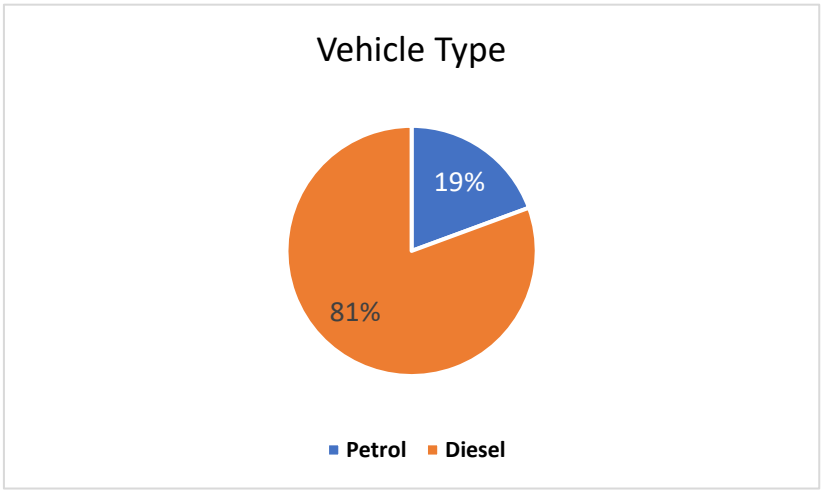


Figure 18 Vehicle fuel type from survey data

All vehicles owned by respondents are either petrol or diesel vehicles, with diesel being by far the most popular at 81%.

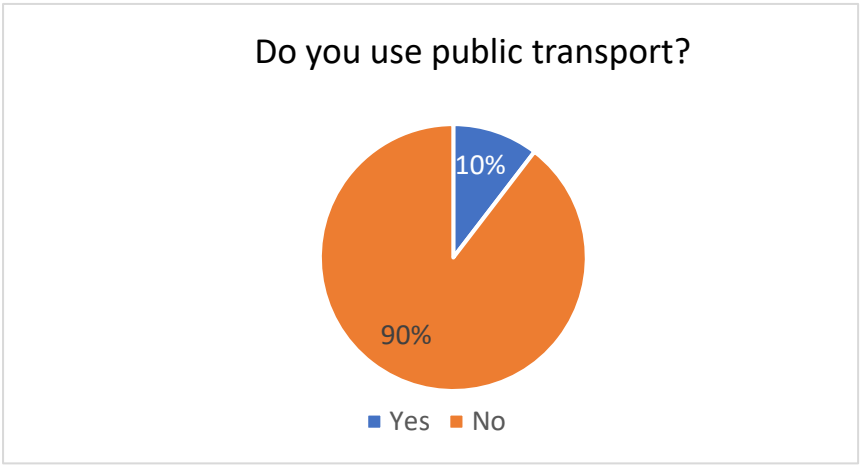


Figure 19 Public transport usage from survey data

Only 10% of the respondents use public transport. Reasons for using public transport included school, work, and hospital appointments.

Funding and grants

Table 6 Method of funding energy upgrades from survey data

Funding source	Number of houses	Proportion
Grant only	36	73%
Grant + Own savings	18	37%
Grant + Loan finance	10	20%

When respondents were asked about which funding source they would use if they went ahead with energy-saving upgrades on their home, 73% said they would prefer only to make use of grants, while 37% said they would be willing to use their savings with a grant and 20% they would obtain loan finance to fund energy upgrades with SEAI grants. Note that some respondents chose more than one funding source. Sustainable Energy Authority Ireland (SEAI) offers different levels of grant support depending on the homeowners' status. For fuel poor homeowners, the SEAI can fund up to 80% of the cost of performing an energy-saving upgrade, and for non-fuel poor homeowners, the SEAI offers up to 35% of the cost. This grant is given based on the fulfilment of several criteria and standards.

2.4 Non-Residential

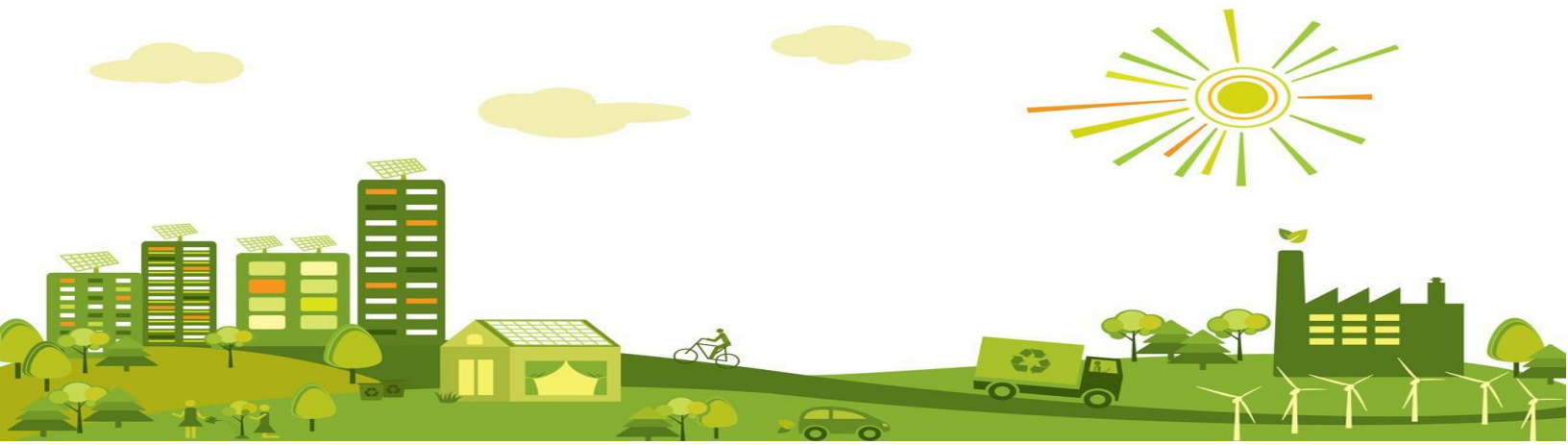
Non-Residential Property – Summary

- There are 12 non-residential properties in the Granagh catchment area
- It is estimated that the non-residential sector accounts for 4.6% of the total energy demand consuming an estimated 862 MWh of energy per year
- Carbon emissions account for an estimated 5% (227tCO_2) per year
- The estimated cost of non-residential energy usage is €115,722 per year

Introduction

In this section of the local energy

plan, the non-residential sector was investigated. The non-residential sector includes buildings and activities that do not form part of the residential sector. Typical non-residential entities are community buildings, i.e. schools, community centers, hospitality buildings, commercial enterprises, retail and medical facilities, etc, and can include farms also. In the Granagh SEC catchment area, there are 12 non-residential type activities, and the energy footprint was estimated using typical energy metrics for similar type buildings and activities benchmarked against CIBSE Part F where possible and also using a proportional method from the CSO commercial energy database.



