3cea
driving sustainability

Abbeyleix Sustainable Energy Community Energy Master Plan

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Document Revision History

Revision	Date	Prepared By:	Reviewed By:	Action Taken/Comments
Rev A	**07/2019**	**Initials**: DA **Date**: 26/7/2019	**Initials**: AH **Date**: 30/07/19	
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1.0 SUSTAINABLE ABBEYLEIX COMMUNITY CHARTER

OUR VISION:

Is to build a thriving, resilient community, by reducing or carbon usage and increasing our energy security.

WE WILL DO THIS BY:

- Gaining a thorough understanding of our energy usage and educating ourselves to do more with less
- Improving the energy performance of our buildings / facilities
- Making smarter transport choices

WE WILL WORK TOGETHER:

With our community in conjunction with the SEC network and other support agencies to develop expertise and to access advice and capital supports to achieve our vision

WE COMMIT TO:

- Working with SEC initiative to develop a long-term strategy for Abbeyleix, which will set out a roadmap if integrated initiatives and continuous improvement
- Engaging enthusiastically with SEAI and other network members
- Maintaining records of energy and fuel usage in our target buildings
- Implementing behavioural changes which will reduce our carbon usage
- Developing the skills needed to access capital supports which will enable energy efficiency improvements in our buildings

WE THE UNDERSIGNED:

Are fully supportive of the vision, aims and commitments outlined above

2.0 EXECUTIVE SUMMARY

The 3 Counties Energy Agency (3CEA) has been commissioned by Sustainable Abbeyleix, the Sustainable Energy Community (SEC) set up by Abbeyleix Tidy Towns and Abbeyleix Women's Development Group (with support from Abbeyleix Business and Community (ABC) Forum and other Community Groups), to complete an energy survey of their community in order to produce an Energy Master Plan (EMP). This EMP provides a roadmap for the transition of the town towards an energy efficient community, that offers the following for residents and businesses:

- A clear understanding of its' energy needs and supply options
- A source of education and information on efficient and renewable energy
- An increase in resilience and energy security in the community
- Part funding opportunities for energy upgrades
- Participation in group funding applications
- Partnership building – for collaborating and co-creating in all aspects of the development of the community
- Improved standard of building comfort
- Reduction in energy costs
- Elimination / Reduction in fuel poverty
- Improvement in local air quality (by replacing fossil fuels with cleaner / more sustainable thermal energy* sources)

* Thermal energy is any energy used to generate and supply heat

Sustainable Abbeyleix have previously supported Abbeyleix Tennis Club with their Better Energy Communities (BEC) application and have worked with the Midlands Energy Agency to complete energy audits on a number of public buildings. The scope of the SEC within this Programme is defined as all residential, commercial, public and community buildings within the boundary of the town, as illustrated below in Figure 1. It also includes energy used for transport in the area. The total annual energy spend in the local community is estimated to be €2,000,000 per year. This inclusion of the whole town of Abbeyleix

in the scope of the SEC is ambitious and a very inclusive way of developing a resilient, sustainable community that is committed to improving the quality of life of all inhabitants and ensuring their needs are met.

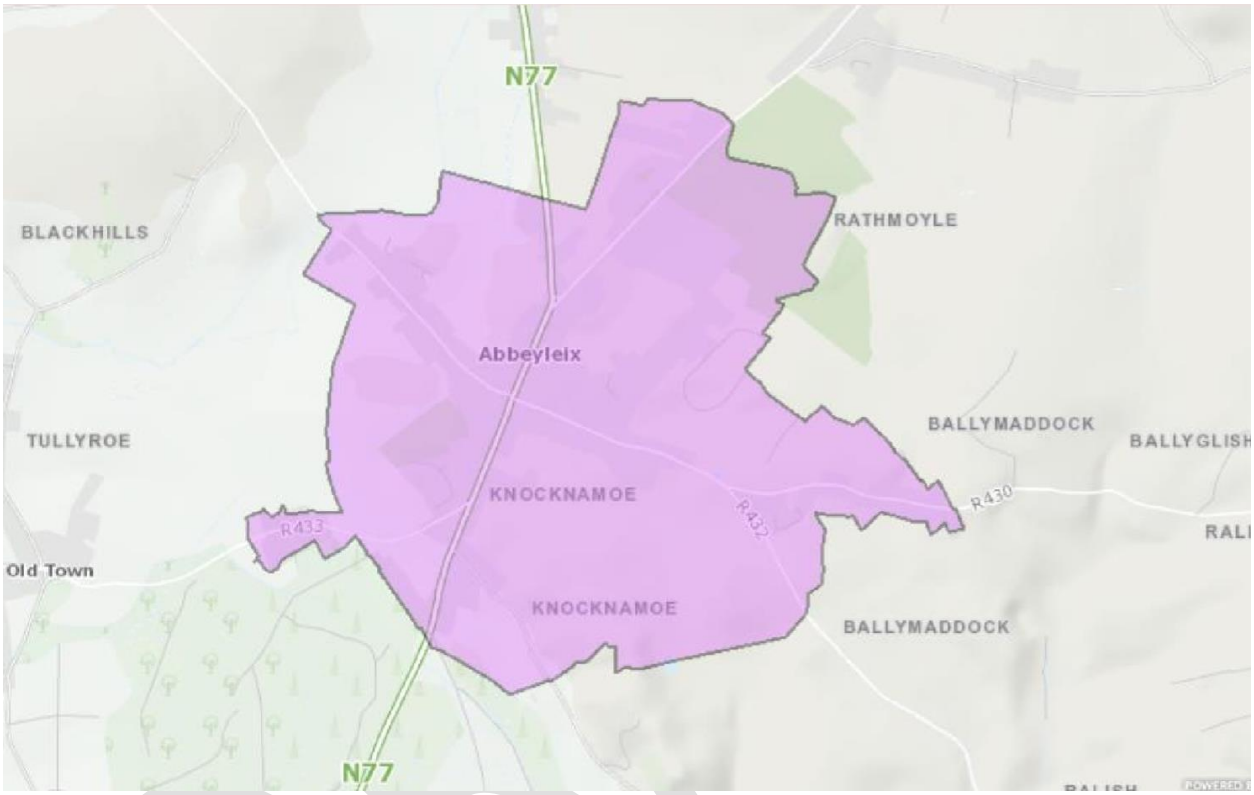

Figure 1: Map highlighting scope of Sustainable Abbeyleix

The first step of this survey was to establish an energy baseline for the town of Abbeyleix, i.e. a summary of the different types of energy currently used, the sector groupings they're being used in, the total amount of energy used in a typical year and what the associated CO_2 emissions are. This involved gathering and collating data from a number of sources, as detailed in Section 3. Two different methods were used to establish this energy baseline:

1) Top down – using national data and adjusting down to local level, using population size
2) Bottom up – conducting surveys with residents, businesses and occupants of public buildings

Ideally the bottom up approach to data gathering and collating is the applied method, as it is a truer reflection of the actual energy consumption, needs and demands. Unfortunately, there was a limited

response to the energy surveys distributed, but door to door visits to the commercial sector and detailed background data gathering and analysis for the residential sector enabled 3CEA to establish a bottom-up baseline. This report includes the data collated from both methods, which are illustrated through a series of tables and graphs in this Section and Section 5. For a high level overview of energy usage in Abbeyleix, the top-down data has been used. It represents the energy profile of an average town (usage by sector and energy type etc.), but it's important to note that every city, town and village will have their own unique profile as a result of demographics, geography, locally industry and other variables. The development of the Register of Opportunities was completed using specific data collated in the bottom-up analysis method. A summary of both the bottom-up and top down baseline energy data is available in this Executive Summary Section of the EMP.

The second stage of the EMP was the development of the 'Register of Opportunities', which is a list of the projects and programmes that provide Sustainable Abbeyleix with the **opportunities** to:

- Achieve a greater level of energy efficiency within the community
- Reduce individual and collective energy consumption
- Reduce energy costs
- Switch to renewable energy sources
- Reduce CO_2 emissions

2.1 SUMMARY OF BOTTOM UP ENERGY BASELINE DATA

The baseline year used for the bottom-up method of gathering and collating energy data was 2018. A summary of the data is provided in the tables and pie-charts in this section. Table 1 below details the following information:

1) The different types of energy used in Abbeyleix (cells in green along the top of the table)
2) The total amount of each energy type used in each sector in 2018 (cells in orange on right)
3) The total amount of each energy type used in 2018 (cells in grey along the bottom)
4) The total amount of energy used in Abbeyleix in 2018 (cell highlighted in pink)

An illustration of the breakdown of where energy is being used, within the different sectors in Abbeyleix is provided in Figure 2 below.

Energy Use in MWh in 2018								
	Energy Type							
Sector	**Coal**	**Oil**	**Petrol**	**LPG**	**Diesel**	**Biomass**	**Electricity**	**Sector Totals**
Residential	1.34	4.03	0.00	0.00	0.00	0.00	2,746.85	**2,752.22**
Commercial	0.00	255.21	0.00	830.55	0.00	0.00	536.34	**1,622.10**
Public Sector	0.00	897.24	0.00	0.00	0.00	56.02	128.42	**1,081.69**
Community	0.00	0.21	0.00	0.00	0.00	0.00	17.29	**17.50**
Transport	0.00	0.00	0.04	0.00	0.00	0.00	0.00	**920.19**
Total	**1.34**	**1,156.69**	**0.04**	**830.55**	**920.16**	**56.02**	**3,428.90**	**6,393.70**

Table 1: Total Energy Used by Energy Type and Sector

The residential sector is by far the biggest consumer at 43% with the commercial sector next at 25%. The public sector and transport are almost tied at 17% and 15% respectively. Transport is one of the hardest sectors to make an impact on at a local level, however Figure 2 shows where the key energy efficiency opportunities lie, i.e the residential sector.

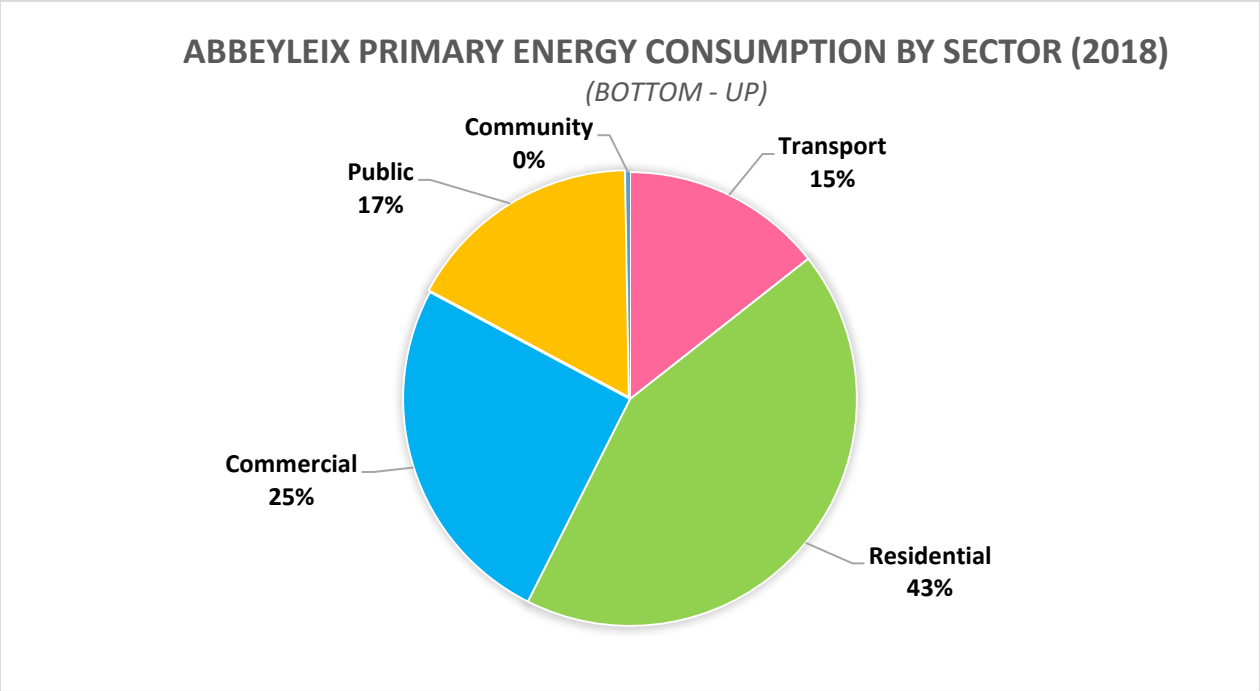

Figure 2: Breakdown of Energy Usage by Sector (2018)

This next chart, Figure 3 below, illustrates the energy usage in Abbeyleix, according to energy type. Electricity constitutes more than half of the total energy consumed at 54%, Oil is next at 18%, Diesel at 14% and finally LPG at 13%. Consumption of both Coal and Petrol are so minimal that they appear as 0% in proportion to the other energy types.

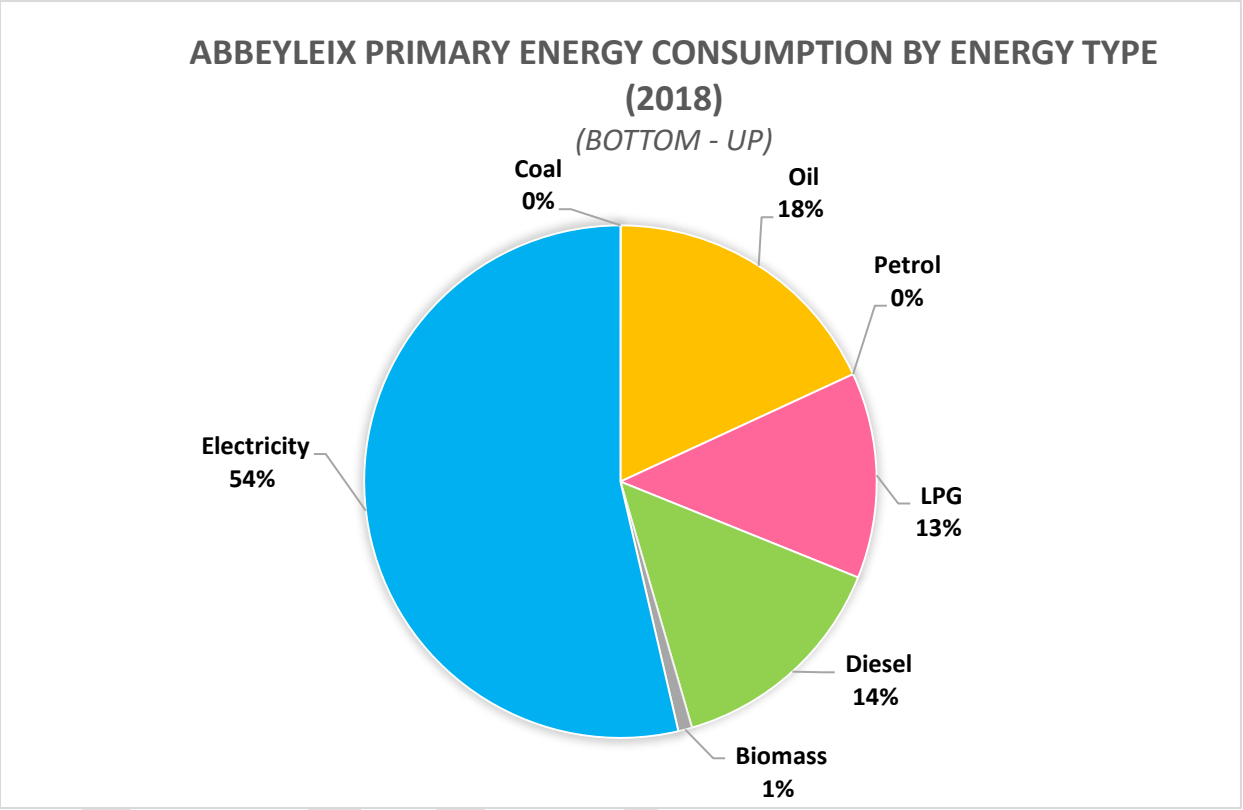

Figure 3: Breakdown of Energy Usage by Energy Type (2018)

Adding up the potential savings identified in the Register of Opportunities (developed using bottom-up data) and splitting them into Domestic and Non-Domestic provides the summary details in Table 2 below. What this clearly shows is that the best way to reduce energy usage, cost and the associated CO_2 emissions is to focus on retro-fitting the homes of residents. It's important to note that the capital investment needed to retro-fit a house can be considerable and that while there are energy and cost savings each year following the retro-fit, the payback period in some cases can be quite long. The SEAI 35% grant funding for the retro-fits helps to make these projects more affordable and reduce the payback period. See Section 4.1 for an explanation of payback period.

Sector	Potential Energy Savings (MWh / year)	Potential Energy Cost Savings (€ / year)	Potential CO_2 Reduction (tonnes / Year)
Domestic	Data to be verified	Data to be verified	Data to be verified
Non-Domestic	Data to be verified	Data to be verified	Data to be verified
Total	Data to be verified	Data to be verified	Data to be verified

Table 2: Summary of Potential Energy and Cost Savings and CO_2 Reduction

The other important measurable in establishing the baseline and developing the Register of Opportunities is the CO_2 emissions that arise as a result of the energy consumption. A summary of the CO_2 emissions according to energy type and sector are provided in Table 2 below. With regard to sectors the, CO_2 is in proportion with the amount of energy being used, therefore most is attributed to the residential sector followed by the commercial sector. In terms of energy type, it is the amount of energy and the nature of the energy that determine the amount of CO_2, e.g. electricity generation produces more CO_2 than burning oil in an oil fired heating system. This is very evident in the table below with electricity accounting for almost 70% of CO_2 emissions.

CO_2 Emissions in 2018								
	Energy Type							
Sector	**Coal**	**Oil**	**Petrol**	**LPG**	**Diesel**	**Biomass**	**Electricity**	**Sector Totals**
Residential	379.99	1,139.97	0.00	0.00	0.00	0.00	2,396.15	**3,916.11**
Commercial	0.00	67.35	0.00	190.44	0.00	0.00	1,869.66	**2,127.45**
Public Sector	0.00	219.14	0.00	0.00	0.00	0.00	358.75	**577.89**
Community	0.00	54.31	0.00	0.00	0.00	0.00	74.43	**128.73**
Transport	0.00	0.00	9.57	0.00	242.83	0.00	0.00	**252.40**
Total	**379.99**	**1,480.76**	**9.57**	**190.44**	**242.83**	**0.00**	**4,698.99**	**7,002.59**

Table 3 : Total CO_2 Emissions by Energy Type and Sector

Figures 4 and 5 below illustrate the CO_2 summary data in pie charts to provide a visual understanding of the biggest producers of CO_2 emissions, i.e. the residential sector and the consumption of electricity.