Background

The total number of commercial buildings in Ireland is around 109,000. This figure is broken down into 4 main groups, office buildings (42,000), retail buildings (40,000), Restaurants/ public houses (16,000), and Hotels (4,000). Of the buildings surveyed approximately 60% have electrical heating.

Public sector bodies have achieved annual primary energy savings of 2,336 GWh, yielding a cost-saving of €133 million. The public sector has a target of 33% energy efficiency improvement by 2020.

Figure 20: Heating of Commercial Buildings

The range of fuels used in this sector is small – essentially oil, gas, and electricity. Oil and gas are used predominantly for space heating, but also water heating, cooking. Since 2005, gas consumption has increased by 62% to 484 ktoe. Electricity is used in buildings for heating, air conditioning, water heating, lighting, and information and communications technology (ICT). Electricity in services is also used for public lighting and water and sanitation services. Electricity consumption in services fell by 17% (1.5% per annum) between 2005 and 2016, to 604 ktoe (7,027 GWh), and has a higher share at 43% than any other individual fuel in services, down from 46% in 2005. Electricity use in services is driven by the changing structure of this sector and the general increase in the use of ICT, electric heating, and air conditioning.

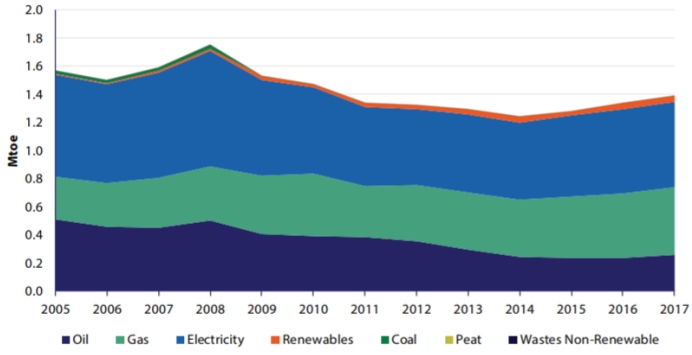


Figure 21: Energy demand in the Commercial Sector

Non-residential Granagh

There are 12 non-residential properties (the pig farm is included in the agricultural energy sector) in the Granagh SEC catchment area. As part of this EMP, Granagh NS and the community center have been selected to undertake non-residential energy audits which will identify where savings in energy can be made with potential energy measures proposed and this data will feed into the Register of Opportunities (ROO) and roadmap to achieve energy reduction targets.

Non-residential properties include:

- 2 No. Local shops
- 2 No. Local Pubs
- 2 No. National Schools
- 1 No. Pre-cast concrete business
- 2 No. Churches
- 2 No. Community Centres
- 1 No. small poultry business

2.5 Sustainable Transport Granagh Community

Transport – Summary

- 88%of residents of Granagh SEC have access to 1 or more cars/vans
- Current vehicles are predominantly diesel/petrol fuelled
- There are no Electric Vehicle charging points in Granagh catchment area
- The closest electric vehicle charge point is approximately 14.5km away at Adare
- The total energy used in road transport is approx. 8,590 MWh/yr (46% total energy)
- The total tCO_2 produced from road transport is approx. 2,268 tCO_2/yr (47% of emissions)
- An estimated 73% (308 persons) travel to work outside of the catchment area
- 81% of persons commuting journey is 45 minutes or less

Introduction

Transport is the sector with the largest energy demand and is the most sensitive to the economy. It tends to grow or reduce sharply in response to economic growth or contraction. This is evident over the past three decades. Energy demand from transport increased by a massive 183% between 1990 and 2007. It then decreased by 27% between 2007 and 2012, increased again by 25% between 2012 and 2018. (source SEAI). The estimated total domestic vehicle ownership within the Granagh SEC catchment area is 495 private vehicles and 36 commercial vehicles (based on the latest Census data). Private vehicle driving accounts for 59% of the total energy used in transport (41% of energy from commercial transport). Greenhouse gas emissions from transport (private & commercial) account for approximately 45% of total emissions within the catchment area. Data from the latest CSO Census suggest that there are no electric vehicles or electric infrastructure in the catchment area with the closest charge point being Adare 14.5km; Charleville Co. Cork 16.2km; and Newcastle West 22.1km.