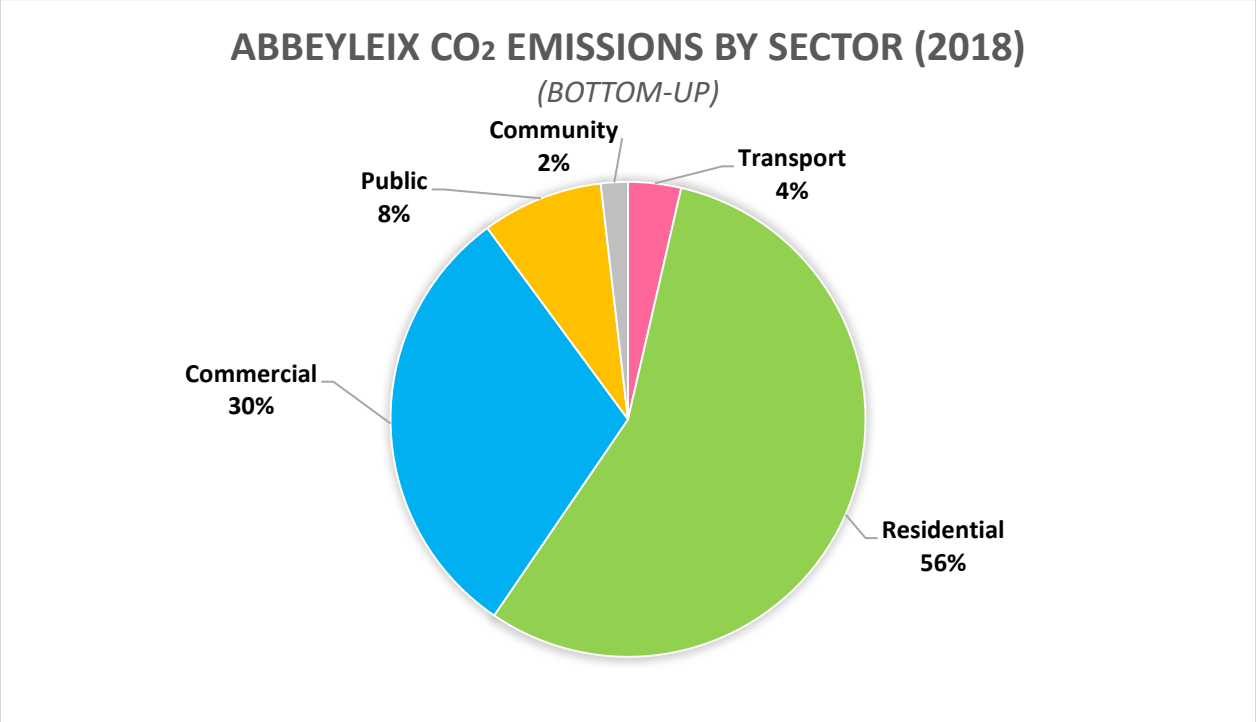

Figure 4: Abbeyleix CO_2 Emissions by Sector (2018)

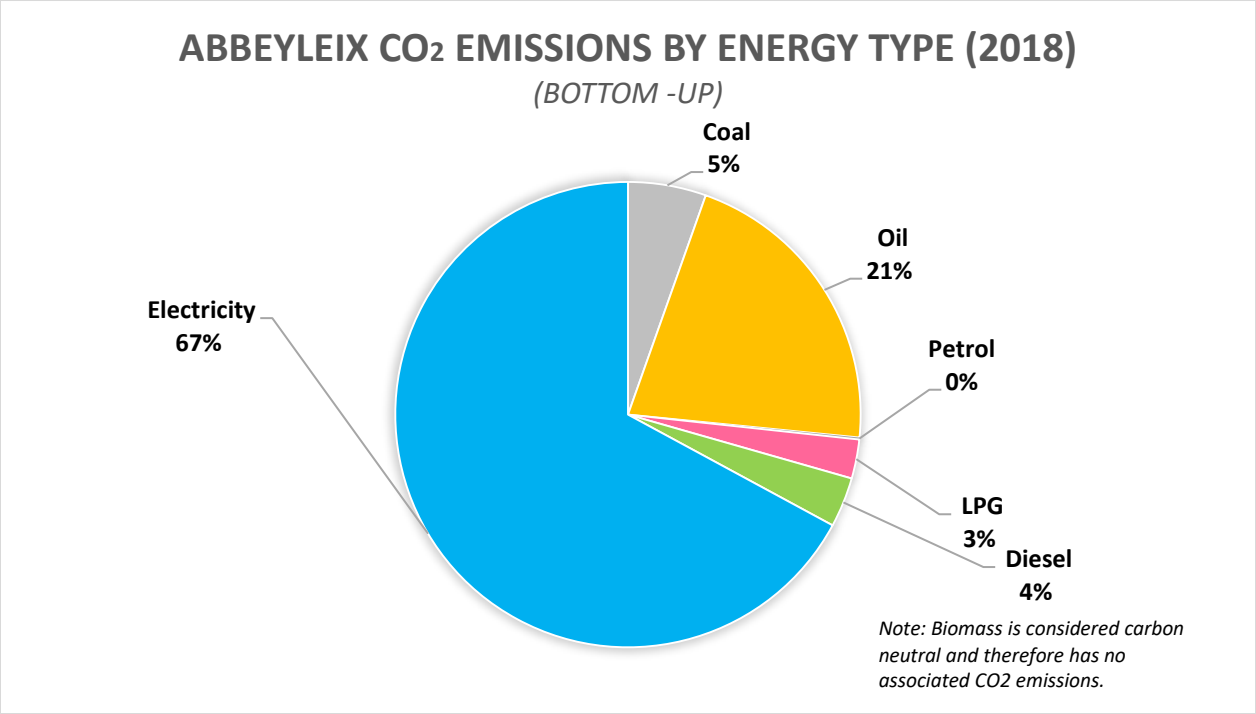

Figure 5: Abbeyleix CO_2 Emissions by Energy Type (2018)

2.2 SUMMARY OF TOP DOWN ENERGY BASELINE DATA

The top down energy baseline provides a high level perspective on the breakdown of energy usage in Abbeyleix. As noted previously, the unique and specific characteristics of any town and village result in some differences to these high level figures.

Figure 6 below, breaks down the energy usage by sector and highlights the Transport Sector as the biggest user of energy (by a significant margin). This is followed by the Commercial and Residential sectors and finally the Public and Community Sectors that account for just 5% and 2% respectively.

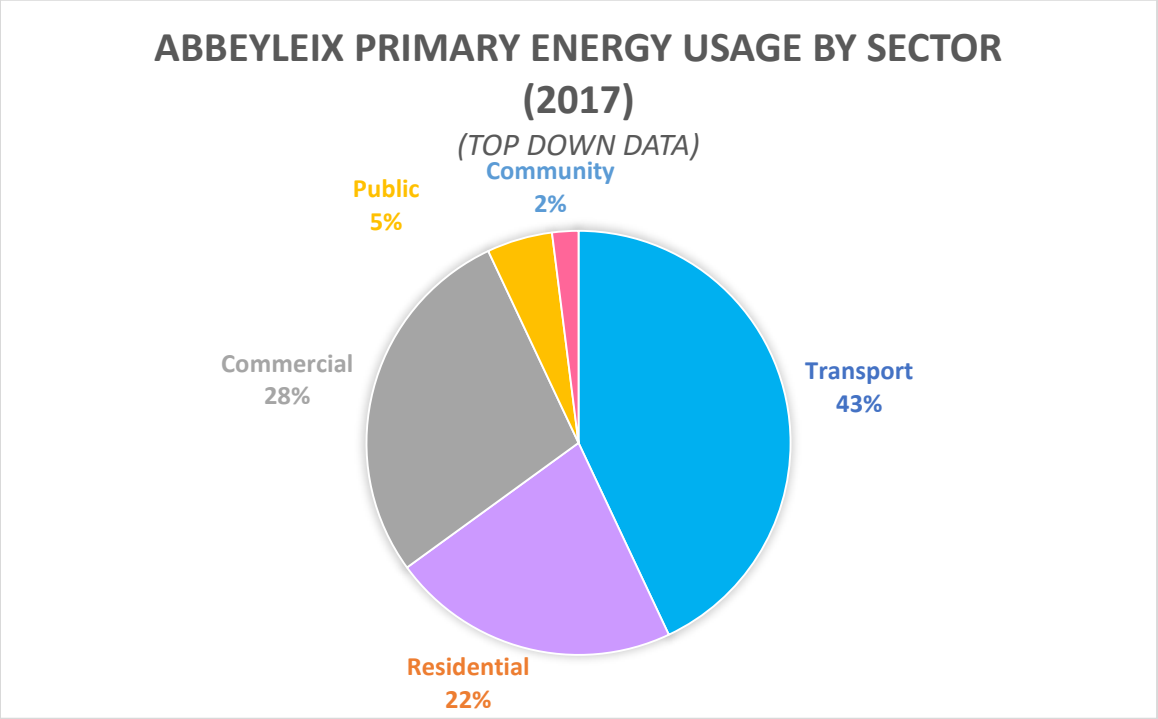

Figure 6: Breakdown of Primary Energy Usage by Sector (2017)

Figure 7 on the next page provides a breakdown of energy usage by fuel type and clearly illustrates that oil usage typically accounts for almost half of total energy. Coal, Gas and Peat have been grouped together and account for 23% of the total energy and electricity is close behind at 19%.

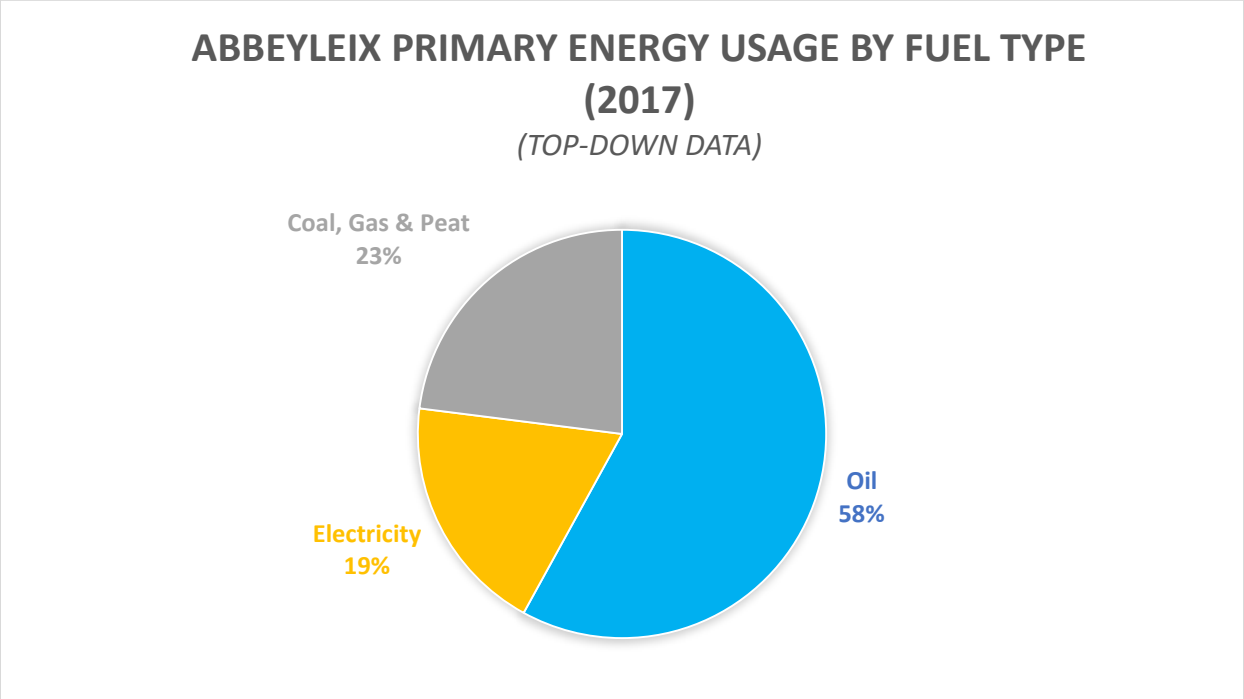

Figure 7: Primary Energy Usage by Fuel Type (2017)

To then relate this to the CO_2 emitted as a result of this energy usage, Figure 8 paints a very clear picture. Thermal energy, i.e. accounts for 96% of CO_2 emissions. Figure 9, breaks down CO_2 emissions by sector. Both charts again demonstrate that the greatest potential for Abbeyleix to make a significant and positive impact on energy efficiency (and off-set CO_2 emissions) is by focusing on the domestic sector, i.e. retro-fitting homes. Section 5 Register of Opportunities goes into this in more detail.

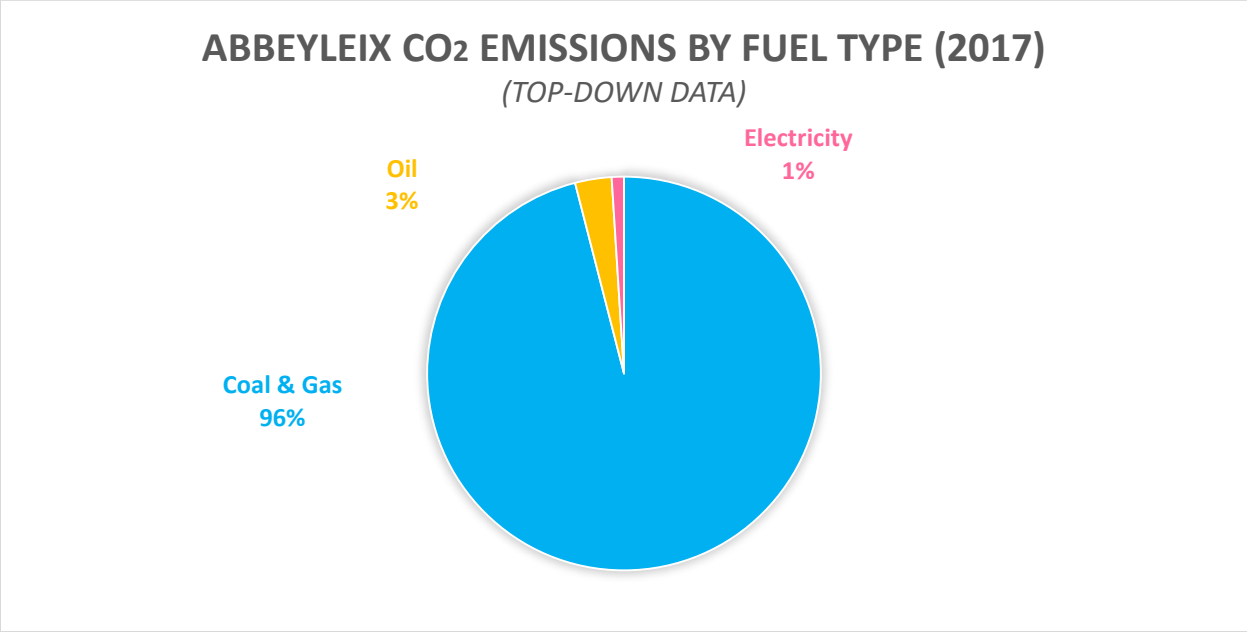

Figure 8: CO_2 Emissions by Fuel Type (2017)

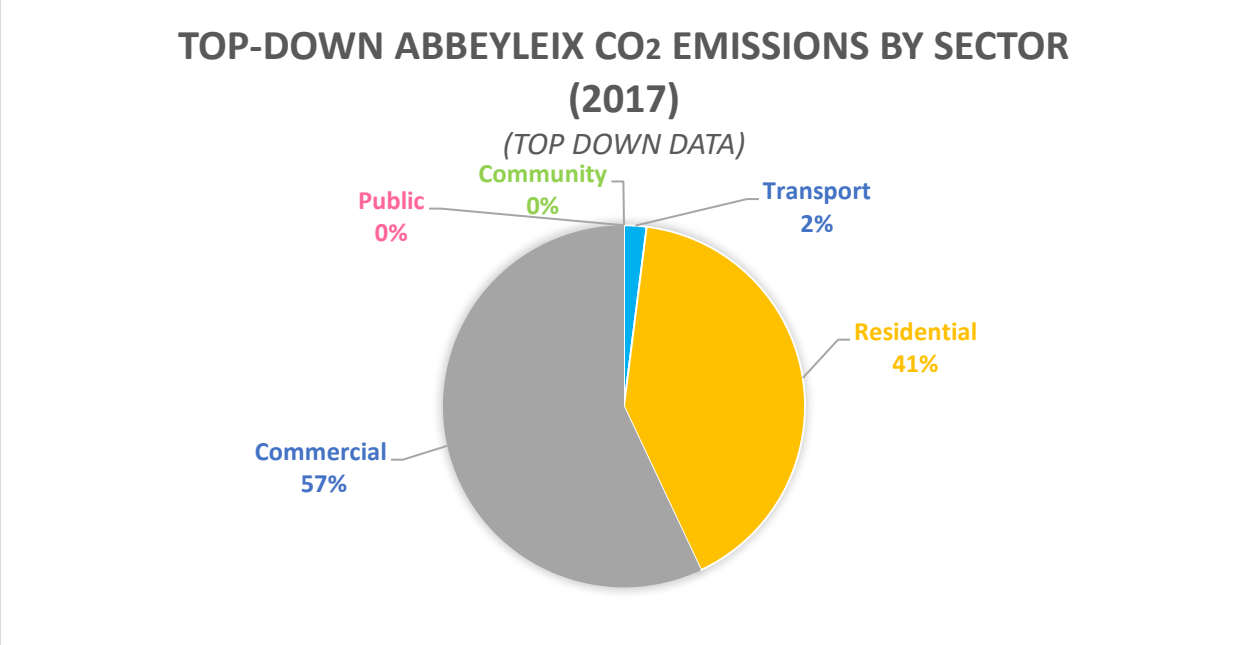

Figure 9: CO_2 Emissions by Sector (2017)

The Energy Master Plan is a core document for Sustainable Abbeyleix to manage, build upon and use in their plans and vision for their community. It is important that progress is monitored:

- To help identify any obstacles that may arise and develop the solutions needed
- To see projects through to completion
- To ensure the ultimate goals are achieved

It is the intention of Sustainable Abbeyleix to play an exemplary role in creating a sustainable future and to provide guidance and support to the various stakeholders and sectors in Abbeyleix. It is important to note that without the will, resources and necessary supports, the completion of projects and the realisation of the goals and vision for Abbeyleix will be far more challenging. The implementation of the EMP will require engagement, time and support by the core team, the wider community, as well as funding from various agencies and organisations.

3.0 INTRODUCTION

Sustainable Abbeyleix was the first community in Laois to be accepted into the Sustainable Energy Community (SEC) Programme, which is managed by the Sustainable Energy Authority of Ireland (SEAI). The SEC approach aims to enable bottom-up, community developed solutions to local energy matters. Sustainable Abbeyleix entered into Partnership with SEAI in 2016, which gives a three-year, two-way exchange between the local community and SEAI to help establish an Energy Master Plan (EMP) and provide the framework and part funding to complete a variety of energy projects. The EMP:

- Surveys and assesses the energy usage within the scope of the SEC
- Establishes the energy baseline for the SEC
- Illustrates the CO_2 emissions relating to energy usage
- Identifies the renewable energy and energy efficiency opportunities in each sector of the SEC (in the form of a Register of Opportunities)

This will help the community set out a roadmap for their energy transition by increasing knowledge of where energy is used in the community, identifying the key stakeholders and selecting priority energy saving projects to complete reductions in energy usage and CO_2 emissions. This document presents the current energy baseline and profile for Abbeyleix through both a top-down and bottom-up analysis of the energy data in terms of energy type and the key sector groupings within the community:

1. Residential
2. Commercial
3. Public sector
4. Community
5. Transport

The report also contains a Register of Opportunities, which lists the possible energy efficiency and renewable energy projects across each sector that the community can implement to make Abbeyleix a resilient and Sustainable Energy Community.