2.5.1 Transport in Granagh sec

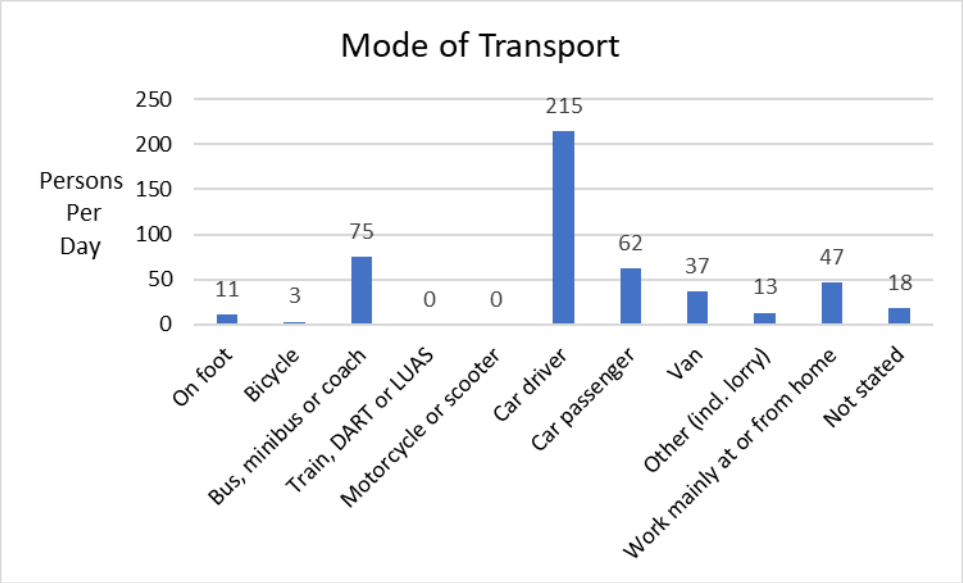


Figure 22: Granagh SEC Mode of transport to work/college

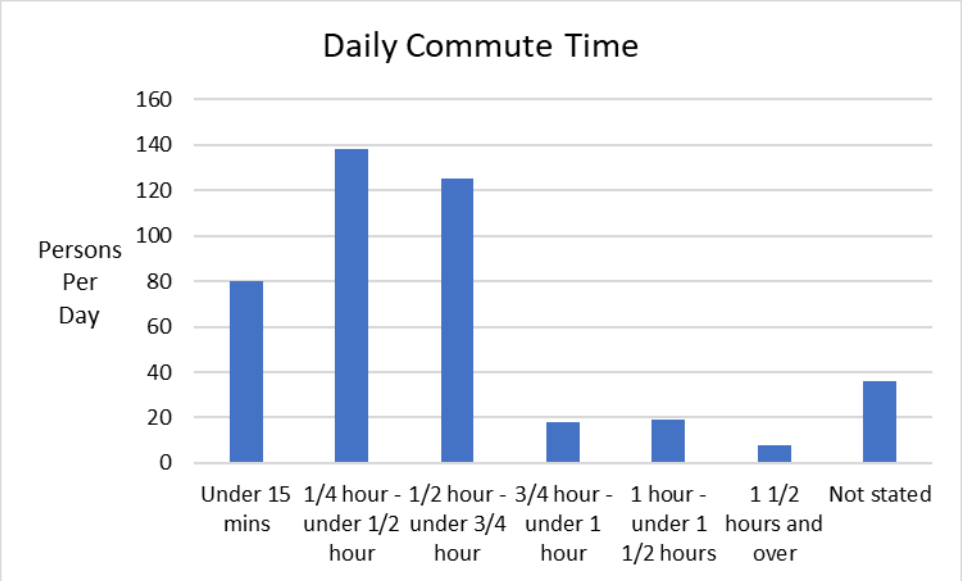


Figure 23: Daily Commute time

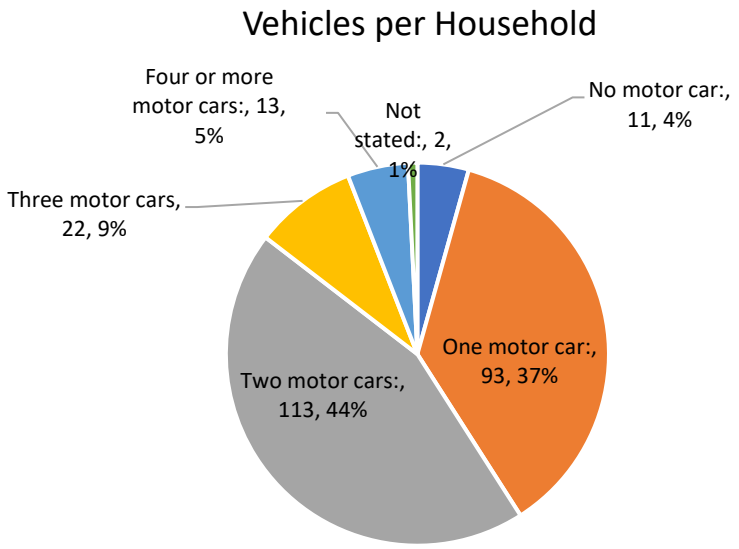


Figure 24: Vehicles per household Granagh SEC

No specific statistics in terms of vehicle fuel type and use are available in this Local Energy Plan. To estimate household vehicle energy use, therefore, it has been presumed that the mix of vehicle fuel type will be similar to that produced from the home energy survey and averaged in Ireland as a whole. Based on census data the estimated ownership within the catchment area is 536 cars/vans. The average km/yr was used for both passenger vehicles (18,000km/yr) and commercial vehicles (40,000km) in deriving the energy, emissions, and costs associated with road travel within the catchment area.

Statistics from the CSO National Travel Survey 2016 provide a breakdown of vehicle-km travel within each local authority region and by road classification. This can be combined with energy statistics that provide a breakdown of vehicle fuel usage estimated for each local authority area.

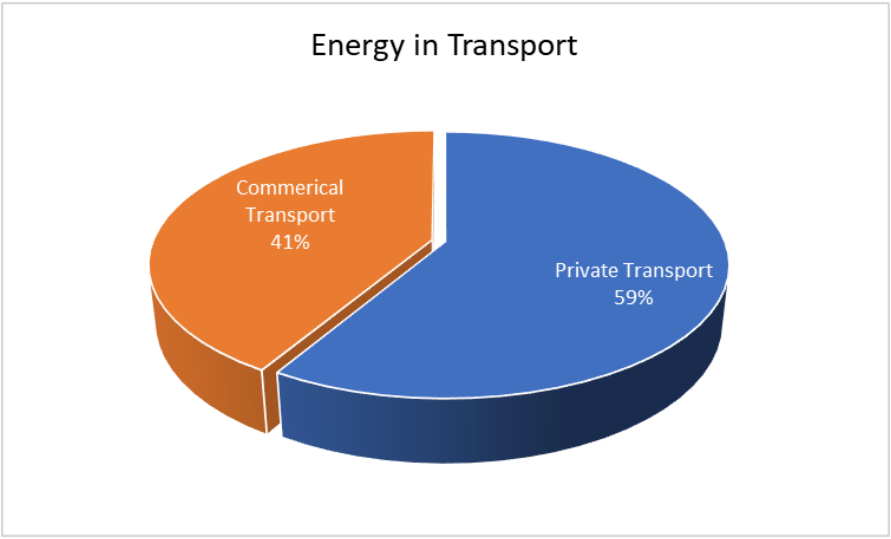


Figure 25: Energy in transport Granagh SEC

2.5.2 Transport Energy Savings and Financial Incentives

There are several ways that Granagh SEC can reduce their energy used in the transport sector.