4.0 METHODOLOGY AND BASELINE DATA

To establish the energy and CO_2 emissions baseline for Abbeyleix's Energy Master Plan (EMP), there were two methodologies applied and two baseline years selected. As discussed in the Executive Summary, the two methodologies applied were as follows; 1) Top-down for high level review and discussion of the energy baseline for Abbeyleix and 2) Bottom-up for more specific energy usage data, which was used in the development of the Register of Opportunities.

The baseline year selected for the top-down method was 2017, due to the availability of the 2017 National Energy Balance data. The baseline year selected for the bottom-up method was 2018, on the basis of the procurement of the energy master plan. Data was collated under the different energy types used and under the different sector groupings (residential, commercial, public, community and transport). Agriculture was not included as the town environs for Abbeyleix did not include any specific agricultural organisations and the Abbeyleix SEC felt it did not fit the scope of the EMP.

The data sources used in the development of this EMP are as follows:

- Central Statistics Office (CSO) National Census, 2016
- CSO Small Area Population Statistics (SAPS)
- 2017 National Energy Balance
- SEAI National Building Energy Rating (BER) Register
- National Travel Survey (NTS), 2016 – which was completed as part of the Quarterly National Household Survey (QNHS) in the fourth quarter (October – December) of 2016
- Primary data gathered from energy surveys, utility bills, and XML files
- Satellite imagery and Google Maps

4.1 ENERGY UNITS AND LANGUAGE

The language used to discuss energy usage, efficiency and savings can be confusing as there are different units that can be used. To help ensure the information and data provided in this report is clear, the units used are explained below and are consistent throughout.

Energy Usage: the energy usage in this report is detailed in Megawatt-hours (MWh) when discussing usage at a high level, i.e. the total energy used in the Domestic Sector in Abbeyleix or the total electrical energy used in Abbeyleix. When discussing energy usage related to a specific house or building, Kilowatt-hours (kWh) are used. You will recognise kWh as the unit of energy detailed in a home electricity bill, where you are charged for each kWh used.

Note: *1 MWh = 1,000 kWh*

Energy Efficiency: Energy efficiency is achieved when a change in technology or behavior reduces the amount of energy being used. This means there are less MWh / kWh being used. Therefore, energy efficiency is discussed in both MWh and kWh.

Total Primary Energy Usage: An important note on the figures calculated for electricity usage is that they are based on the Total Primary Energy Requirement (TPER). This means that they include the losses incurred at the generation station and during transmission through the network. The SEAI maintains a database, which provides primary energy conversion factors to convert Final Energy Consumption (kWh usage data detailed in electricity bills) to Total Primary Energy Requirement. This database is updated annually to reflect improvements and efficiencies.

Thermal Energy: Energy that is used to generate heat e.g. oil, natural gas or peat used in boilers, stoves or open fires.

Energy Savings: Energy costs money, therefore when energy efficiency is achieved, energy savings are also made in form of Euro's. Therefore, when discussing energy savings in this report, it is done in Euro's (€).

CO_2 Emissions: When fossil fuels are burned to generate electricity (at electrical power stations) or to generate thermal energy (heat e.g. oil boilers) they release CO_2. When energy efficiencies or renewable energies are introduced, less energy is used, therefore less CO_2 is emitted. CO_2 is typically measured in kg or tonnes, depending on the scale. For the purposes of this report, CO_2 is discussed in tonnes. It is discussed in relation to how much CO_2 can be potentially off-set by introducing an energy efficiency or renewable energy.

Note: *1 tonne = 1,000kg*

Simple Payback Period: This is the number of years it will take for the total investment in an energy project to be paid back by the savings made.

4.2 TOP-DOWN ANALYSIS

The top-down analysis was completed using data from national authority databases as detailed at the beginning of Section 4.0. This national energy data was then apportioned based on the 2016 population of Abbeyleix (CSO, 2016). This data has been discussed and illustrated in Figures 6,7, 8 and 9 in the Executive Summary.

4.3 BOTTOM-UP ANALYSIS

A bottom-up analysis was completed using the data collected directly from those in the community who engaged with the process. Flyers were designed and sent out to the community online to invite interest and engagement with the process and ultimately the EMP, see Appendix A. An energy survey was also designed and sent out to all areas of the community via Facebook, email and other sources. Site visits also took place where members of 3CEA went door to door to all the commercial businesses in town, talking to each one and hand delivering the energy survey. 3CEA targeted a number of the larger, key stakeholders in the SEC environs and met (*) the majority of them directly to obtain energy data. These included:

- Abbeyleix Further Education Centre*
- Abbeyleix District Hospital*
- First Spirits Ireland*
- Abbeyleix Manor Hotel*
- SuperValu

A copy of the survey can be found in Appendix B. Responses to the survey were poor, with only 6 online responses from the entire residential community. However, 3CEA gained much more responses from the face to face meetings and door-to-door engagements.

4.4 RESIDENTIAL DATA

To establish the current energy usage for the residential sector of Abbeyleix, the Building Energy Rating (BER) data was requested from SEAI. Unfortunately however, only the BER data for the entire County Laois could be provided, i.e. there was no individual breakdown per town available for analysis.

4.4.1 TOP-DOWN DATA

National residential data was obtained from the Central Statistics Office (CSO), and the granular town data was obtained through the CSO's Small Area Population Statistics (SAPS), which lists the housing stock present in a small town by house type and year of construction.

4.4.2 BOTTOM-UP DATA

The methodology employed locally involved looking at the existing housing stock in the main housing estates, as highlighted in the map in Figure 10 below. The house type in each estate and average year of construction were determined, where possible, and can be seen in Table 4 below. Data was obtained from a representative house / apartment in each of these estates and was then multiplied out according to how many other houses / apartments there were in the estate / street (See Table 4 below). There is a total of 550 houses accounted for in these main estates, which equates to 70% of the total 790 domestic houses in Abbeyleix, as per the CSO SAPS data from the 2016 Census.

Estate Name	House Type						Estimated Year of Construction
	Detached	Semi Detached	Terraced	Apartment	Other	Total	
Grallow Wood	19	16				35	2006
De Vesci Hill	29				4	33	In construction phase
Vesey Close	19					19	2002
The Maisonettes	2	4				6	N/A
Thornberry	1	42	12			55	2002
Rathmoyle Crescent		10				10	1999
Ashbrook		20				20	Unknown
Upper Rathmoyle	26	20				46	1999
Gort na Noir		34		34	1	69	1996
Corran na Noir		12				12	1996
Sli na Noir		20				20	1996
Balladine Heights	1	22				23	2004
Balladine Drive		32				32	2004
The Tiles	13					13	Unknown
Fairways	34	56				90	2005
Knocknamoe Lane	9					9	2000
Temperance Street		2	12			14	Unknown
Abbey Crescent	36					36	2006
Laburnum Close	8					8	2012
TOTAL	**197**	**290**	**24**	**34**	**5**	**550**	

Table 4: List of Abbeyleix Housing Estates, their House Types and Age

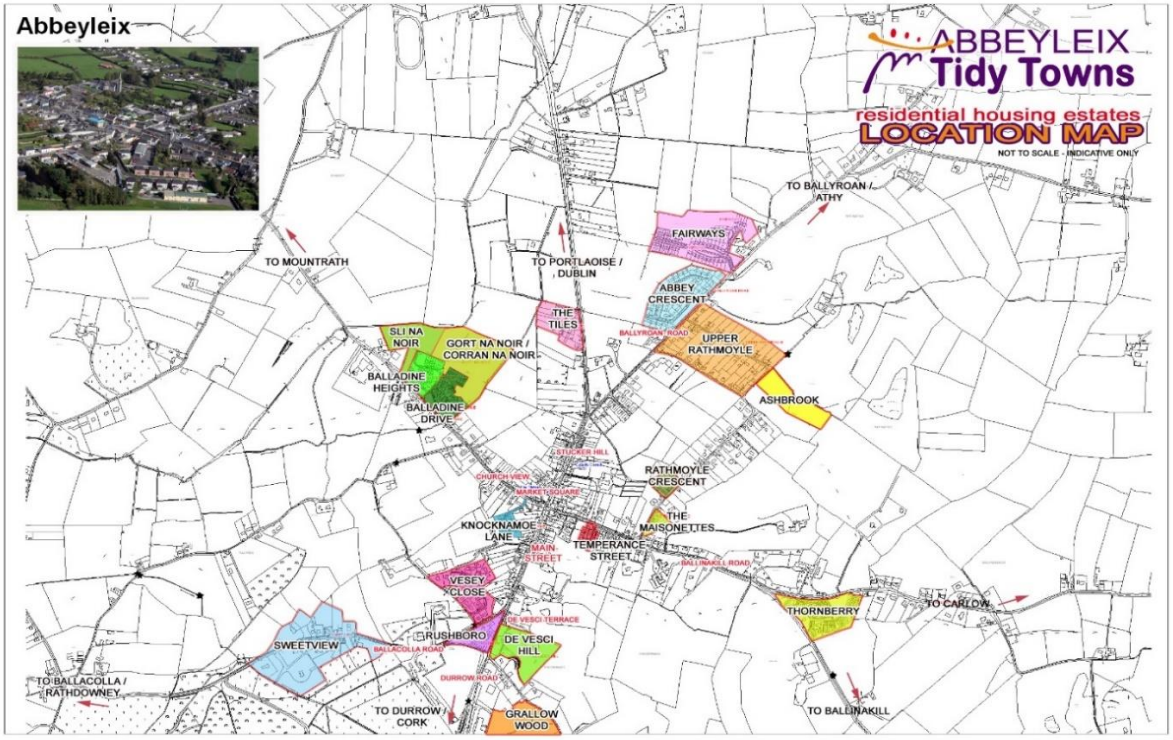

Figure 10: Map showing estate locations within the Abbeyleix SEC environs

3CEA obtained energy usage data and information directly from some of the homeowners in the estates and areas listed below:

- Ashbrook
- Balladine
- Gort na n-Oir
- Grallow Wood
- Main St
- Rathmoyle Crescent
- The Fairways
- The Tiles
- Thornberry
- Upper Rathmoyle
- Vesey Close

The objective was to analyse the energy performance of these homes and through this, develop a refurbishment guide that can aid homeowners in deciding what energy efficiency / renewable energy projects to do. The home refurbishment guide can be found in Appendices D to P.

Looking at the age of the houses in Abbeyleix helps to indicate the level of insulation and other energy efficient design and technologies present. The graph below, in Figure 11, groups together the houses in Abbeyleix by age and compares them to National figures. What we can see, is that there are proportionally more older houses (pre 1919) and more new houses (2001 - 2011) compared with the national figures. In particular, there is significantly more new houses, at 37%, compared with the national proportion of 25.5%. This means there are more houses built to better energy efficient standards than is typical for many areas.

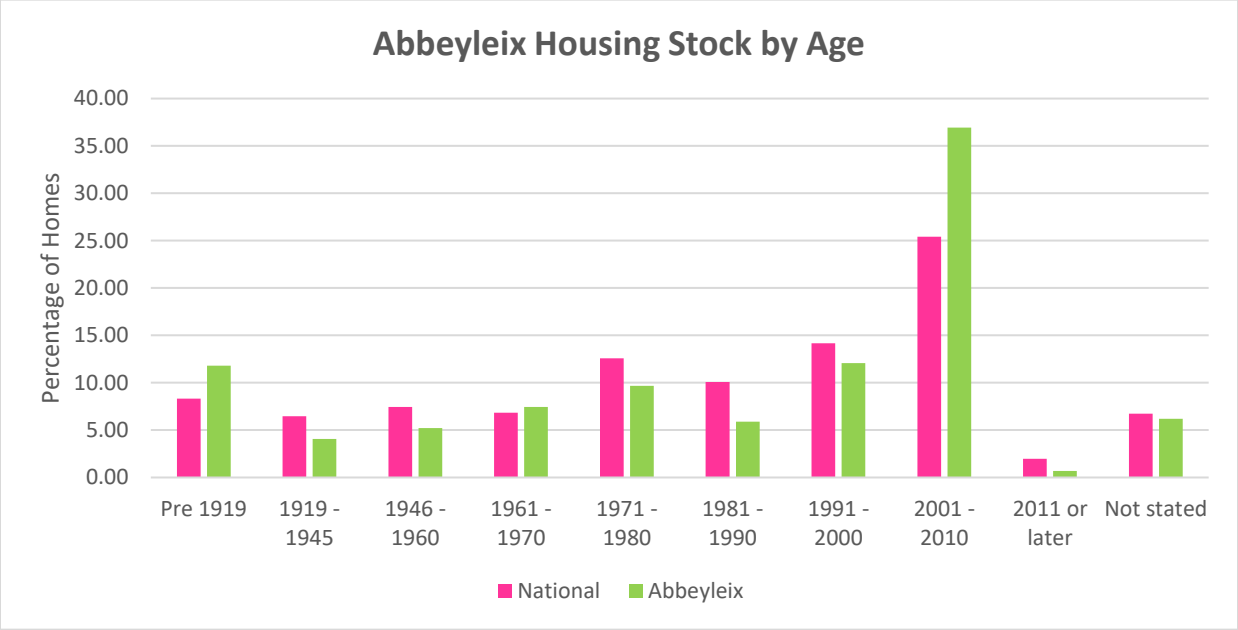

Figure 11 Illustration of Abbeyleix Housing Stock by Age versus National Data

4.5 COMMERCIAL DATA

4.5.1 TOP-DOWN DATA

The top-down analysis was completed using data from national authority databases as detailed in Section 4.0. This national energy data was then apportioned based on the 2016 population of Abbeyleix (CSO, 2016). This data has been discussed at a high level and illustrated in Figures 6, 7, 8 and 9 in the Executive Summary.

4.5.2 BOTTOM-UP DATA

The commercial sector in this study includes the industrial and small-medium enterprises (SMEs) in Abbeyleix from different business types, as shown in Figure 12 below. Visits were made to each individual business and time was taken to talk to the staff and business owners. The data gathered and collated during this stage, is what was used to establish energy opportunities in the Commercial Sector.

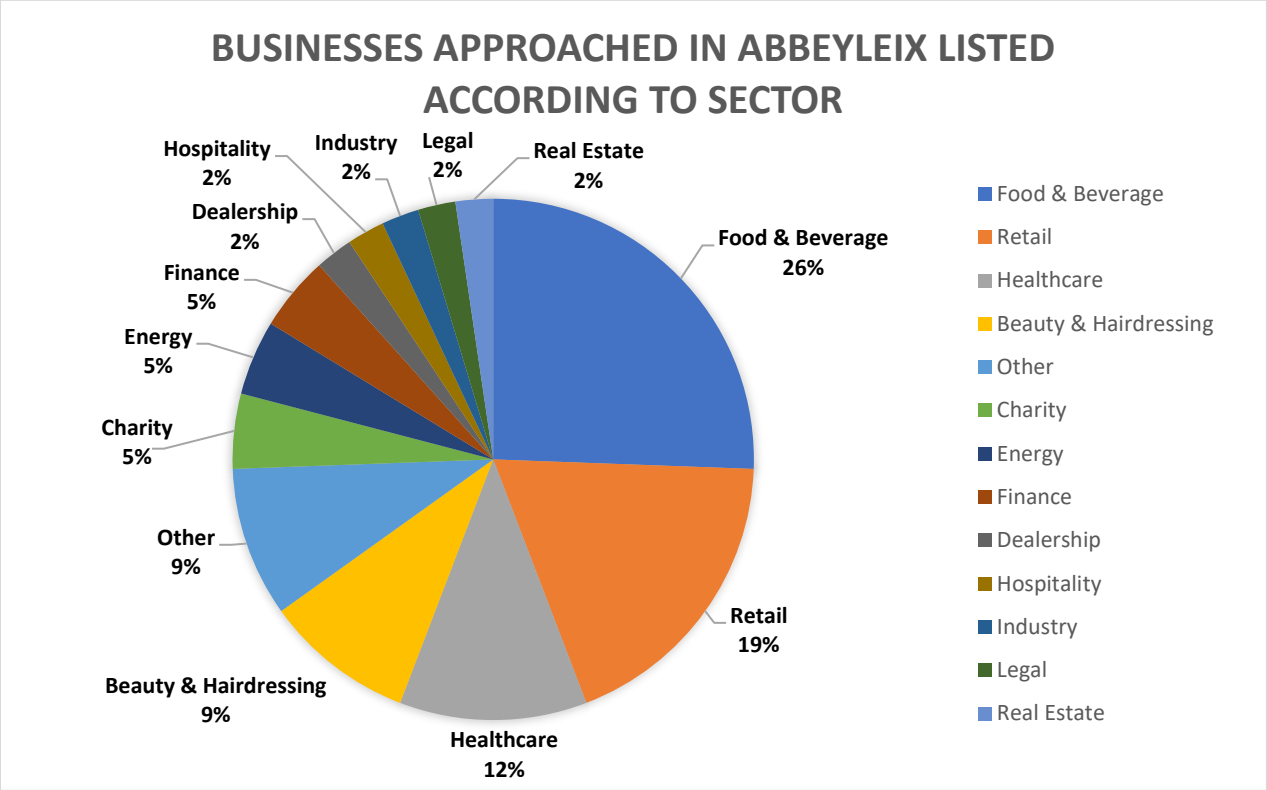

Figure 12 Breakdown of Business Types approached during Data Gathering

Based on the reactions of the people spoken to, the initial impression was a high engagement rate and turnout from the community. Unfortunately, out of the 43 businesses approached, only 7 businesses provided conclusive energy data that could be included in the Energy Master Plan. A full list of businesses approached by 3CEA can be found in Appendix C.

4.6 Public Sector Data

4.6.1 Top-Down Data

The top-down analysis was completed using data from national authority databases as detailed in Section 4.0. This national energy data was then apportioned based on the 2016 population of Abbeyleix (CSO, 2016). This data has been discussed at a high level and illustrated in Figures 6, 7, 8 and 9 in the Executive Summary.

4.6.2 BOTTOM-UP DATA

For the public sector, local authority data (*) was used with permission from Laois County Council. Energy audits (**) were carried out in some buildings, such as the schools and the rest of the energy data was obtained as a result of direct correspondence with key people managing the facilities. The organisations and buildings in the public sector in Abbeyleix are listed down below.

- Abbeyleix Library*
- Abbeyleix Fire Station*
- Public Lighting*
- Abbeyleix District Hospital
- Abbeyleix Further Education Centre**
- Scoil Mhuire**
- Abbeyleix South National School**

4.7 COMMUNITY DATA

4.7.1 TOP-DOWN DATA

Top-down data for the community sector on its own is not available on a national scope.

4.7.2 BOTTOM-UP DATA

The data from this sector was primarily obtained from energy surveys (*) distributed by 3CEA and energy audits (**) undertaken in the following community establishments:

- Abbeyleix St. Michael & All Angels Church & Rectory*
- Abbeyleix Parish Development Co.*
- Jelly Tots Creche**
- Abbeyleix Golf Club**
- Abbeyleix Tennis & Football Club**

4.8 TRANSPORT DATA

4.8.1 TOP-DOWN DATA

The transport sector's national primary energy and CO_2 emissions was obtained from SEAI. From the data, the figures for the aviation industry and fuel tourism, as well as rail and public passenger services (which are included in the public sector) were omitted as they don't relate specifically to Abbeyleix. The top-down transport data is discussed at a high level in the Executive Summary.

4.8.2 BOTTOM-UP DATA

The bottom-up calculations for Abbeyleix's primary energy usage and CO_2 emissions for transport, were based on primary information obtained through energy surveys distributed by 3CEA. The first part of the survey related to what modes of transport the people of Abbeyleix use and the second part focused on typical travel times for commuters. The results of these surveys are illustrated in Figures 13 and 14 below.

Figure 13 shows that over 70% of the people in Abbeyleix get around by car, approximately 13% travel by foot and the remainder use a mixture of bicycle and public transport or travel by car as passengers. Looking at the comparison to the national figures, there are more people in Abbeyleix travelling as passengers in a car, by bus and on foot than the average. In addition there are less people in Abbelyeix travelling by car than is typical. This all suggests there is good support for more sustainable ways of travelling in the community.

Looking at the commute times in Figure 14, there are less people in Abbelyeix with short commute times of under 15 minutes than is typical and there are more people having to travel for over 1 hour. This would also suggest that opportunities and ideas for more sustainable ways of working and travelling would be well received in the community.

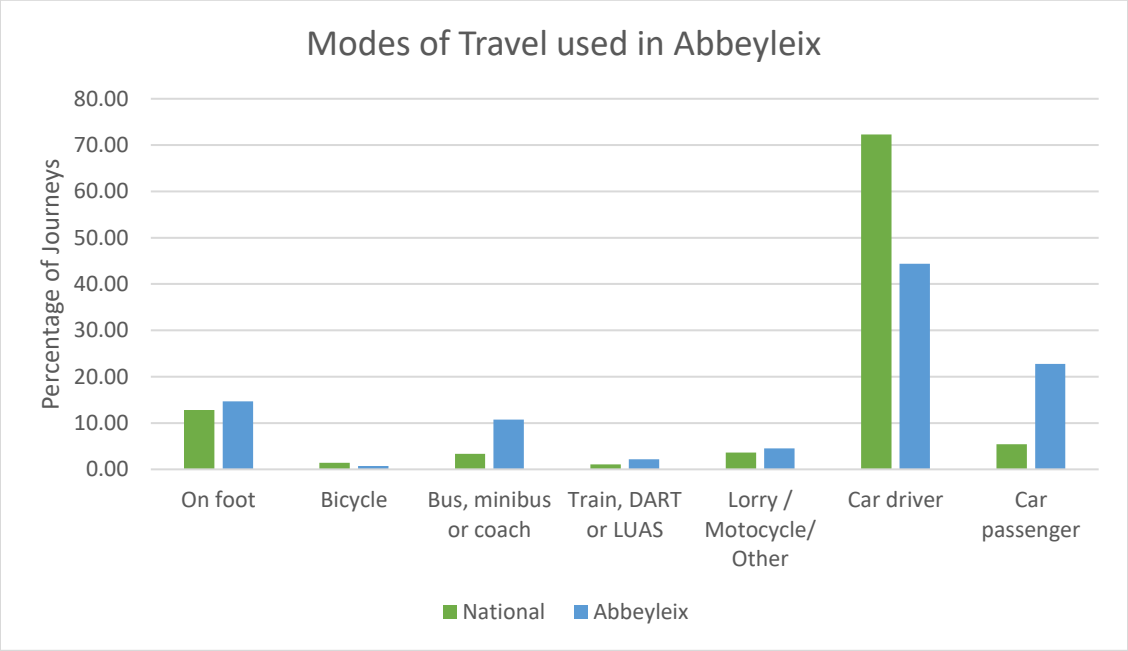

Figure 13 Modes of travel used in Abbeyleix

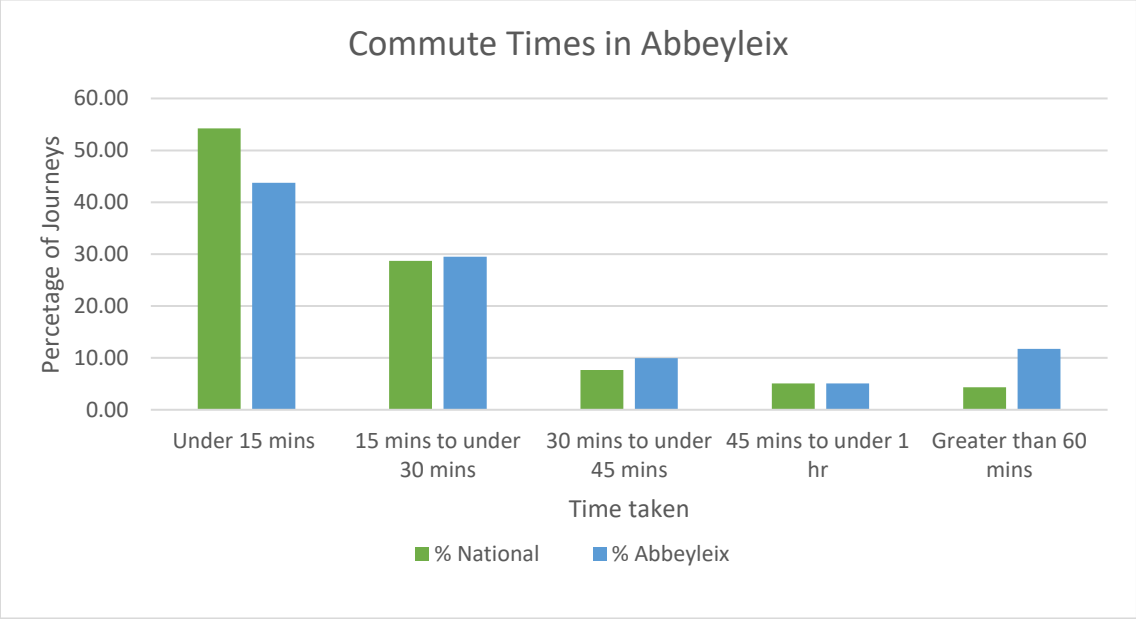

Figure 14 Commute Times in Abbeyleix

4.9 METHODOLOGY FLOW CHART

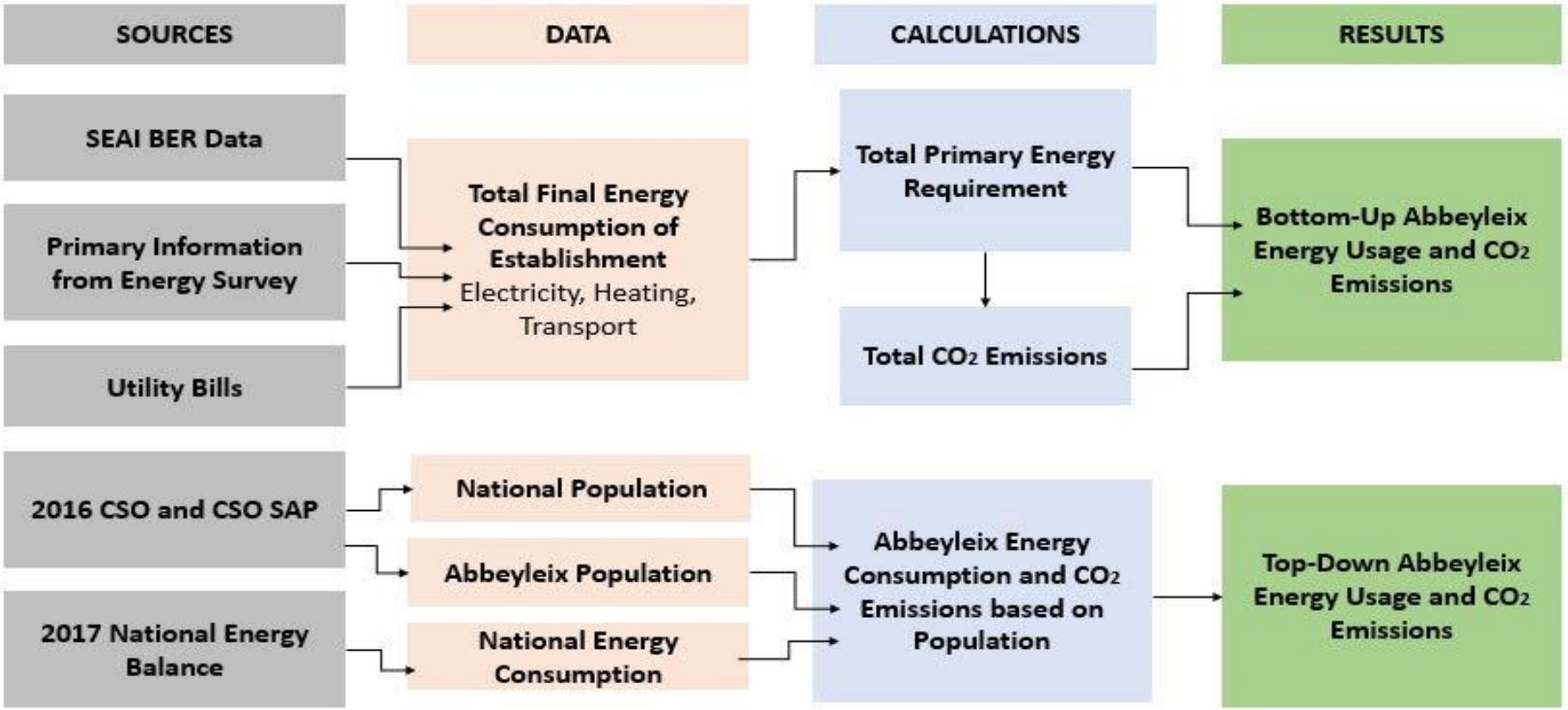

Figure 15: Energy Master Plan Baseline Analysis Methodology

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5.0 REGISTER OF OPPORTUNITIES

The presentation of the Register of Opportunities in this report is in the form of two summary tables. The first summary table is for projects identified in the Domestic Sector (Table 4) and the second table is for projects identified in the Non-Domestic Sector (Table 5). It should be noted that this is not an exhaustive list of projects within the scope of this SEC (the town of Abbeyleix). The projects identified are based on availability of information and data and access to buildings.

There is also a list of soft opportunities, i.e. opportunities to increase energy efficiency and make savings through awareness and education projects and programmes. These are also detailed in this section of the report.

It is recommended that selecting suitable projects to focus on and try to deliver should be based on a number of criteria:

- Capital cost of project and available funds
- Payback period
    - the lower the payback period, the quicker the initial capital investment will be paid back. This then facilitates investment in another project
- Other priorities e.g. fuel poverty in vulnerable members of the community / serious issue with comfort levels of a building / issue with functioning / operation of building / facility

Note: The Register of Opportunities has been developed based on data gathered and site visits. In the case of Scoil Mhuire, the community have noted that since the time of the audit, there have been issues identified with the building relating to the nature of its' flat roof construction, i.e. leaks. It is recommended that the projects identified for this building be put on hold until further investigation is made into the buildings issues. The findings may determine that other more extensive works are more necessary at this time.

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5.1 DOMESTIC (RESIDENTIAL) REGISTER OF OPPORTUNITIES

A summary of all recommended refurbishment works to the houses in Abbeyleix are listed in Table 4 below. The detailed refurbishment guides for each house / apartment type are in the Appendices Section, see Appendices D to P.

All data in summary table being verified and will be included in follow-up draft

The refurbishment guides in Appendices D to P contain all the recommended measures in the residential sector of Abbeyleix.

Table 5: List of Houses and Refurbishment Works Costs and Savings

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5.2 NON-DOMESTIC REGISTER OF OPPORTUNITIES

A summary of all the recommended refurbishment works in the non-domestic buildings in Abbeyleix are listed in Table 6 below.

All data in summary table being verified and will be included in follow-up draft

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Location	Recommended Measures	Energy saved / generated (kWh/yr)	Energy saved / generated (€/yr)	CO_2 Avoided (tonnes CO_2/yr)	Estimated Capital Expenditure (Ex-VAT) (€)	Simple Payback Period (Years)
Abbeyleix FEC	Upgrade walls insulation to achieve U-Value of 0.21 W/m2K					
	Upgrade attic insulation to achieve U-Value of 0.16 W/m2K					
	Replace oil boiler with Calor BioLPG boiler					
	Install new heat pump system, new low temp radiators, circulation pipes, time and temperature control.					
	Install heating control system					
	Replace Existing lighting with LED equivalent					
	Install absence sensors in classrooms					
	Install 6kW PV panels with battery storage					
	Submit readings to electricity supplier					
	Empty and unplug fridge during closing periods					
	Install timer on every plug-in loads					

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Abbeyleix Golf Club	Upgrade walls insulation to achieve U-Value of 0.21 W/m2K					
	Upgrade attic insulation to achieve U-Value of 0.16 W/m2K					
	Replace single glazed windows with double or triple-glazed					
	Replace oil boiler with Calor BioLPG boiler					
	Install new heat pump system, new low temp radiators, circulation pipes, time and temperature control.					
	Replace Existing lighting with LED equivalent, install presence sensors					
	Install 6kW PV panels with battery storage					
	Submit readings to electricity supplier					
	Submit readings to electricity supplier					
	Install PV panel with battery storage					
	Submit readings to electricity supplier					

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Jelly Tots Creche	Upgrade walls insulation to achieve U-Value of 0.21 W/m2K					
	Upgrade attic insulation to achieve U-Value of 0.16 W/m2K, only over creche area.					
	Upgrade roof insulation c. 560m2 on the slop with roofing insulated panel to achieve U-Value of 0.16 W/m2K					
	Replace single glazed windows with double or triple-glazed					
	Install new heat pump system, new low temp radiators, circulation pipes, time and temperature control.					
	Replace Existing lighting with LED equivalent, install presence sensors					
	Install 6kW PV panels with battery storage					
	Submit readings to electricity supplier					
	Upgrade walls insulation to achieve U-Value of 0.21 W/m2K					
	Upgrade attic insulation to achieve U-Value of 0.16 W/m2K					
	Replace Existing lighting with LED equivalent, install presence sensors					
	Install 6kW PV panels with battery storage					

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Scoil Muire Abbeyleix	Upgrade walls insulation to achieve U-Value of 0.21 W/m2K					
	Upgrade attic insulation to achieve U-Value of 0.16 W/m2K					
	Replace single glazed windows with triple glazed windows					
	Replace oil boiler with Calor BioLPG boiler					
	Install new heat pump system, new low temp radiators, circulation pipes, time and temperature control.					
	Link the new heating system to the existing BMS					
	Install thermostat in the classroom of the original building					
	Replace Existing lighting with LED equivalent, install presence sensors					
	Install 6kW PV panels with battery storage					

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Abbeyleix Tennis Club	Upgrade walls insulation to achieve U-Value of 0.21 W/m2K					
	Upgrade attic insulation to achieve U-Value of 0.16 W/m2K					
	Replace single glazed windows with double or triple-glazed					
	Replace Existing internal lighting with LED equivalent, install presence sensors					
	Replace Existing external lighting with LED equivalent, install presence sensors					
	Install 6kW PV panels with battery storage					
	Submit readings to electricity supplier					
	Upgrade walls insulation to achieve U-Value of 0.21 W/m2K					
	Upgrade attic insulation to achieve U-Value of 0.16 W/m2K					
	Replace Existing internal lighting with LED equivalent, install presence sensors					
	Replace Existing external lighting with LED equivalent, install presence sensors					
	Install 1500W Infrared heating panels					
	Install 6kW PV panels with battery storage					

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	Submit readings to electricity supplier					

Table 6 Register of Opportunities for Non-Domestic Sectors

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5.2.1 SCHOOLS SEAI PROGRAMME

There is a dedicated Sustainable Energy Authority of Ireland (SEAI) programme for schools, the provides training, workshops and ideas for creating a sustainable culture within your school and identifying energy efficiency / saving opportunities. This programme provides a fantastic opportunity not just to create efficient and sustainable schools, but to educate students in all matters relating to energy efficiency and sustainability that will inform their studies, work and way of living.

Energy efficiency and sustainability will connect students with the following topics:

- Mechanical Engineering
- Electrical Engineering
- Maths
- Economics
- Organisational behavior and psychology
- Communication
- Project Management
- Leadership

See the link below for more information relating to this programme.

https://www.seai.ie/community-energy/schools/

5.2.2 AN TAISCE

An Taisce are running a Climate Ambassador Programme that provides support and training for individuals to become Climate Ambassadors. Their intention is to create a network of ambassadors around Ireland and to inspire meaningful action. This is another wonderful opportunity for students and individuals to acquire valuable skills, while also having a very positive impact on their environment and community. See the link below for more information.

https://climateambassador.ie/

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5.2.3 GREEN SCHOOLS PROGRAMME

The Green Schools Programme is an environmental management and education programme developed and run by An Taisce. The programme is broken up into different environmental subjects and milestones so that students have the opportunity to really explore:

- The many aspects of our environment
- What role they play
- How they interact with each other
- How we influence the environment (both positively and negatively)

As with both previously mentioned programmes, they are a wonderful learning opportunity for students and their community. All of these programmes are not just teaching, they are also shaping how the younger generations perceive and interact with their environment and community, which will become hugely significant in how the town and environs continue to develop.

5.2.4 REMOTE SENSING PROJECTS

Some of the schools in the community are involved in an innovative weather/ air quality monitoring programme, which looks at particulate matter and links it to the level of traffic on the roads. This could be extended to also include the particulates generated from domestic fires and stoves. The level of particulate matter in the local environment is directly related to the following:

- Number of open fires and stoves in use
- Frequency of use of open fires and stoves
- Number of car journeys
- Length of car journeys

A reduction in any or all of these activities will have a significantly positive impact locally by:

- Reducing the incidence of seasonal bronchial health issues
- Reducing traffic and travel times

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5.2.5 COMMUNICATION PROJECT

As the preliminary stages of this project demonstrated, communication and engagement with the local community is one the most important factors in bringing about change. A communication strategy would be a huge support to Sustainable Abbeyleix SEC in delivering and further developing their Energy Master Plan (EMP). This communication strategy would:

- Invite and engage the community
- Provide updates on projects completed
- Inform everyone about upcoming projects and next steps
- Communicate savings achieved

This is something that takes time and resources, therefore it would be an ideal project for a transition year to take on. There is a huge educational opportunity in developing and managing a communication strategy. It would require the students to understand about:

- Human behaviour
- How we communicate
- Social Media
- Print Media
- Digital Design

Ideally the strategy would be designed and packaged to include:

- The messages
- The audience types (demongraphics)
- The different forms of communication
- How to reach each audience member
- The level of engagement (feedback system)
- A programme of communication (what, when, how)

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6.0 SUSTAINABLE TRANSPORT

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
- Car pooling

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.