- Encourage Walking and Cycling
- Encourage Car-share where possible to reduce the No. of vehicles traveling.

  The national average of people walking to work is approximately 9.3% whereas the percentage of people who both walk/cycle in GRANAGH SEC is approximately only 5%. Workplaces should encourage employees to cycle to work and make the "Bike to work scheme" available to their employees.
- Electric vehicles are a fantastic way to reduce CO2 emissions. The range of e-cars is improving all the time and the Hyundai Kona is now capable of traveling 400Km without charging. There are several financial incentives including up to a €5,000 grant from SEAI, reduced VRT of up to €5,000, and zero Benefit in Kind for employees with an electric company car. They are also cheaper to run, tax, and have reduced toll rates.
- Increasing the public transport network and its use where possible and financially viable.

CAR	HYUNDAI IONIQ Battery Electric	BMW 3 Series Saloon F30, From February 2012 Diesel	VOLKSWAGEN e-golf (MY 2017) Battery Electric
ENERGY COST	€166	€767	€183
MOTOR TAX	€120	€180	€120
CO2 EMISSIONS	0.89 tonnes CO_2	1.58 tonnes CO_2	0.98 tonnes CO_2
ELECTRIC RANGE	Not Applicable	Not Applicable	300 km
MAX FAST CHARGE	Not Applicable	Not Applicable	50kW
MAX HOME CHARGE	Not Applicable	Not Applicable	3.6kW or 7.2kW

Comparisons of electric cars can be made on the SEAI website. https://www.seai.ie/grants/electric-vehicle-grants/grant-eligible-cars/ From this comparison above the CO2 emissions can be cut by 56% and Fuel costs savings as much as 70% when compared to a diesel car. Currently, the price of batteries is drastically reducing while the range and size of them are increasing. As previously mentioned above there are a lot more chargers being installed and with the increase in the range of cars, range anxiety should not be a factor in the future.

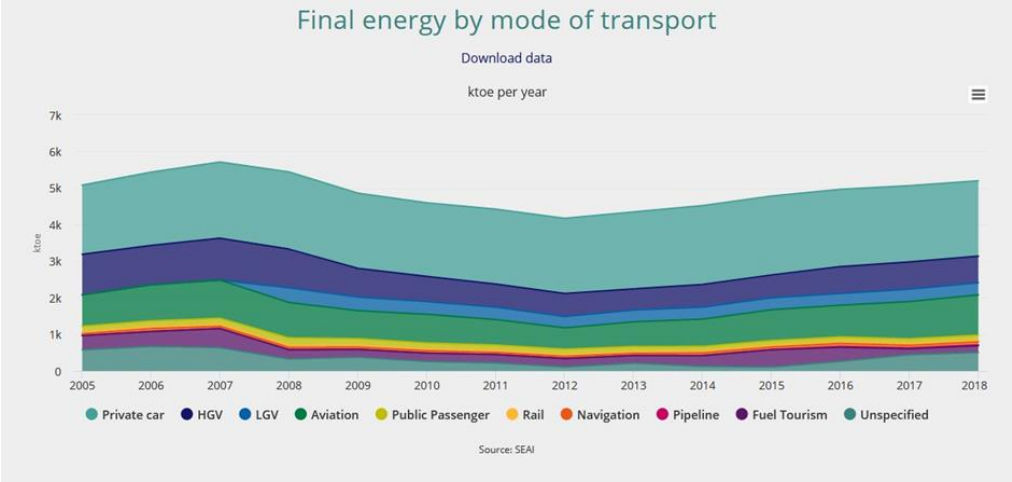


Figure 26 Final energy by mode of transport

Transport is the sector with the largest energy demand and is the most sensitive to the economy. It tends to grow or reduce sharply in response to economic growth or contraction. This is evident over the past three decades. Energy demand from transport increased nationally by a massive 183% between 1990 and 2007. It then decreased by 27% between 2007 and 2012 and increased again by 25% between 2012 and 2018. (source SEAI)

3.5.2 Existing Car Charging Infrastructure

Figure 27: EV Charging Points

Currently, the are 1,100 public charge points in Ireland with the closest being approx. 14.5 km from the Granagh catchment area in Adare Co. Limerick.

2.5.3 Sustainable Transport Options

As mentioned previously, it is quite challenging to have an impact on transport at a local level. It requires looking at and changing local infrastructure (related to electric cars and cycling) and engaging with locals to encourage alternative modes of transport:

- Walking
- Cycling
- Carpooling

This section discusses the Register of Opportunities that are within the transport section of the community. These opportunities are not based on firm facts and figures as with those identified for buildings but are developed from knowledge, experience, and understanding.

Walking

This opportunity is simply based on encouraging and motivating the local community to walk when and where possible. Walking provides a range of benefits and opportunities, such as:

- Improved health (through exercise)

- Reduction in transport-related emissions (that contribute to health issues as well as climate change)
- Reduction in traffic, especially at peak times
- Reduced demand for available parking
- Increased opportunity for members of the community to walk through and see all parts of their town and surrounds
- Increased opportunity for people in O'briensbridge to meet and connect on a day-to-day basis

Some great programs help promote walking in your community, see links below. In addition to this, you could engage with your local Doctor's offices, HSE clinics, etc. to put up promotional material on walking or arrange to deliver short informative talks designed to inspire the community to get walking. See some useful links below.

https://activeschoolflag.ie/events/feelgoodfridays-walkway-day/

https://www.getirelandwalking.ie/_files/2017103145513_626b84f6.pdf

Cycling

Cycling is a great form of exercise that brings lots of health benefits. As with walking, it also reduces the reliance on traveling by car, which then reduces, traffic congestions and transport-related emissions. Cycling requires more specific infrastructure compared with walking, such as:

- Cycle lanes
- Bicycle shelters

The development of cycle lanes is likely to be a more long-term goal as it requires significant infrastructure work, which would be under the responsibility of the local authority. It is likely to already part of the local development plans, but this Energy Master Plan (EMP) is an opportunity for the community to engage with the local authority on the matter and find out more about what is planned and what is achievable.
Another important factor in encouraging (or discouraging) cycling is speed limits and their influence on road safety. There is a lot of momentum in Ireland and Europe at the moment around reducing speed limits in different areas to:

- • Reduce emissions to help reach CO_2 targets
- • Increase road safety (for all users)

The reduction of the speed limits would increase safety and encourage more people to cycle, who would previously have driven. The article below provides some additional information following a national review of speed limits.

https://www.rsa.ie/en/Utility/News/2013/Speed-Limits-Review-body-publishes-report--recommends-new-appeals-system/

For those considering taking up cycling again (or for the first time), there is a cycle to work scheme that allows employees to purchase a new bike and pay for it in instalments. The scheme was developed to incentivize employees to cycle to work. See more information in the link below.

https://www.citizensinformation.ie/en/travel_and_recreation/cycling/cycle_to_work_scheme.html

Car Pooling

Car-pooling is not an opportunity that in itself will have a significant impact, but it does have a contribution to make to transport in the local area. The area where this would have the most benefits is in the school drop. It provides parents with the chance to take turns bringing children to school, which means the volume of traffic around the school gates drops, which creates a safer local environment around the school, reduces congestion, and allows parents to have days/weeks where they can get to work earlier than normal. The article below summarises the benefits of car-pooling for school.

https://www.gokid.mobi/6-reasons-carpool-school/

Shared Workspaces

Shared workspaces have become increasingly popular as an option for both self-employed persons and employees who are given the option of working remotely for part or all of the week. This reduces the frequency and duration of journeys and therefore reduces traffic, congestion, and emissions. Shared workspaces also provide a fantastic opportunity for networking and socializing for people who may otherwise become quite isolated in the work that they do. They also boost the local economy by encouraging workers to stay local during the week, where they may avail of local services. There are shared workspaces in the region, see the link below.

http://clareherald.com/2020/09/clare-hubs-receive-reopening-funding-28409/

https://www.clarecoco.ie/your-council/contact-the-council/directory/broadband-digital-it/digiclarehubs/digiclare-digital-hubs.html

E-Mobility

The move to electric vehicles is not a simple switch and there are a variety of factors for a person to consider before making a purchase. These factors include:

- E-charging infrastructure locally
- Typical journey lengths
- E-charging infrastructure along typical routes travelled
- Cost

As a first step, the community should contact their Local Authority to find out more about the current e-charging infrastructure and what the plans are for the next few years. The first step will inform the next steps, but ideally, the next steps would be to promote the switch to e-cars. If there are issues with the infrastructure, however, this may need to be a more long-term goal. A local talk on electric cars, i.e. what you need to know before making the switch, maybe a useful idea to explore.
There are grants currently available for electric cars, see link below. Another potential financial incentive for those thinking about making the switch is for those with solar electricity, which would provide a very economical way of charging the car at home.

https://www.seai.ie/grants/electric-vehicle-grants/

The overall target is to reduce CO_2 equivalent emissions from the transport sector by 45-50%[2]. The targets to be delivered are to increase the number of electric vehicles (EV's) to 936,000, comprised of:

- 840,000 passenger EV's (from 9,170 in 2020)
- 95,000 electric vans & trucks
- 1,200 electric buses

The blend proportion of biofuels in road transport will be raised to 10% in petrol and 12% in diesel

Also, by 2030 there will be 4,500 Compressed Natural Gas (CNG) trucks on Irish roads.

[2] https://www.gov.ie/en/organisation/department-of-the-environment-climate-and-communications/?referrer=http://www.dccae.gov.ie/en-ie/climate-action/publications/Documents/16/Climate_Action_Plan_2019.pdf

2.6 Agriculture

Agriculture – Summary

- Individually owned farms have by reduced by only 24% since 1991.
- 23% of faming farms are ran by persons 65 years old and older.
- There are only 5% of under 35's working on farms in the Granagh catchment area.
- The sheep herd has increased by 23% since 1991.
- The dairy herd has decreased by 40% since 1991.
- Cattle account for 52% of total livestock.
- 67% of total agricultural land is under pasture (1,802 Hectares).
- Employment in Agriculture has declined by 64% since 1991.
- Energy usage from agricultural activity is estimated at 7%; 1,261MWh/yr and 333 tCO_2/yr.

Introduction

Granagh farmland is predominantly pasture-based and uses approximately 67% of the total area farmed (1,893 hectares) and there is little or no tillage since 1991. The land in the area is of good quality and is suitable for most types of livestock farming. The number of sheep on the land increased since 1991 by 23%, dairy cows have decreased by 40% since 1991. Based on the latest CSO figures cattle account for 52% of livestock. The number of farms has reduced from 82 farms in 1991 to 66 farms in 2010. Energy use in agriculture is from petroleum and electricity use and is estimated to be 7% of total energy usage in the catchment areas. Also, the number of people employed in farming has declined from 181 in 1991 to 64 in 2010 this is a 64% decrease in employment in agriculture. There are only 3 persons under the age of 35 working on farms in the area according to the latest census data.

2.6.1 Agricultural Statistics Granagh

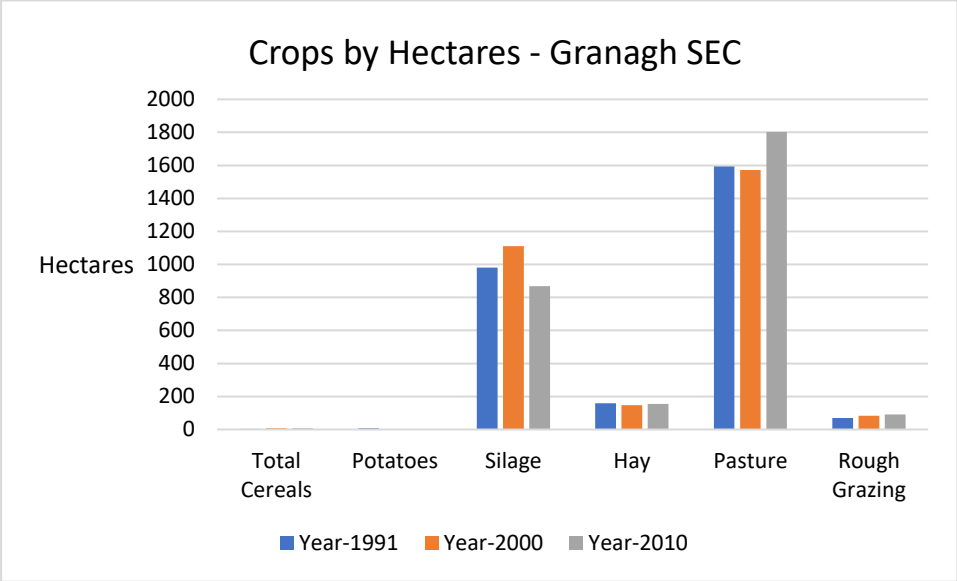


Figure 28: Crops by hectares 1991 to 2010

Land under pasture has increased in the Granagh catchment by 12% since 1991 according to the latest agricultural CSO data, the main crop in the catchment area is silage and this has reduced by 13%, the hectares of hay fodder is slowly decreasing with a 2% decrease since 1991 with rough grazing steady increasing by 24% since 1991.

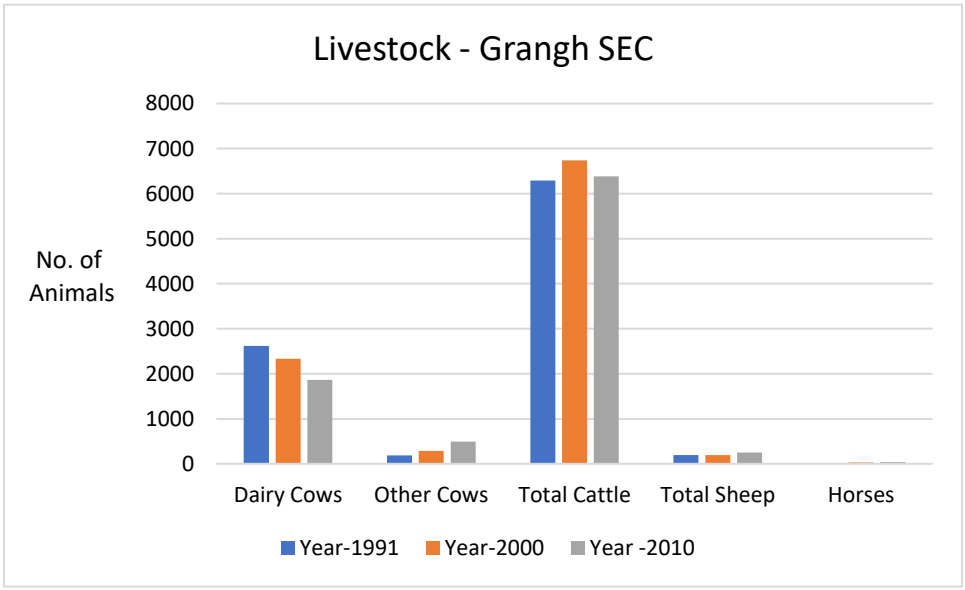


Figure 29: Farm size Breakdown

The dairy herd has decreased by 40% since the year 1991, and other cows (sucklers, Pedigree, etc.) have increased by 62% in the same period. The sheep herd has increased by 23% since 1991.

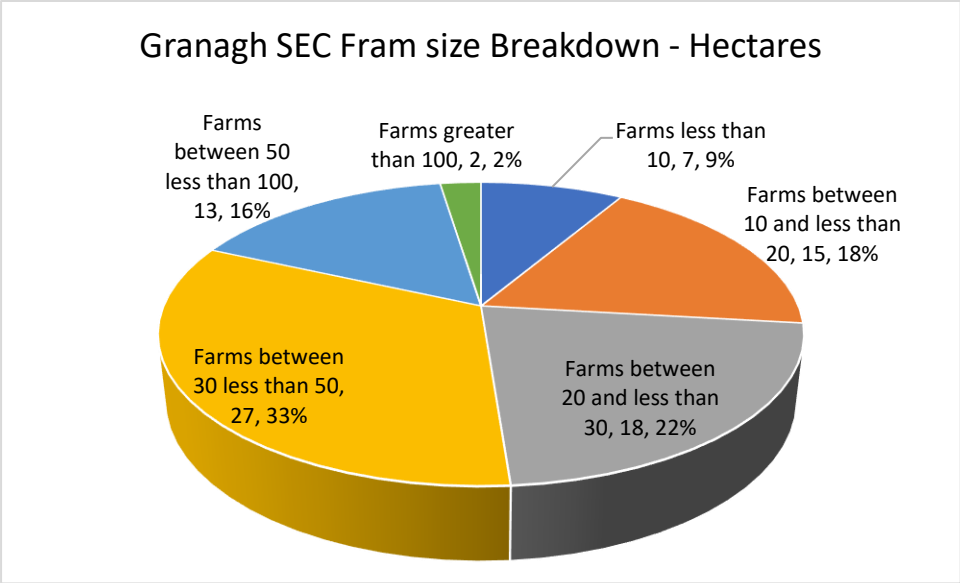


Figure 30: Granagh average farm size since 1991

According to Teagasc the average farm size in 2019 remained just over 43 hectares and the average income level per hectare increased slightly relative to 2018 to €555 (but remained well down on the €693 recorded in 2017). The average size for a dairy farm in 2019 remained close to 59 hectares. An Average Family Farm Income (FFI) of €1,132 per hectare was earned on Dairy farms in 2019; this reflects a year-on-year increase of €86 per hectare. Across all systems, the income per hectare in 2019 was next highest on tillage farms at €568, down €109 per hectare on the 2018 level. Cattle and sheep farms in Ireland, are typically characterized by lower profitability and smaller holdings. In 2019, the average income per hectare remained lowest on Cattle Rearing farms, albeit that the figure rose to €288 in 2019. (Source: Teagasc National Farm Survey)