6.1 WALKING

This opportunity is simply based around 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 on 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 Abbeyleix to meet and connect on a day to day basis

There are some great programmes that help promote walking in your community, see links below. In addition to this you could engage with your local Doctors offices, HSE clinics etc. to put up promotional

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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/wp-content/uploads/2015/08/HSE-Get-Your-School-Walking-Guide.pdf

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

6.2 CYCLING

Cycling is a great form of exercise that brings lots of health benefits. As with walking, it also reduces the reliance on travelling 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.

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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 installments. The scheme was developed to incentivise 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

6.3 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/

6.4 SHARED WORK SPACES

Shared work spaces 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 work spaces 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 work spaces in the region, see the link below.

https://laois.ie/departments/business-and-economic-development/digital-hubs-coworking-space/

The opportunities under this category are to promote these Shared Work Spaces as a real option among local employees / self-employed persons who may be travelling long distances for work.

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6.5 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, may be 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/

7.0 Renewable Energy

The development of community owned renewable energy projects is a huge undertaking the requires a lot of time, commitment and planning. It is not something that Sustainable Abbeyleix wish to explore at present, as they recognise the value in developing and strengthening their SEC and focusing on energy efficiency first. However, it is something they will consider for the future.

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The inclusion of renewable energy as an important sustainability option has been achieved by including it in the house refurbishment guides, which can be seen in the Register of Opportunities and Appendices D to P.

8.0 Carbon Sequestration

The sequestering of carbon has become an important part of global and local efforts to reduce the levels of CO_2 and off-set the impact of Climate Change. Abbeyleix are in fact engaged in a Community Managed Bog of approximately 500 acres. There is a drain blocking programme underway and it is highly recommended that the community continue to engage and manage this programme, thereby facilitating the sequestration of CO_2 being generated locally. Ongoing support and management of this programme has been included in the Non-Domestic Register of Opportunities.

9.0 Funding and Support Options

Some final additional info to be included here

BEC

Climate Action Fund

Laois County Council

Laois Partnership

Laois Local Enterprise Office (LEO)

EEEF

European Porgrammes

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10.0 Conclusions and Acknowledgements

To be completed following final review of data

Acknowledgements

3CEA would like to thank all the organisations and individuals who took the time to contribute to this Energy Master Plan, in particular:

- Laois County Council
- John McCormack, Respond Housing Association
- Aidan Moloney, Laois & Offaly Education and Training Board
- Steven Daly, HSE Estates
- Rev. Canon Patrick Harvey, Diocese of Cashel, Ferns & Ossory
- Karl Purcell, SEAI
- Noel Byrne, Abbeyleix Parish Development Co.
- Ruth Wallace, Abbeyleix South National School
- Melissa Cole, Scoil Mhuire Abbeyleix
- Joe Claffey, First Ireland Spirits
- April Kent, Abbeyleix Manor Hotel
- Connell Breslin, SuperValu
- Rita O'Gorman, Benny's Pub
- Richard O'Connell, Mueller & O'Connell Bakery
- Moynan's Fuel Service
- Anthony & Evelyn Casserly, Casserly Pharmacy

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Primary data gathered from energy surveys, utility bills and XML files

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12.0 APPENDICES

APPENDIX A – FLYER

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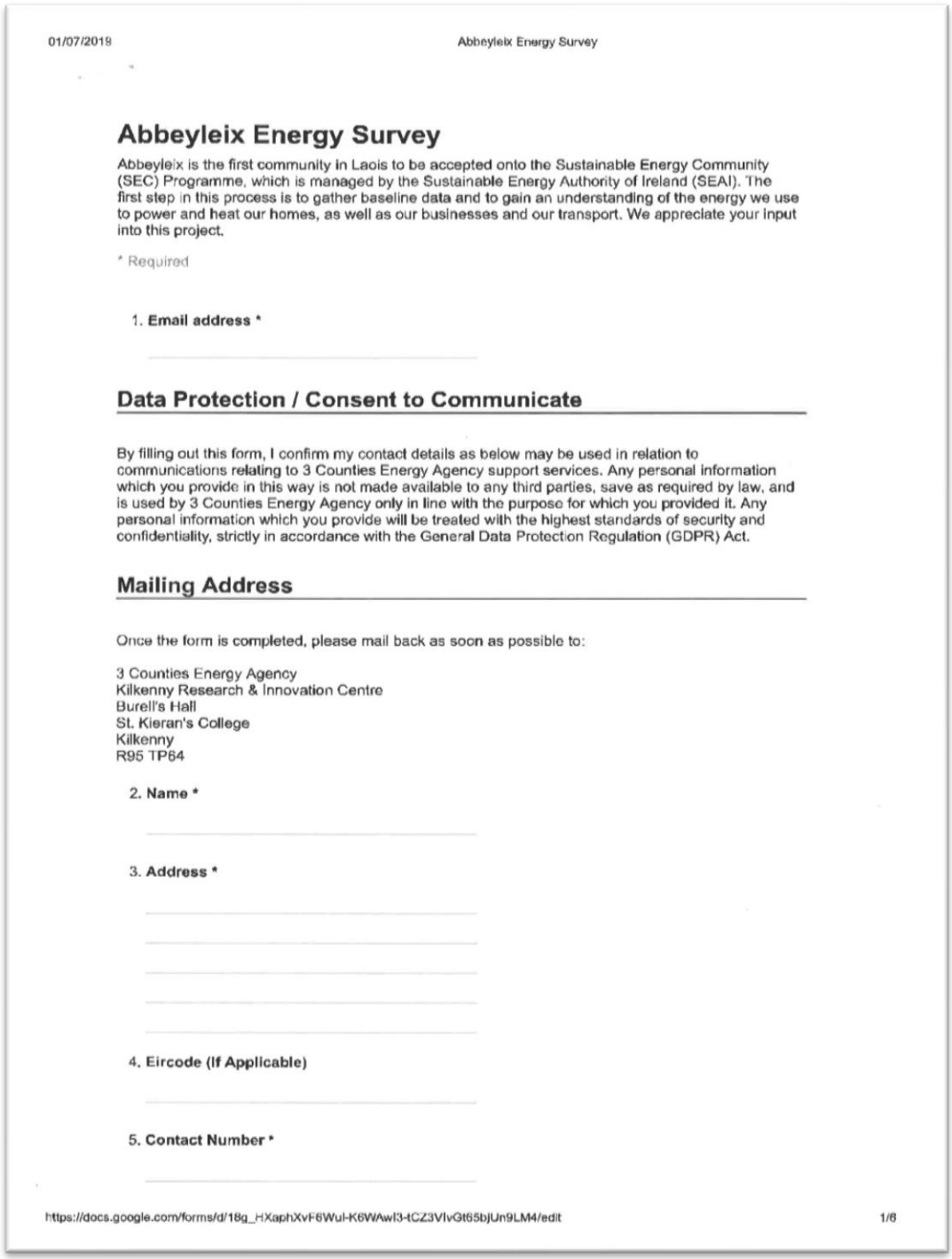
APPENDIX B – ENERGY SURVEY



01/07/2019 Abbeyleix Energy Survey

Abbeyleix Energy Survey

Abbeyleix is the first community in Laois to be accepted onto the Sustainable Energy Community (SEC) Programme, which is managed by the Sustainable Energy Authority of Ireland (SEAI). The first step in this process is to gather baseline data and to gain an understanding of the energy we use to power and heat our homes, as well as our businesses and our transport. We appreciate your input into this project.

* Required

1. **Email address** *

Data Protection / Consent to Communicate

By filling out this form, I confirm my contact details as below may be used in relation to communications relating to 3 Counties Energy Agency support services. Any personal information which you provide in this way is not made available to any third parties, save as required by law, and is used by 3 Counties Energy Agency only in line with the purpose for which you provided it. Any personal information which you provide will be treated with the highest standards of security and confidentiality, strictly in accordance with the General Data Protection Regulation (GDPR) Act.

Mailing Address

Once the form is completed, please mail back as soon as possible to:

3 Counties Energy Agency
Kilkenny Research & Innovation Centre
Burell's Hall
St. Kieran's College
Kilkenny
R95 TP64

2. **Name** *

3. **Address** *

4. **Eircode (If Applicable)**

5. **Contact Number** *

https://docs.google.com/forms/d/18g_HXaphXvF6WuI-K6WAwI3-tCZ3VIvGt65bjUn9LM4/edit 1/6

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6. **Type of Energy User** *
Mark only one oval.

- ◯ Domestic *Skip to question 6.*
- ◯ Non-Domestic *Skip to question 9.*

Home Profile
Tell us about your home.

7. **Type of Dwelling** *
Mark only one oval.

- ◯ Detached House
- ◯ Semi-detached House
- ◯ Terraced
- ◯ Apartment
- ◯ Other: _____

8. **What size is your house? Floor Area (m2)** *
What is the approximate floor area of your house? For reference, note that the average area of a 3 bed semi-detached house is 120 m2.

_____

9. **What year was your house built? Year of Construction** *
Please specify to the best of your knowledge.

_____

Skip to question 13.

Building Profile
Tell us about your building

10. **Type of Establishment** *
Mark only one oval.

- ◯ Retail
- ◯ Office
- ◯ Industrial
- ◯ Community Building
- ◯ Healthcare provider (Medical Clinic, Hospital)
- ◯ Hospitality (Hotel, Pub, Cafe, Restaurant etc.)
- ◯ Leisure (Sports Club, Swimming Pool, GAA Club, Gym etc.)
- ◯ Petrol Station/Fuel Depot
- ◯ Educational (School, Childcare Centre etc.)
- ◯ Church
- ◯ Other: _____

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11. **What is your establishment's operational hours? (hrs/day, days/week) ***
How long is your building open per day? How many days per week are you open?

12. **What is the size of your establishment? Floor Area (m2) ***
What is the approximate floor area of your building?

13. **What year was the building built? Year of Construction ***
Please specify to the best of your knowledge.

Skip to question 13.

BER Rating (If Applicable)

14. **Has a Building Energy Rating (BER) test been undertaken? ***
Mark only one oval.

- ◯ Yes
- ◯ No

15. **What is the Building Energy Rating (BER)/Non Domestic BER (ND-BER) of the house/building? ***
Mark only one oval.

- ◯ A1
- ◯ A2
- ◯ A3
- ◯ B1
- ◯ B2
- ◯ B3
- ◯ C1
- ◯ C2
- ◯ C3
- ◯ D1
- ◯ D2
- ◯ E1
- ◯ E2
- ◯ F
- ◯ G
- ◯ Exempt Build
- ◯ Unknown
- ◯ Other: _____

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Electricity and Thermal Costs

We need to gain understanding of your electricity costs and also the costs of heating your home/establishment (e.g. oil/coal/firewood). Let us know if you would like us to get in touch to help you interpret your bills.

16. **How much is your Annual Electricity Cost? (€/year) ***

17. **What is your Annual Electricity Consumption? (kWh/year) ***
Your electricity bill will have this information. You can also easily access this information via your online account. Let us know if you would like help with this.

18. **If you are not sure what your Annual Electricity Consumption is, can we contact you to provide 12-months of your electricity bills? ***
Mark only one oval.
- ◯ Yes
- ◯ No

19. **What is the main source of heating for your premises? ***
Mark only one oval.
- ◯ Oil
- ◯ Electricity
- ◯ Solid Fuel
- ◯ LPG
- ◯ Natural Gas
- ◯ Other:

20. **How much is your Annual Thermal Cost? (€/year) ***
This is the annual cost of heating your home/establishment.

21. **What is your Annual Thermal Consumption? (kWh/year or L/year) ***
How much electricity/oil/coal/firewood do you use to heat your home/establishment?

22. **If you are not sure what your Annual Thermal Consumption is, can we contact you to provide 12-months of your heating bills? ***
Mark only one oval.
- ◯ Yes
- ◯ No

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Transport

Tell us about your transport choices.

23. **Does your household/establishment own a vehicle? ***
Mark only one oval.

- ◯ Yes
- ◯ No

24. **How many vehicles? ***
Mark only one oval.

- ◯ 1
- ◯ 2
- ◯ More than 2

25. **Vehicle Type (Please select all appropriate types) ***
Check all that apply.

- ☐ Car
- ☐ Van
- ☐ Motorbike
- ☐ Truck
- ☐ Other: _____

26. **Fuel Type (Please select all appropriate types) ***
Check all that apply.

- ☐ Petrol
- ☐ Diesel
- ☐ Electricity
- ☐ Hybrid
- ☐ Other: _____

27. **What is your Annual Transport Fuel Cost? (€/year) ***

_____

28. **What is your Annual Transport Fuel Consumption? (L/year) ***

_____

Energy Upgrades

29. **Have you had any energy works completed in your house/establishment? ***
Mark only one oval.

- ◯ Yes *After the last question in this section, skip to question 28.*
- ◯ No

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30. **If you have answered yes to the question above, please specify the energy works done (e.g. Attic insulation topped up to 300mm, cavity wall pumped, new boiler in 2017, double glazed windows installed in 2014 etc).**

31. **Would you like advice on energy upgrades for your building?**
Mark only one oval.

- ◯ Yes
- ◯ No

32. **Would you like to get involved in the Sustainable Energy Communtiy Initiative in Abbeyleix?**
We are looking for volunteers to help Abbeyleix on its low-carbon journey. If you would like to get involved then let us know and we will get in touch.
Mark only one oval.

- ◯ Yes
- ◯ No

☐ Send me a copy of my responses.

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APPENDIX C – BUSINESSES APPROACHED

Abbeyleix Manor Hotel	Hospitality
First Ireland Spirits	Industry
SuperValu	Retail
Campus Service Station	Energy
Connell Mueller Café	Food & Beverage
Fintan Dunne Real Estate	Real Estate
Williams Butchers	Food & Beverage
Vincent's Charity Shop	Charity
Bonham Cars Sale	Dealership
Andrew Sheils Butcher	Food & Beverage
Casserly Pharmacy	Healthcare
Moynans Fuel	Energy
Leix Pub	Food & Beverage
Sue Ryder Charity Shop	Charity
Solicitors	Legal
Anita's Hairdresser	Beauty & Hairdressing
Clelands	Food & Beverage
Tir na nOg Beauty Salon	Beauty Services
Papa Noni's	Food & Beverage
Fyffe	Retail
Dunnes Furniture Shop	Retail
Abbeyleix Social Services	Other
Abbeyleix APEC Enterprise Development Centre	Other

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Abbeyleix Dental	Healthcare
The Old Forge	Food & Beverage
John Madden GP	Healthcare
Margaret Hennessy Acupuncturist	Healthcare
O'Donnell's Pharmacy	Healthcare
The Gallic Kitchen	Food & Beverage
Laois Cleaners	Other
Moran	Retail
Ladybelle Boutique	Retail
Abbeyleix Mobile	Retail
The Red Door Gift Shop	Retail
Leinster House Shop	Retail
Sideline Cuts (Barber Shop)	Beauty & Hairdressing
Morrissey Pub	Food & Beverage
Ego Boost Hair Salon	Beauty & Hairdressing
People First Credit Union	Finance
Bank of Ireland Abbeyleix	Finance
Irish Grain and Feed Association	Other
Benny's Pub	Food & Beverage
Capri Grill	Food & Beverage

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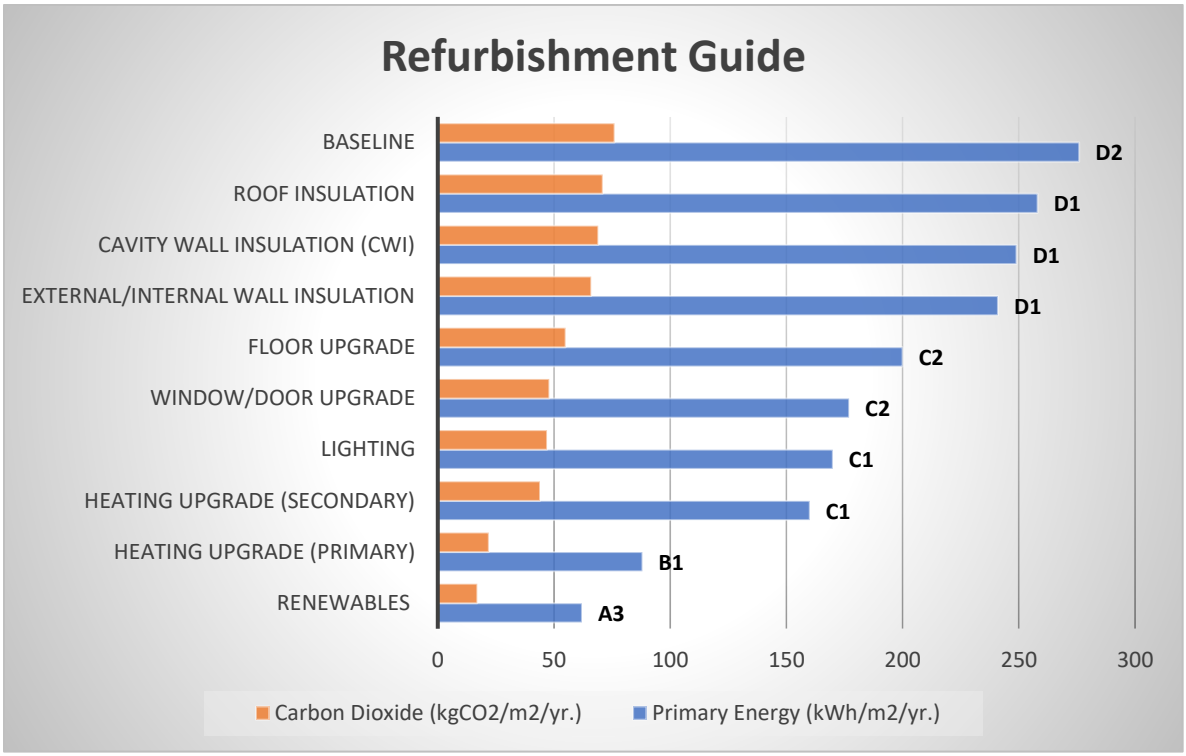
APPENDIX D – HOME REFURBISHMENT GUIDE



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APPENDIX E - REFURBISHMENT GUIDE THE TILES

Detached house, The Tiles, Abbeyleix, 1983-1993 Brick, Cavity Wall Construction

Existing Building Details			
Building Elements		Insulation Thickness (mm)	U-Value
Walls	300mm Cavity Wall, Partially Filled	None	0.6
Roof	Pitched Roof insulated at ceiling level	100mm-150mm	0.35
Floor	Solid Floor	Unknown	0.5
Windows	Double Glazed Air filled	N/A	2.7 - 2.9
Doors	Solid, uPVC	N/A	3

Existing Heating Characteristics			
Heating System		Fuel	Efficiency (%)
Primary Heating System	Oil boiler, primary pipework uninsulated	Oil	75%-80%
Secondary Heating System	Open Fire	Coal	30%
Hot Water	Heated with Primary heating system & Electric immersion		
Cylinder	Insulated with loose cylinder jacket (30mm)		
Controls	Time clock only		

Domestic Upgrade (Step by Step Guide)			Energy Consumption (kWh/m²/yr.)	Carbon Emissions ($kgCO_2/m^2/yr.$)	Building Energy Rating (BER)
Energy Efficient Measures		Target U Value (kWh/m²/yr.)	Current Usage (244)	Current Emissions (63)	D1
Roof insulation	Insulation top-up to achieve 300mm-400mm	0.13 - 0.16	231	60	D1
Cavity Wall Insulation (CWI)	Pump Existing cavity with a bonded bead insulation	0.30 - 0.35	212	54	C3
External/Internal Wall Insulation	Install Wall Insulation (internal or External), thickness 50mm-100mm	0.18 - 0.21	201	52	C3
Floor Upgrade	Insulate solid floor with rigid insulation	0.18 - 0.21	179	45	C2
Window/Door Upgrade	Replace existing glazing with Double/Triple glazed, (low E) units	1.1 - 1.4	162	41	C1
Lighting	Install energy efficient light bulbs (LEDs)	N/A	156	40	C1
Heating Upgrade (secondary)	Install wood burning stove	N/A	143	36	B3
Heating Upgrade (Primary)	Heat Pump, two separate heating zones with time and temperature controls.	N/A	78	20	A3
Renewables	Install 1.2 kWp Solar PV system	N/A	31	4	A2

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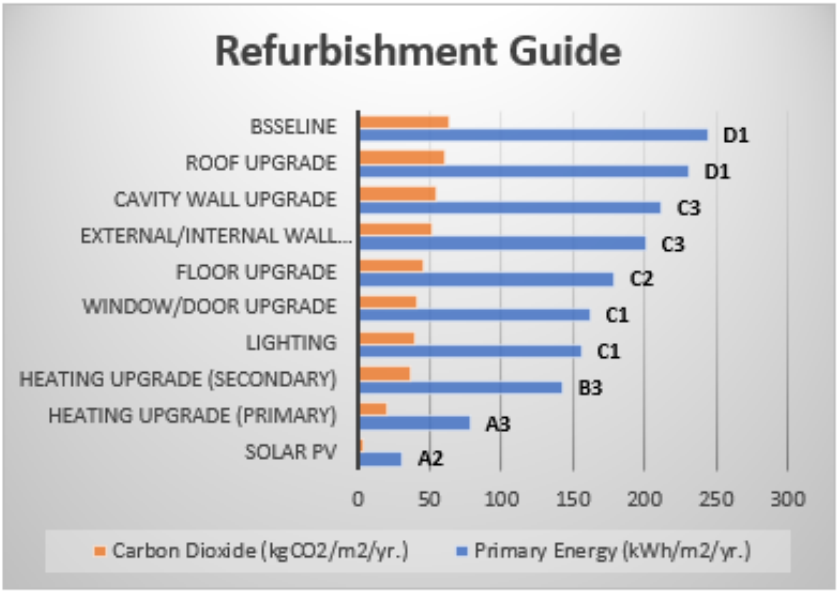

Estimated Cost Summary			
	Measure	Estimated Costs (€/m²)	Estimated Total Costs (€)
1	Roof Upgrade	10 - 15	€1,650
2	Cavity Wall upgrade	7 - 10	€1,200
3	Wall Insulation	90 - 140	€14,300
4	Floor Upgrade	80 - 100	€9,350
5	Window/Door upgrade	250 - 350	€6,000
6	Lighting	20/fitting	€200
7	Heating Upgrade (Secondary)	2200 (System)	€2,200
8	Heating Upgrade (Primary)	9,500 (System)	€9,500
9	Solar PV	2,200 (1.2 kWp System)	€2,200
10	Demand Controlled Ventilation (if required)	3,000 (System)	€3,000
Total			**€49,600**
Total Cost to Homeowner including 35% Grant funding			**€32,240**

Savings Summary				
BER Rating	Energy Savings (kWh/m²/yr.)	Energy Savings (kWh/yr.)	Cost Savings (€)	Simple Payback in years (Including 35% Grant Funding)
A2	213	46,860	€2,812	11

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APPENDIX F – REFURBISHMENT GUIDE MAIN ST.

Mid Terraced House, Main St, Pre 1900s Solid Wall construction

Existing Building Details			
Building Elements		Insulation Thickness (mm)	U-Value
Walls	Solid mass concrete	None	2.1
Roof	Pitched roof with no insulation	None	2.3
Floor	Solid Floor	Unknown	0.84
Windows	Double glazed Air filled	N/A	2.8 - 4.8
Doors	Solid Door	N/A	3

Existing Heating Characteristics			
Heating System		Fuel	Efficiency (%)
Primary Heating System	Oil Boiler, with uninsulated pipework	Oil	85%
Secondary Heating System	Open Fire	Coal	30%
Hot Water	Heated with Primary heating system & Electric immersion		
Cylinder	Uninsulated cylinder		
Controls	No Controls present		

Domestic Retrofit (Step by Step Guide)			Energy Consumption (kWh/m²/yr.)	Carbon Emissions ($kgCO_2/m^2/yr.$)	Building Energy Rating (BER)
Energy Efficient Measures		Target U Value (kWh/m²/yr)	Current Usage (500)	Baseline Value (145)	G
Roof insulation	Loft wool Insulation top-up to achieve 300mm-400mm across all roof area	435	132	257	G
External/Internal Wall Insulation	Install Wall Insulation (internal or External), thickness 50mm-100mm	375	120	127	F
Floor Upgrade	Insulate solid floor with rigid insulation	340	104	104	E2
Window/Door Upgrade	Replace existing glazing with Double/Triple glazed, (low E) units	280	85	85	D2
Lighting	Install energy efficient light bulbs (LEDs)	278	84	84	D2
Heating Upgrade (secondary)	Install wood burning stove	255	76	76	D1
Heating Upgrade (Primary)	Heat Pump, two separate heating zones with time and temperature controls.	98	39	39	B2
Renewables	Install 1.2 kWp Solar PV system	43	12	12	A3

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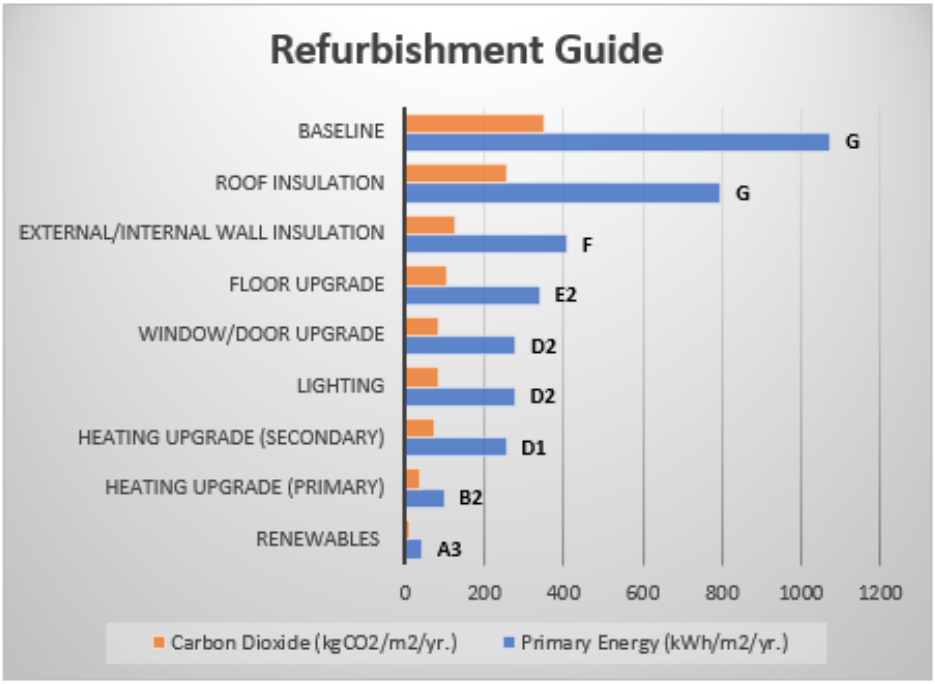

Estimated Cost Summary			
	Measure	Estimated Costs (€/m²)	Estimated Total Costs (€)
1	Roof Upgrade	10 - 15	€750
3	Wall Insulation	90 - 140	€7,800
4	Floor Upgrade	80 - 100	€5,500
5	Window/Door upgrade	250 - 350	€2,700
6	Lighting	20/fitting	€180
7	Heating Upgrade (Secondary)	2200 (System)	€2,200
8	Heating Upgrade (Primary)	8,500 (System)	€8,500
9	Solar PV	2,200 (1.2 kWp System)	€2,200
10	Demand Controlled Ventilation	3,000 (System)	€3,000
Total			**€32,830**
Total Cost to Homeowner including 35% Grant funding			**€21,340**

Savings Summary				
BER Rating	Energy Savings (kWh/m²/yr.)	Energy Savings (kWh/yr.)	Cost Savings (€)	Simple Payback in years (Including 35% Grant Funding)
A3	457	48,442	€2,907	7

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APPENDIX G – REFURBISHMENT GUIDE RATHMOYLE

Semi Detached Bungalow, Rathmoyle, Pre 1900s, Solid Wall Construction

Existing Building Details			
Building Elements		Insulation Thickness (mm)	U-Value
Walls	300mm Cavity Wall, Partially Filled	50mm	0.45
Roof	Pitched Roof insulated at ceiling	100mm-150mm	0.3
Floor	Solid Floor	Unknown	0.6
Windows	Double Glazed Air filled	N/A	2.8
Doors	Solid Timber	N/A	3

Existing Heating Characteristics			
Heating System		Fuel	Efficiency (%)
Primary Heating System	Oil Boiler, with uninsulated pipework	Oil	70%- 80%
Secondary Heating System	Multi fuel stove	Multi fuel	60% - 70%
Hot Water	Heated with Primary heating system & Electric immersion		
Cylinder	Factory Insulated, (25mm)		
Controls	Programmer, Thermostat		

Domestic Retrofit (Step by Step Guide)			Energy Consumption (kWh/m2/yr.)	Carbon Emissions (kgCO2/m2/yr.)	Building Energy Rating (BER)
Energy Efficient Measures		Target U Value (kWh/m2/yr.)	Current Usage (276)	Current Emissions (76)	D2
Roof insulation	Loft wool Insulation top-up to achieve 300mm-400mm across all roof area, (including upgrading ventilation requirements).	0.13 - 0.16	258	71	D1
External/Internal Wall Insulation	Install Wall Insulation (internal or External), thickness 50mm-100mm	0.18 - 0.21	241	66	D1
Floor Upgrade	Insulate solid floor with rigid insulation, addressing airtightness requirements	0.18 - 0.21	200	55	C2
Window/Door Upgrade	Replace existing glazing with Double/Triple glazed, (low E) units	1.1 - 1.4	177	48	C2
Lighting	Install energy efficient light bulbs (LEDs)	N/A	170	47	C1
Heating Upgrade (secondary)	Install wood burning stove	N/A	160	44	C1
Heating Upgrade (Primary)	Heat Pump, two separate heating zones with time and temperature controls.	N/A	88	22	B1
Renewables	Install 1.2 kWp Solar PV system	N/A	62	17	A3

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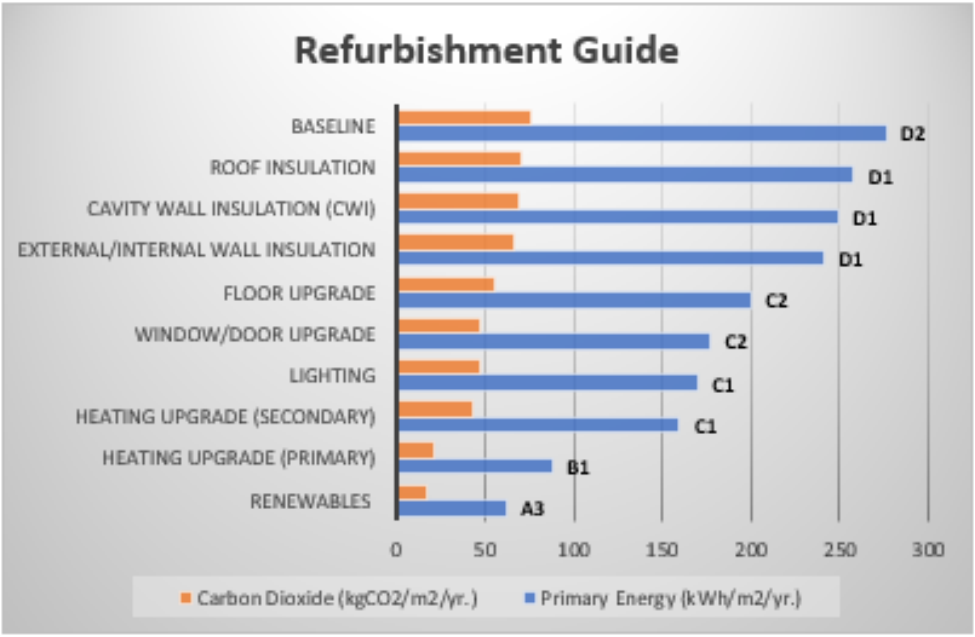

Estimated Cost Summary			
	Measure	Estimated Costs (€/m2)	Estimated Total Costs (€)
1	Roof Upgrade	10 - 15	€1,125
2	Cavity Wall upgrade	7 - 10	N/A
3	Wall Insulation	90 - 140	€3,150
4	Floor Upgrade	80 - 100	€8,250
5	Window/Door upgrade	250 - 350	€3,600
6	Lighting	20/fitting	€180
7	Heating Upgrade (Secondary)	2200 (System)	€2,200
8	Heating Upgrade (Primary)	9,500 (System)	€9,500
9	Solar PV	2,200 (1.2 kWp System)	€2,200
10	Demand Controlled Ventilation	3,000 (System)	
Total			**€30,205**
Total Cost to Homeowner at 35% Grant funding			**€19,633**

Savings Summary				
BER Rating	Energy Savings (kWh/m2/yr.)	Energy Savings (kWh/yr.)	Cost Savings (€)	Simple Payback in years (Including 35% Grant Funding)
A3	214	16050	€963	20

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APPENDIX H – REFURBISHMENT GUIDE KNOCKNAMOE LANE

Detached House, Knocknamoe Lane, 2000-2006, Solid Wall Construction

Existing Building Details			
Building Elements		Insulation Thickness (mm)	U-Value
Walls	300mm Cavity Wall, Partially Filled	None	0.55
Roof	Pitched Roof insulated at ceiling	50mm-100mm	0.4
Floor	Solid Floor	Unknown	0.41
Windows	Double Glazed Air filled	N/A	2.8
Doors	uPVC	N/A	2.7

Existing Heating Characteristics			
Heating System		Fuel	Efficiency (%)
Primary Heating System	Oil Boiler, with uninsulated pipework	Oil	75% - 85%
Secondary Heating System	Multi Fuel Stove	Multi fuel	30% - 40%
Hot Water	Heated with Primary heating system & Electric immersion		
Cylinder	Loose Cylinder Jacket (25mm)		
Controls	Programmer & Room Thermostat		

Refurbishment Guide			Energy Consumption (kWh/m2/yr.)	Emissions (CO2) (kgCO2/m2/yr.)	Building Energy Rating (BER)
Energy Efficient Measures		Target U Value (kWh/m2/yr.)	Current Usage (367)	Current Emissions (109)	E2
Roof insulation	Loftwool Insulation top-up to achieve 300mm-400mm across all roof area, (including upgrading ventilation requirements).	0.13 - 0.16	338	100	E1
Cavity Wall Insulation (CWI)	Pump Existing cavity with a bonded bead insulation	0.30 - 0.35	295	88	D2
External/Internal Wall Insulation	Install Wall Insulation (internal or External), thickness 50mm-100mm	0.18 - 0.21	266	78	D2
Floor Upgrade	Insulate solid floor with rigid insulation, addressing airtightness requirements	0.18 - 0.21	240	70	D1
Window/Door Upgrade	Replace existing glazing with Double/Triple glazed, (low E) units	1.1 - 1.4	214	62	C3
Lighting	Install energy efficient light bulbs (LEDs)	N/A	212	60	C3
Heating Upgrade (secondary)	Install wood burning stove	N/A	165	46	C1
Heating Upgrade (Primary)	Heat Pump, two separate heating zones with time and temperature controls.	N/A	94	27	B2
Renewables	Install 1.2 kWp Solar PV system	N/A	65	18	A3

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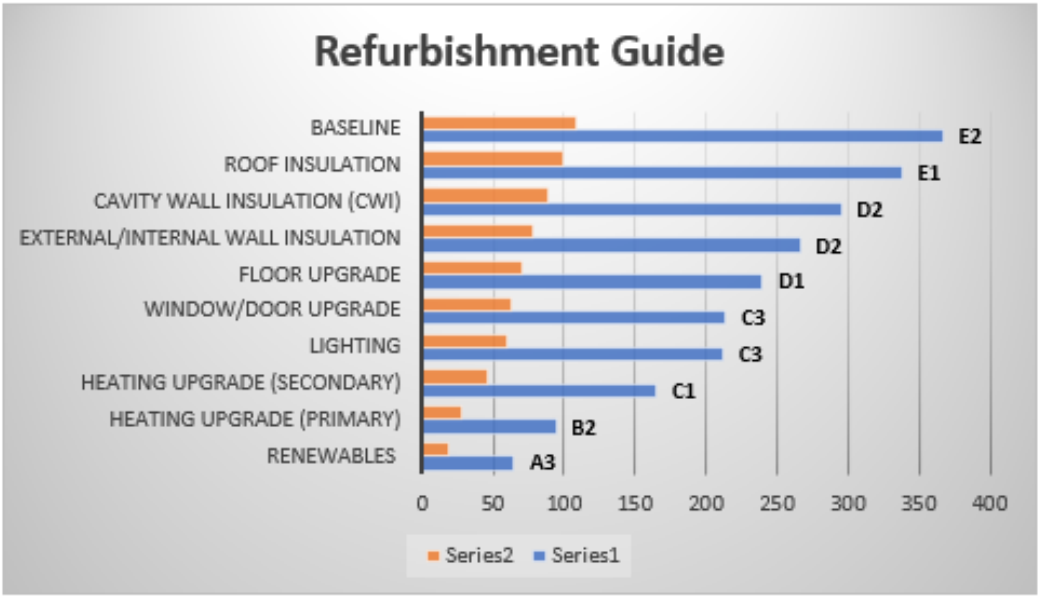

Estimated Cost Summary			
	Measure	Estimated Costs (€/m2)	Estimated Total Costs (€)
1	Roof Upgrade	10 - 15	€1,440
3	Wall Insulation	90 - 140	€22,200
4	Floor Upgrade	80 - 100	€8,640
5	Window/Door upgrade	250 - 350	€6,954
6	Lighting	20/fitting	€200
7	Heating Upgrade (Secondary)	2200 (System)	€2,200
8	Heating Upgrade (Primary)	9,500 (System)	€9,500
9	Solar PV	2,200 (1.2 kWp System)	€2,200
10	Demand Controlled Ventilation	3,000 (System)	€3,000
Total			**€56,334**
Total Cost to Homeowner at 35% Grant funding			**€36,617**
Total Cost to Homeowner at 50% Grant funding			**€28,167**

Savings Summary				
BER Rating	Energy Savings (kWh/m2/yr.)	Energy Savings (kWh/yr.)	Cost Savings (€)	Simple Payback in years (Including 35% Grant Funding)
A3	302	30646	€1,839	20