Table 7 Average farm size & FFI per Ha 2019

	Size (ha)	Income € per ha
Dairy	58.8	1,132
Cattle Rearing	31.9	288
Cattle Other	36.2	384
Sheep	47.0	310
Tillage	60.6	568
All	43.2	555

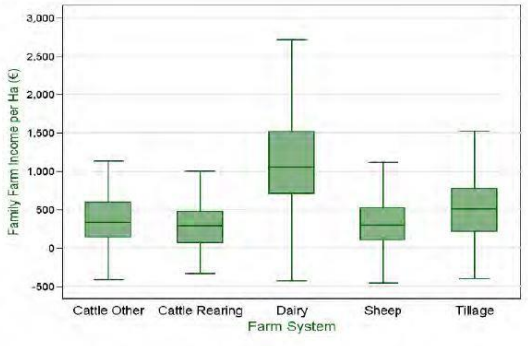


Figure 31: System avg. FFI per hectare 2019

2.6.2 Agricultural Energy Savings

2.6.2.1 Dairy Farms

Dairy farms by their nature use large amounts of electrical energy and there are significant savings to be made. Teagasc has measured the average component consumption on dairy farms and from the figure below it can be seen that milk cooling, water heating, and milking use the most energy and these areas should be targeted for energy savings. According to Teagasc, the cost of electricity varies from 4 kWh/cow/week to 7.3 kWh/cow/week. This is equivalent to €0.60/cow/week to €1.10/cow/week and savings of up to 50% can be achieved on some farms.

Energy Saving Tips

- Eliminate energy wastage; fix all hot water leaks, insulate all hot water piping and refrigerant gas piping, and use lights only when necessary. A leak as small as one liter per hour can waste 8,500 liters of hot water and 3,800 kWh per year.
- Optimize plate cooling by increasing water flow to achieve the correct water to milk flow ratios. Increasing the milk to water flow ratios from 1:1 to 1:3 can reduce the power consumed by the bulk tank by over 40%.
- Switch all water heating tonight rate only.
- Consider using a variable speed drive controller on vacuum pumps. This can save over 60% on vacuum pump running costs.
- Use energy-efficient lighting.

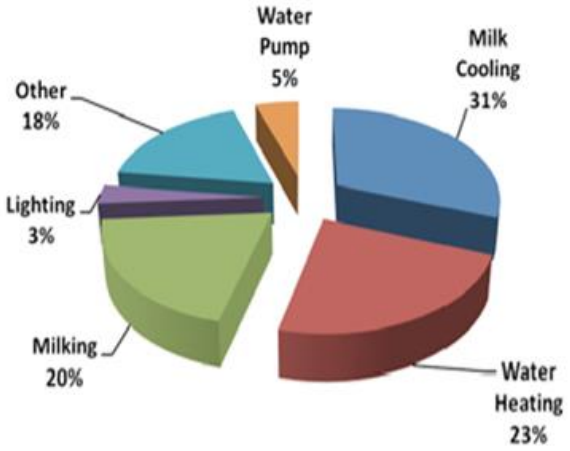


Figure 32: average consumption on 60 commercial dairy farms

2.6.2.2 Dry stock and Tillage Farms

Energy use on dry stock farms is normally low in comparison to dairy farms. The main energy used on both dry stock and tillage farms is from machinery.

Energy Saving Tips

- Tractors should be maintained regularly by replacing filters, changing the oil, and keeping tires inflated to the correct pressure, this will keep the tractors working efficiently.
- Idling tractors can use up to 20% of total fuel use so they should be switched off when not in use.
- Weights should be removed from tractors when not required which will both save fuel and tire wear.
- The horsepower of the tractor should match as close as is practical the implement requirements as too much or too little horsepower will reduce fuel efficiency.
- Driving tractors at lower rpm and higher gears will also reduce fuel use. Implements should also be maintained to increase fuel efficiency such as keeping knives sharp in balers etc.

2.6.3 Financial Incentives

1. **Accelerated Capital Allowance**

   Under the Finance Act 2008, a provision is made for accelerated wear and tear allowances for certain energy-efficient equipment. This allows a business to write off 100% of the value of the cost of the equipment against their profit over 1 year as opposed to the normal 8 years.

2. **TAMS on-farm investment scheme**

   Under this department of Agriculture scheme, €10million has been made available for energy efficiencies and renewable energy technologies. These include a solar PV installation of up to 6kW and battery storage, LED lighting, plate coolers, heat transfer units, and internal ice builders for the dairy sector. Other grants are available for the pig and poultry sectors.

3. **SEAI Pilot scheme for Dairy Farmers**

   SEAI ran a pilot scheme that provided grant aid for variable speed drives in 2017 and this may or may not reopen as it is currently closed.

3.0 Granagh Baseline Energy Balance

Baseline Energy Balance – Summary

- 46% of total estimated energy consumed (8,590 MWh/yr) is used in transport.
- 43% of total estimated energy consumed (8,004 MWh/yr) is used to heat and power homes.
- 7% of total estimated energy is consumed (385 MWh/yr) by agricultural practices.
- 4% of total estimated energy is consumed (334.5 MWh/yr) by non-residential sector.

Introduction

Transport energy use is the largest source of energy consumption (46%) within the Granagh SEC catchment area with residential energy the second highest energy consumer (43%). The data analytics employed used both census data and average transport statistics benchmarked against national figures where applicable for each of the four categories of residential, Non-residential transport, and agricultural energy use. The average km/year travelled is based on the national averages of 18,000km/yr. 75% of the Granagh area population have to travel by car to their place of employment, school, or college.

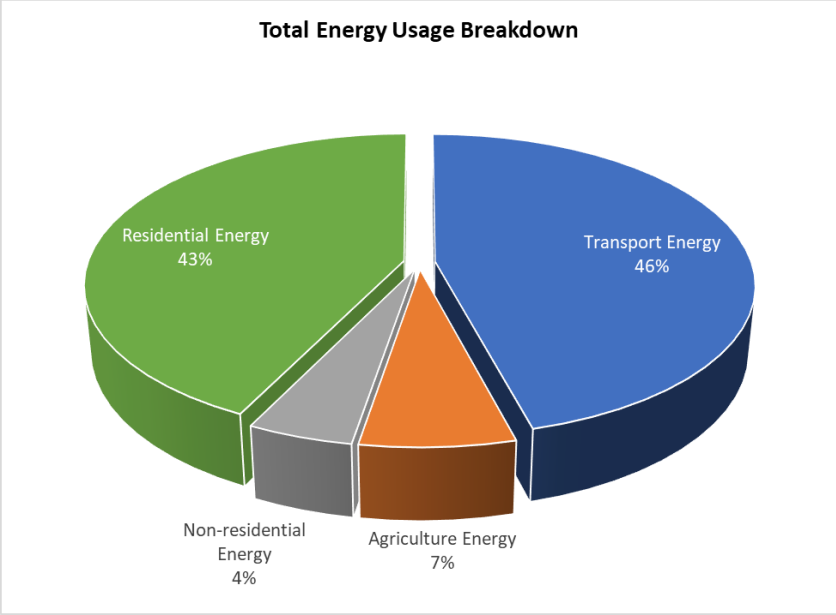


Figure 33: Baseline Energy for GRANAGH SEC

Table 8: Breakdown of energy use, CO2, and annual spend on energy (Granagh SEC)

Baseline Year of 2016						
TYPE	**GRANAGH SEC toe**	**MWh**	**tCO2**	**% Energy demand**	**% tCO_2**	**€/year**
Transport Energy	739	8,590	2268	46%	47%	€899,636
Agriculture Energy	360	1,261	333	7%	7%	€482,989
Non-residential Energy	74	862	227	5%	5%	€115,722
Residential Energy	688	8,004	1991	43%	41%	€607,220
Total	**1,861**	**18,717**	**4819**	**100.00%**	**100%**	**€2,105,567**

From the analysis of the total energy usage in the Granagh catchment area, transport energy use consumes the largest share of energy 46% (8,590MWh/yr), and residential energy usage accounts for 43% (8,004 MWh/yr) of the total energy used with agriculture accounting for an estimated 7% (1,261 MWh/yr) and non-residential energy use at 4% (862 MWh/yr) of total energy within the Granagh SEC study area. In A 'Do Nothing Scenario,' it is not anticipated that there will be a significant change in overall energy demand within Granagh SEC in the short to medium term. Also, the tonnes of carbon dioxide greenhouse gas per sector and the estimated spend in euro on energy per sector is included in figure 34 and 35 below.

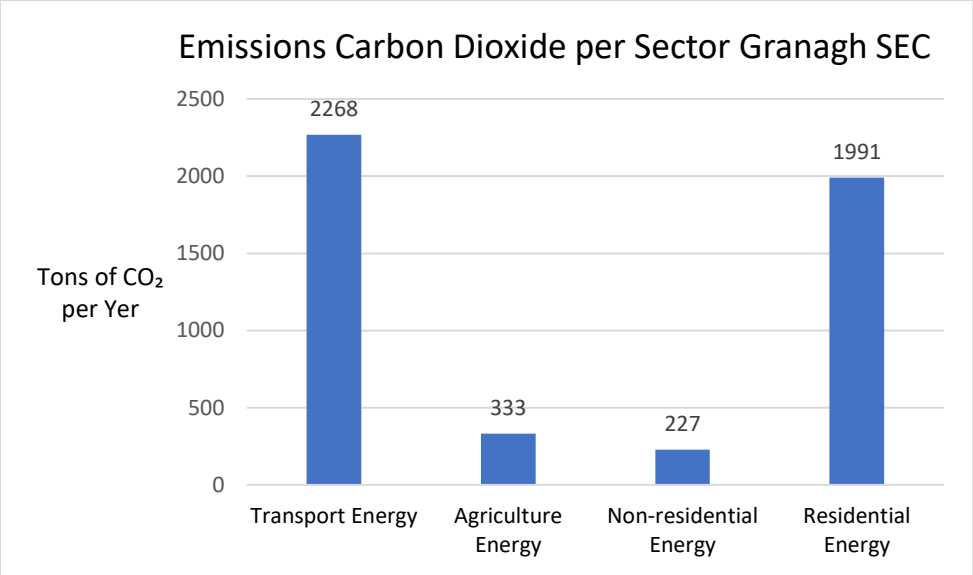


Figure 34 Greenhouse emissions per sector in Granagh SEC

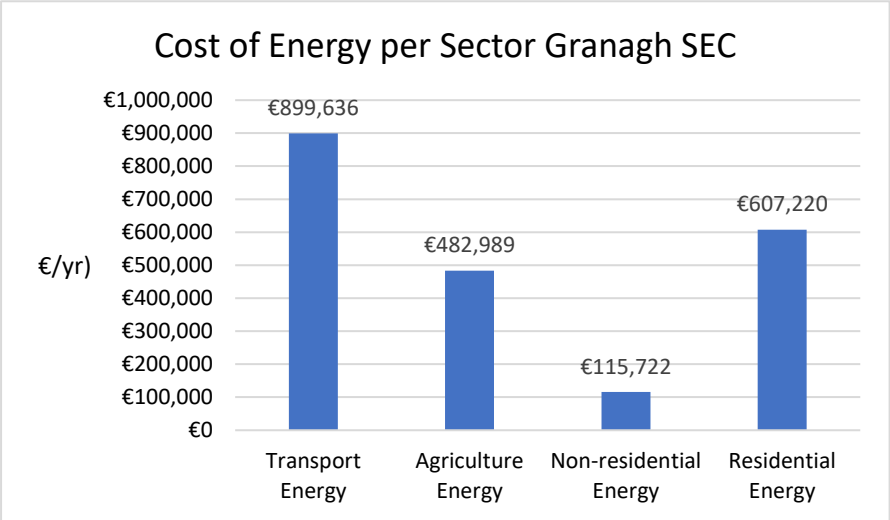


Figure 35 Cost of energy per sector Granagh SEC