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APPENDIX I – REFURBISHMENT GUIDE FOR GORT NA NOIR SEMI DETACHED

Semi Detached House, Gort na Noir, >2005, Cavity Wall Construction

Existing Building Details			
Building Elements		Insulation Thickness (mm)	U-Value
Walls	300mm Cavity Wall, Partially Filled	50mm	0.37
Roof	Pitched Roof insulated at ceiling	150mm-200mm	0.2
Floor	Solid Floor	Unknown	0.38
Windows	Double Glazed Air filled (low E)	N/A	2.2
Doors	Solid Door	N/A	2.6 - 3

Existing Building Details			
Building Elements		Insulation Thickness (mm)	U-Value
Walls	300mm Cavity Wall, Partially Filled	50mm	0.37
Roof	Pitched Roof insulated at ceiling	150mm-200mm	0.2
Floor	Solid Floor	Unknown	0.38
Windows & Doors	Double Glazed Air filled (low E), Solid Door	N/A	2.2 - 3

Refurbishment Guide			Energy Consumption (kWh/m2/yr.)	Emissions (kgCO2/m2/yr.)	Building Energy Rating (BER)
Energy Efficient Measures		Target U Value (kWh/m2/yr)	Baseline Value (215)	Baseline Value (55)	C3
Roof insulation	Loft wool Insulation top-up to achieve 300mm-400mm across all roof area,	0.13 - 0.16	210	53	C3
Cavity Wall Insulation (CWI)	Pump Existing cavity with a bonded bead insulation	0.30 - 0.35	204	51	C3
External/Internal Wall Insulation	Install Wall Insulation (internal or External), thickness 50mm-100mm	0.18 - 0.21	193	49	C2
Floor Upgrade	Insulate solid floor with rigid insulation, addressing airtightness requirements	0.18 - 0.21	185	46	C2
Window/Door Upgrade	Replace existing glazing with Double/Triple glazed, (low E) units	1.1 - 1.4	175	44	C2
Lighting	Install energy efficient light bulbs (LEDs)	N/A	170	43	C1
Heating Upgrade (secondary)	Install wood burning stove	N/A	155	38	C1
Heating Upgrade (Primary)	Heat Pump, two separate heating zones with time and temperature controls.	N/A	83	15	B1
Renewables	Install 1.2 kWp Solar PV system	N/A	54	8	A3

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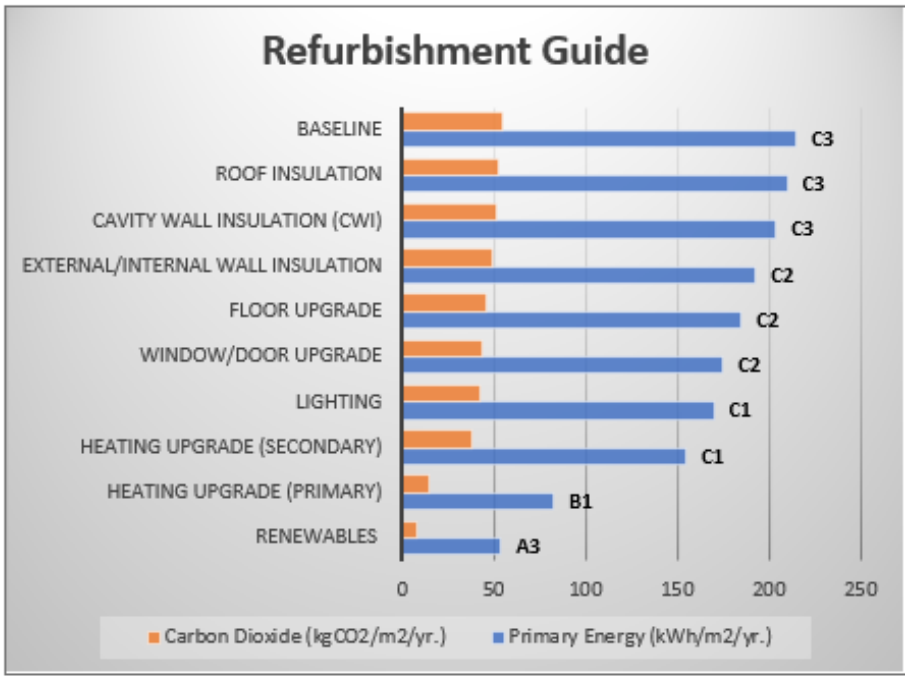

Estimated Cost Summary			
	Measure	Estimated Costs (€/m2)	Estimated Total Costs (€)
1	Roof Upgrade	10 - 15	€1,200
2	Cavity Wall upgrade	7 - 10	€648
3	Wall Insulation	90 - 140	€8,910
4	Floor Upgrade	80 - 100	€7,200
5	Window/Door upgrade	250 - 350	€3,900
6	Lighting	20/fitting	€200
7	Heating Upgrade (Secondary)	2200 (System)	€2,200
8	Heating Upgrade (Primary)	8,500 (System)	€8,500
9	Solar PV	2,200 (1.2 kWp System)	€2,200
10	Demand Controlled Ventilation	3,000 (System)	€3,000
Total			**€37,958**
Total Cost to Homeowner at 35% Grant funding			**€24,673**

Savings Summary				
BER Rating	Energy Savings (kWh/m2/yr.)	Energy Savings (kWh/yr.)	Cost Savings (€)	Simple Payback in years (Including 35% Grant Funding)
A3	161	7490	€449	49

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APPENDIX J – REFURBISHMENT GUIDE FOR GORT NA NOIR APARTMENT

GF Apartment, Gort na Noir,>2005, 425mm Cavity Wall Construction

Existing Building Details			
Building Elements		Insulation Thickness (mm)	U-Value
Walls	425mm Partially insulated Cavity wall	Unknown	0.37
Roof	N/A	N/A	N/A
Floor	Solid Floor	N/A	0.4
Windows	Double Glazed Air filled (low E)	N/A	2.1
Doors	uPVC	N/A	2.1

Existing Heating Characteristics			
Heating System		Fuel	Efficiency (%)
Primary Heating System	Electric Storage Heaters	Electricity	100%
Secondary Heating System	N/A	N/A	N/A
Hot Water	Provided by Electric Immersion		
Cylinder	Hot Water Cylinder, factory insulated (25mm)		
Controls	Automatic Charge Control		

Refurbishment Guide			Energy Consumption (kWh/m2/yr.)	Emissions (kgCO2/m2/yr.)	Building Energy Rating (BER)
Energy Efficient Measures		Target U Value (kWh/m2/yr.)	Current Usage (334)	Current Emissions (66)	E1
Cavity Wall Insulation (CWI)	Pump Existing cavity with a bonded bead insulation	0.30 - 0.35	289	57	D2
External/Internal Wall Insulation	Install Wall Insulation (internal or External), thickness 50mm-100mm	0.18 - 0.21	277	54	D2
Floor Upgrade	Insulate solid floor with rigid insulation, addressing airtightness requirements	0.18 - 0.21	252	50	D1
Window/Door Upgrade	Replace existing glazing with Double/Triple glazed, (low E) units	1.1 - 1.4	239	47	D1
Lighting	Install energy efficient light bulbs (LEDs)	N/A	234	46	D1
Heating Upgrade (Primary)	Heat Pump, two separate heating zones with time and temperature controls.	N/A	78	15	B1

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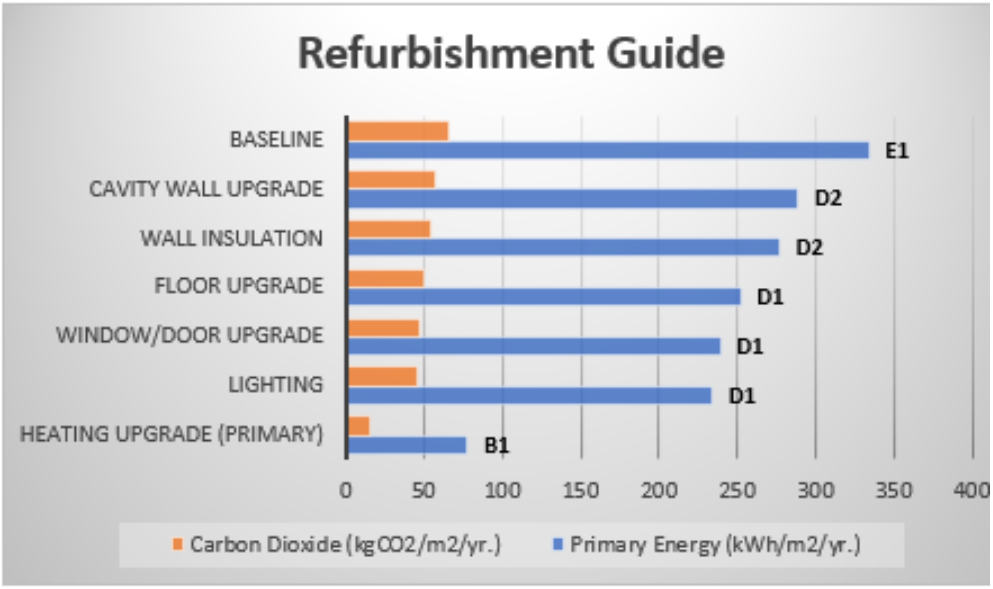

Estimated Cost Summary			
	Measure	Estimated Costs (€/m2)	Estimated Total Costs (€)
1	Roof Upgrade	10 - 15	N/A
2	Cavity Wall upgrade	7 - 10	€224
3	Wall Insulation	90 - 140	€3,080
4	Floor Upgrade	80 - 100	€2,880
5	Window/Door upgrade	250 - 350	€1,900
6	Lighting	20/fitting	€160
7	Heating Upgrade (Secondary)	N/A	N/A
8	Heating Upgrade (Primary)	6,500 (System)	€6,500
9	Solar PV	2,200 (1.2 kWp System)	€2,200
10	Demand Controlled Ventilation	3,000 (System)	€3,000
Total			**€19,944**
Total Cost to Homeowner at 35% Grant funding			**€12,964**

Savings Summary				
BER Rating	Energy Savings (kWh/m2/yr.)	Energy Savings (kWh/yr.)	Cost Savings (€/yr.)	Simple Payback in years (Including 35% Grant Funding)
B1	256	8192	€492	26

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APPENDIX K – REFURBISHMENT GUIDE FOR THE FAIRWAYS

Semi Detached House, The Fairways 2000-2006, 300mm Cavity Wall Construction

Existing Building Details			
	Building Elements	Insulation Thickness (mm)	U-Value
Walls	300mm Cavity Wall, Partially Filled	50mm	0.55
Roof	Pitched Roof insulated at ceiling	100mm-150mm	0.36 - 0.4
Floor	Solid Floor	Unknown	0.41
Windows	Double Glazed Air filled	N/A	2.7
Doors	uPVC	N/A	3

Existing Heating Characteristics			
	Heating System	Fuel	Efficiency (%)
Primary Heating System	Oil Boiler with uninsulated pipework	Oil	80%
Secondary Heating System	Open Fire	Coal	30%
Hot Water	Heated by primary heating system		
Cylinder	Factory insulated (30mm)		
Controls	No cylinder thermostat or programmer		

Domestic Retrofit (Step by Step Guidelines)			Energy Consumption (kWh/m2/yr.)	Emissions (CO2) (kgCO2/m2/yr.)	Building Energy Rating (BER)
Energy Efficient Measures		Target U Value (kWh/m2/yr.)	Current Usage (217)	Current Emissions (55)	C3
Roof insulation	Loft wool Insulation top-up to achieve 300mm-400mm across all roof area, (including upgrading ventilation requirements).	0.13 - 0.16	204	51	C3
Cavity Wall Insulation (CWI)	Pump Existing cavity with a bonded bead insulation	0.30 - 0.35	190	47	C2
External/Internal Wall Insulation	Install Wall Insulation (internal or External), thickness 50mm-100mm	0.18 - 0.21	172	43	C1
Floor Upgrade	Insulate solid floor with rigid insulation, addressing airtightness requirements	0.18 - 0.21	161	39	C1
Window/Door Upgrade	Replace existing glazing with Double/Triple glazed, (low E) units	1.1 - 1.4	154	38	C1
Lighting	Install energy efficient light bulbs (LEDs)	N/A	151	37	C1
Heating Upgrade (secondary)	Install wood burning stove	N/A	141	34	B3
Heating Upgrade (Primary)	Heat Pump, two separate heating zones with time and temperature controls.	N/A	67	12	A3
Renewables	Install 1.2 kWp Solar PV system	N/A	46	7	A2

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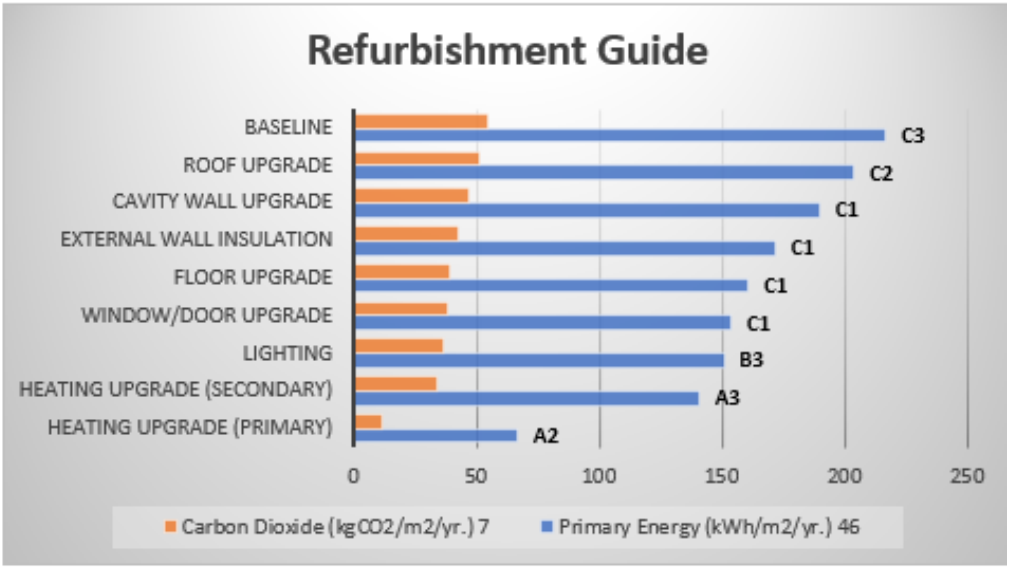

Estimated Cost Summary			
	Measure	Estimated Costs (€/m2)	Estimated Total Costs (€)
1	Roof Upgrade	10 - 15	€780
2	Cavity Wall upgrade	7 - 10	€776
3	Wall Insulation	90 - 140	€10,670
4	Floor Upgrade	80 - 100	€4,680
5	Window/Door upgrade	250 - 350	€3,780
6	Lighting	20/fitting	
7	Heating Upgrade (Secondary)	2200 (System)	€2,200
8	Heating Upgrade (Primary)	9,500 (System)	€9,500
9	Solar PV	2,200 (1.2 kWp System)	€2,200
10	Demand Controlled Ventilation	3,000 (System)	€3,000
Total			**€37,586**
Total Cost to Homeowner at 35% Grant funding			**€24,431**

Savings Summary				
BER Rating	Energy Savings (kWh/m2/yr.)	Energy Savings (kWh/yr.)	Cost Savings (€/yr.)	Simple Payback in years (Including 35% Grant Fuding)
A2	171	17784	€1,067	23

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APPENDIX L - REFURBISHMENT GUIDE FOR ASHBROOK

Semi Detached House, Ashbrook, Timber Frame Construction

Existing Building Details			
Building Elements		Insulation Thickness (mm)	U-Value
Walls	Timber Frame	Unknown	0.37
Roof	Pitched Roof mixture - Ceiling & Rafter	150mm-200mm	0.25
Floor	Solid Floor	Unknown	0.34
Windows	Double Glazed Air filled (low E)	N/A	2.2 - 3
Doors	Solid Timber	N/A	3

Existing Heating Characteristics			
Heating System		Fuel	Efficiency (%)
Primary Heating System	Oil Boiler with uninsulated pipework	Oil	80%
Secondary Heating System	Open Fire	Coal	30%
Hot Water	Heated by primary heating system		
Cylinder	Factory insulated (40mm)		
Controls	Cylinder Thermostat, No programmer		

Domestic Retrofit (Step by Step Guidelines)		Target U Value (kWh/m2/yr)	Energy Consumption (kWh/m2/yr.)	Emissions (CO2) (kgCO2/m2/yr.)	Building Energy Rating (BER)
Energy Efficient Measures			Current Usage (167)	Current Emissions (42)	C1
Roof insulation	Loft wool Insulation top-up to achieve 300mm-400mm across all roof area, (including upgrading ventilation requirements).	0.13 - 0.16	161	40	C1
External/Internal Wall Insulation	Install Wall Insulation (internal or External), thickness 50mm-100mm	0.18 - 0.21	149	37	B3
Floor Upgrade	Insulate solid floor with rigid insulation, addressing airtightness requirements	0.18 - 0.21	143	35	B3
Window/Door Upgrade	Replace existing glazing with Double/Triple glazed, (low E) units	1.1 - 1.4	137	34	B3
Lighting	Install energy efficient light bulbs (LEDs)	N/A	135	33	B3
Heating Upgrade (secondary)	Install wood burning stove	N/A	124	30	B2
Heating Upgrade (Primary)	Heat Pump, two separate heating zones with time and temperature controls.	N/A	73	15	A3
Renewables	Install 2 kWp Solar PV system	N/A	45	10	A2

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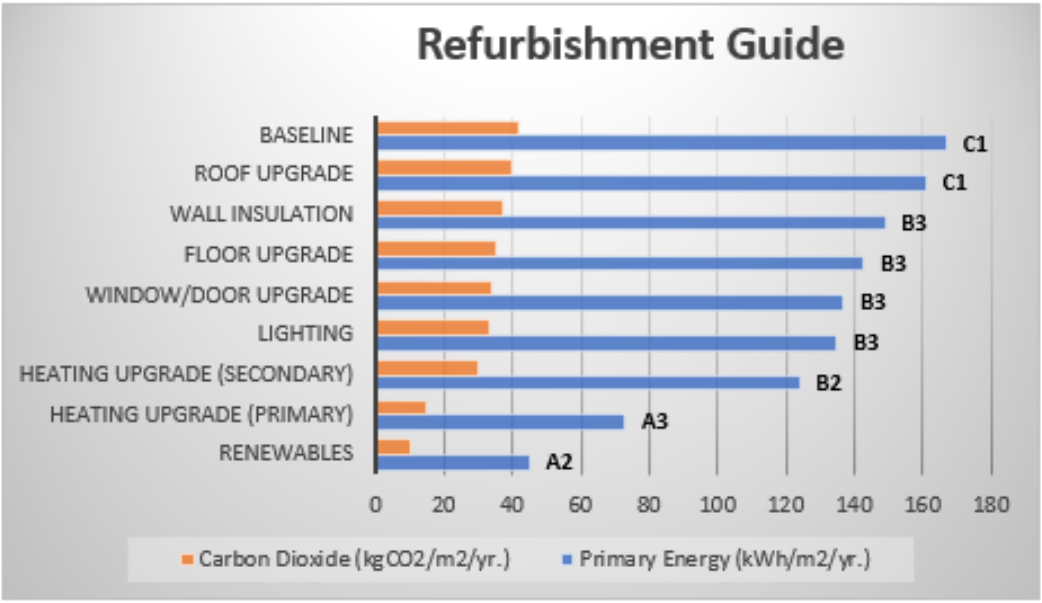

Estimated Cost Summary			
	Measure	Estimated Costs (€/m2)	Estimated Total Costs (€)
1	Roof Upgrade	10 - 15	€1,080
3	Wall Insulation	90 - 140	€10,800
4	Floor Upgrade	80 - 100	€6,480
5	Window/Door upgrade	250 - 350	€7,830
6	Lighting	20/fitting	€200
7	Heating Upgrade (Secondary)	2200 (System)	€2,200
8	Heating Upgrade (Primary)	9,500 (System)	€9,500
9	Solar PV	2,200 (1.2 kWp System)	€2,200
10	Demand Controlled Ventilation	3,000 (System)	€3,000
Total			**€43,290**
Total Cost to Homeowner at 35% Grant funding			**€28,139**

Savings Summary				
BER Rating	Energy Savings (kWh/m2/yr.)	Energy Savings (kWh/yr.)	Cost Savings (€/yr.)	Simple Payback in years (Including 35% Grant Funding)
A2	122	17324	€1,039	27

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APPENDIX M – REFURBISHMENT GUIDE FOR THORNBERRY (CWC)

Mid Terrace House, Thornberry, Cavity Wall Construction

Existing Building Details			
Building Elements		Insulation Thickness (mm)	U-Value
Walls	300mm unfilled Cavity	None	0.6
Roof	Pitched Roof insulated at ceiling	100mm-150mm	0.42
Floor	Solid Floor	Unknown	1.2
Windows	Double Glazed Air filled	N/A	2.8
Doors	uPVC	N/A	2.7

Existing Heating Characteristics			
Heating System		Fuel	Efficiency (%)
Primary Heating System	Range Cooker/Heater	Oil	80%
Secondary Heating System	Stove	Multi fuel	30%
Hot Water	Heated by primary heating system		
Cylinder	Factory Insulated (35mm)		
Controls	N/A		

Domestic Retrofit (Step by Step Guidelines)			Energy Consumption (kWh/m2/yr.)	Emissions (CO2) (kgCO2/m2/yr.)	Building Energy Rating (BER)
Energy Efficient Measures		Target U Value (kWh/m2/yr.)	Current Usage (213)	Current Emissions (54)	C3
Roof insulation	Loft wool Insulation top-up to achieve 300mm-400mm across all roof area, (including upgrading ventilation requirements).	0.13 - 0.16	202	51	C3
Cavity Wall Insulation (CWI)	Pump Existing cavity with a bonded bead insulation	0.30 - 0.35	184	47	C2
External/Internal Wall Insulation	Install Wall Insulation (internal or External), thickness 50mm-100mm	0.18 - 0.21	175	44	C1
Floor Upgrade	Insulate solid floor with rigid insulation, addressing airtightness requirements	0.18 - 0.21	134	33	B3
Window/Door Upgrade	Replace existing glazing with Double/Triple glazed, (low E) units	1.1 - 1.4	130	32	B3
Lighting	Install energy efficient light bulbs (LEDs)	N/A	123	31	B3
Heating Upgrade (secondary)	Install wood burning stove	N/A	115	29	B2
Heating Upgrade (Primary)	Heat Pump, two separate heating zones with time and temperature controls.	N/A	42	10	A2
Renewables	Install 1.2 kWp Solar PV system	N/A	20	5	A1

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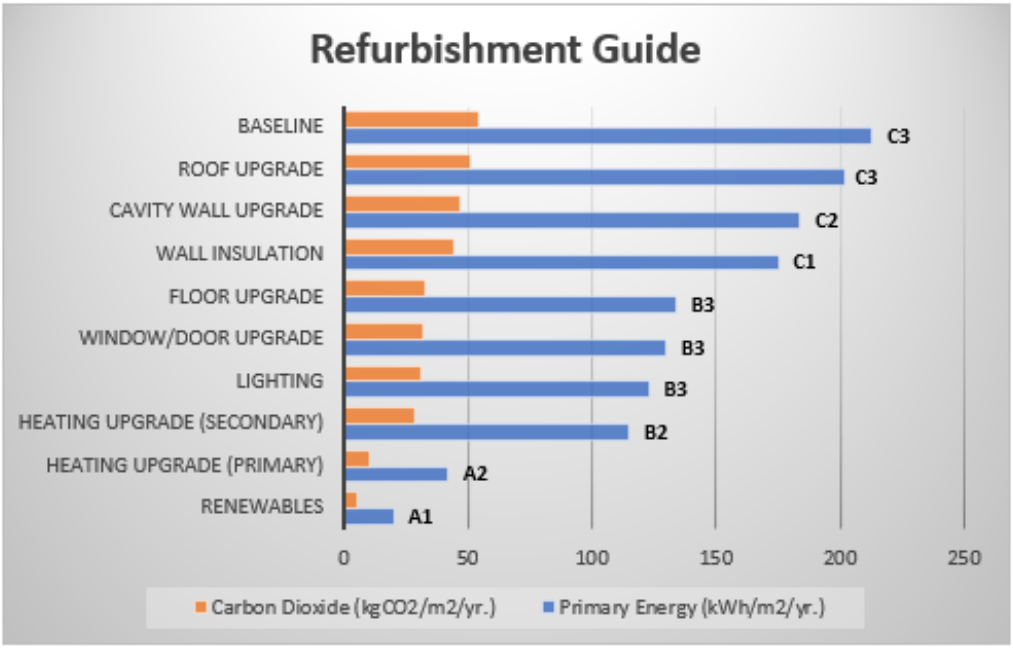

Estimated Cost Summary			
	Measure	Estimated Costs (€/m2)	Estimated Total Costs (€)
1	Roof Upgrade	10 - 15	€612
2	Cavity Wall upgrade	7 - 10	€581
3	Wall Insulation	90 - 140	€7,740
4	Floor Upgrade	80 - 100	€4,590
5	Window/Door upgrade	250 - 350	€2,550
6	Lighting	20/fitting	€200
7	Heating Upgrade (Secondary)	2200 (System)	€2,200
8	Heating Upgrade (Primary)	9,500 (System)	€9,500
9	Solar PV	2,200 (1.2 kWp System)	€2,200
10	Demand Controlled Ventilation	3,000 (System)	€3,000
Total			**€33,173**
Total Cost to Homeowner at 35% Grant funding			**€21,562**

Savings Summary				
BER Rating	Energy Savings (kWh/m2/yr.)	Energy Savings (kWh/yr.)	Cost Savings (€)	Simple Payback in years (Including 35% Grant Funding)
A1	193	19686	€1,181	18

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APPENDIX N – REFURBISHMENT GUIDE FOR THORNBERRY (SWC)

Mid Terraced House, Thornberry, Abbeyleix, Solid Wall Construction

Existing Building Details			
Building Elements		Insulation Thickness (mm)	U-Value
Walls	Solid mass concrete	None	1.6
Roof	Pitched Roof insulated at ceiling	None	2.1
Floor	Solid Floor	Unknown	0.46
Windows	Double Glazed Air filled	N/A	2.3 - 2.7
Doors	uPVC	N/A	2.7

Existing Heating Characteristics			
Heating System		Fuel	Efficiency (%)
Primary Heating System	Range Cooker /Heater	Oil	70%-80%
Secondary Heating System	N/A		
Hot Water	Heated by Primary Heating System		
Cylinder	Factory Insulated (30mm)		
Controls	Manual On/off Controller		

Domestic Retrofit (Step by Step Guidelines)			Energy Consumption (kWh/m2/yr.)	Emissions (CO2) (kgCO2/m2/yr.)	Building Energy Rating (BER)
Energy Efficient Measures		Target U Value (kWh/m2/yr.)	Current Usage (286)	Current Emissions (69)	D2
Roof insulation	Loft wool Insulation top-up to achieve 300mm-400mm across all roof area, (including upgrading ventilation requirements).	0.13 - 0.16	225	55	D1
External/Internal Wall Insulation	Install Wall Insulation (internal or External), thickness 50mm-100mm	0.18 - 0.21	173	41	C1
Floor Upgrade	Insulate solid floor with rigid insulation, addressing airtightness requirements	0.18 - 0.21	163	39	C1
Window/Door Upgrade	Replace existing glazing with Double/Triple glazed, (low E) units	1.1 - 1.4	151	36	C1
Lighting	Install energy efficient light bulbs (LEDs)	N/A	144	35	B3
Heating Upgrade (Primary)	Heat Pump, two separate heating zones with time and temperature controls.	N/A	71	14	A3
Renewables	Install 1.2 kWp Solar PV system	N/A	35	7	A2

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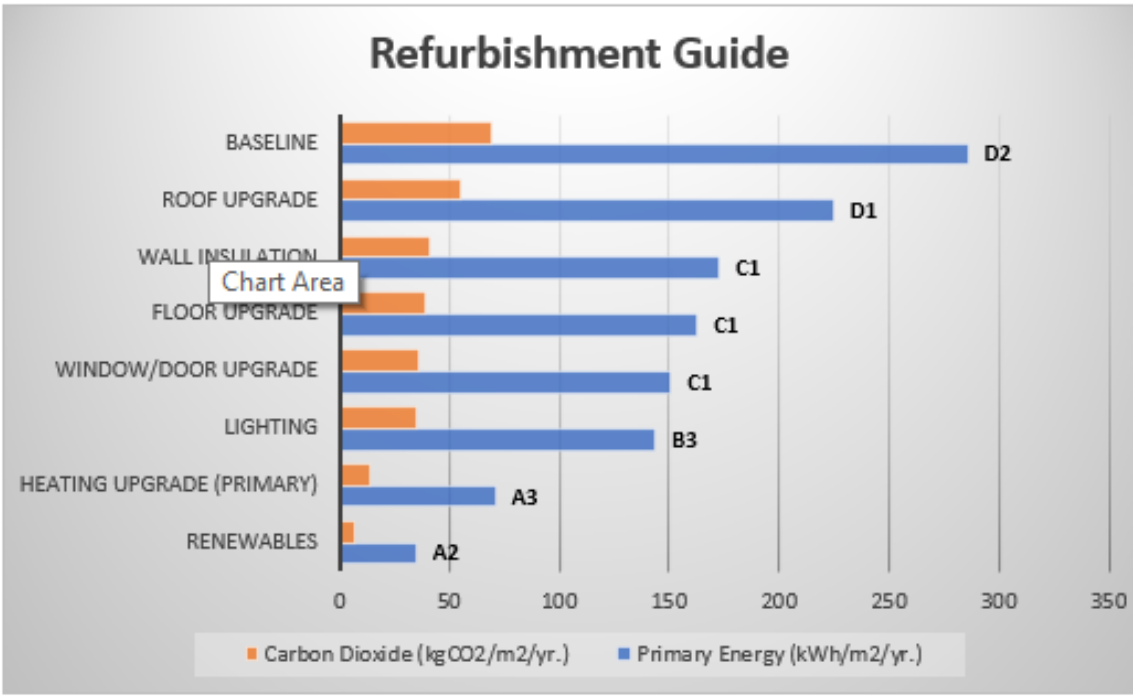

Estimated Cost Summary			
	Measure	Estimated Costs (€/m2)	Estimated Total Costs (€)
1	Roof Upgrade	10 - 15	€540
2	Wall Insulation	90 - 140	€4,080
3	Floor Upgrade	80 - 100	€4,050
4	Window/Door upgrade	250 - 350	€3,714
5	Lighting	20/fitting	€180
7	Heating Upgrade (Primary)	7,500 (System)	€7,500
8	Solar PV	2,200 (1.2 kWp System)	€2,200
9	Demand Controlled Ventilation	3,000 (System)	€3,000
Total			**€25,264**
Total Cost to Homeowner at 35% Grant funding			**€16,422**

Savings Summary				
BER Rating	Energy Savings (kWh/m2/yr.)	Energy Savings (kWh/yr.)	Cost Savings (€/yr.)	Simple Payback in years (Including 35% Grant Funding)
A2	251	22590	€1,355	12

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APPENDIX O - REFURBISHMENT GUIDE FOR BALLADINE DRIVE / HEIGHTS

Semi Detached House, Balladine Drive/Heights, Cavity Wall Construction,

Existing Building Details			
Building Elements		Insulation Thickness (mm)	U-Value
Walls	300mm unfilled Cavity	None	0.6
Roof	Pitched Roof insulated at ceiling	100mm-150mm	0.4
Floor	Solid Floor	Unknown	0.64
Windows	Double Glazed Air filled	N/A	2.8
Doors	Solid Door	N/A	2.7

Existing Heating Characteristics			
Heating System		Fuel	Efficiency (%)
Primary Heating System	Stove	Multi fuel	70%
Secondary Heating System	Stove	Multi fuel	70%
Hot Water	Heated by primary heating system		
Cylinder	Factory Insulated (25mm)		
Controls	Programmer & Thermostat		

Domestic Retrofit (Step by Step Guidelines)			Energy Consumption (kWh/m2/yr.)	Emissions (CO2) (kgCO2/m2/yr.)	Building Energy Rating (BER)
Energy Efficient Measures		Target U Value (kWh/m2/yr.)	Current Usage (268)	Current Emissions (87)	D2
Roof insulation	Loft wool Insulation top-up to achieve 300mm-400mm across all roof area, (including upgrading ventilation requirements).	0.13 - 0.16	257	83	D1
Cavity Wall Insulation (CWI)	Pump Existing cavity with a bonded bead insulation	0.30 - 0.35	239	77	D1
External/Internal Wall Insulation	Install Wall Insulation (internal or External), thickness 50mm-100mm	0.18 - 0.21	220	70	C3
Floor Upgrade	Insulate solid floor with rigid insulation, addressing airtightness requirements	0.18 - 0.21	200	64	C2
Window/Door Upgrade	Replace existing glazing with Double/Triple glazed, (low E) units	1.1 - 1.4	183	60	C2
Lighting	Install energy efficient light bulbs (LEDs)	N/A	178	58	C2
Heating Upgrade (Primary)	Heat Pump, two separate heating zones with time and temperature controls.	N/A	71	14	A3
Renewables	Install 1.2 kWp Solar PV system	N/A	44	8	A2

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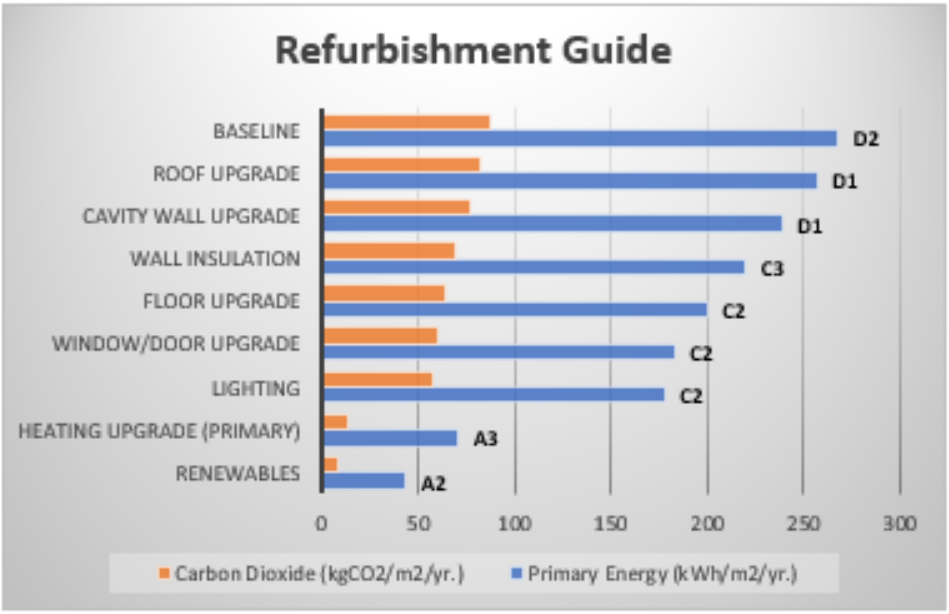

Estimated Cost Summary			
	Measure	Estimated Costs (€/m2)	Estimated Total Costs (€)
1	Roof Upgrade	10 - 15	€492
2	Cavity Wall upgrade	7 - 10	€756
3	Wall Insulation	90 - 140	€10,080
4	Floor Upgrade	80 - 100	€3,690
5	Window/Door upgrade	250 - 350	€4,458
6	Lighting	20/fitting	€160
7	Heating Upgrade (Secondary)	2200 (System)	€2,200
8	Heating Upgrade (Primary)	9,500 (System)	€9,500
9	Solar PV	2,200 (1.2 kWp System)	€2,200
10	Demand Controlled Ventilation	3,000 (System)	€3,000
Total			**€36,536**
Total Cost to Homeowner at 35% Grant funding			**€23,748**

Savings Summary				
BER Rating	Energy Savings (kWh/m2/yr.)	Energy Savings (kWh/yr.)	Cost Savings (€)	Simple Payback in years (Including 35% Grant Funding)
A2	224	18368	€1,102	22

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APPENDIX P – REFURBISHMENT GUIDE FOR GALLOW WOOD

Detached House, Grallow Wood, Cavity Wall Construction

Existing Building Details			
Building Elements		Insulation Thickness (mm)	U-Value
Walls	300mm Cavity Wall, Partially Filled	50mm	0.4
Roof	Pitched Roof insulated at ceiling	100mm-150mm	0.42
Floor	Solid Floor	Unknown	0.37
Windows	Double Glazed Air filled	N/A	2.8
Doors	uPVC	N/A	2.7

Existing Heating Characteristics			
Heating System		Fuel	Efficiency (%)
Primary Heating System	Gas Boiler	Mains Gas	80%-85%
Secondary Heating System	Stove	Multi fuel	70%
Hot Water	Heated by Primary Heating System		
Cylinder	Factory Insulated (35mm)		
Controls	Programmer & Room thermostat		

Domestic Retrofit (Step by Step Guidelines)			Energy Consumption (kWh/m2/yr.)	Emissions (CO2) (kgCO2/m2/yr.)	Building Energy Rating (BER)
Energy Efficient Measures		Target U Value (kWh/m2/yr.)	Current Usage (169)	Current Emissions (33)	C1
Roof insulation	Loft wool Insulation top-up to achieve 300mm-400mm across all roof area, (including upgrading ventilation requirements).	0.13 - 0.16	160	32	C1
Cavity Wall Insulation (CWI)	Pump Existing cavity with a bonded bead insulation	0.30 - 0.35	155	31	C1
External/Internal Wall Insulation	Install Wall Insulation (internal or External), thickness 50mm-100mm	0.18 - 0.21	143	28	B3
Floor Upgrade	Insulate solid floor with rigid insulation, addressing airtightness requirements	0.18 - 0.21	137	27	B3
Window/Door Upgrade	Replace existing glazing with Double/Triple glazed, (low E) units	1.1 - 1.4	127	25	B3
Lighting	Install energy efficient light bulbs (LEDs)	N/A	121	24	B2
Heating Upgrade (Primary)	Heat Pump, two separate heating zones with time and temperature controls.	N/A	63	14	A3
Renewables	Install 1.2 kWp Solar PV system	N/A	47	10	A2

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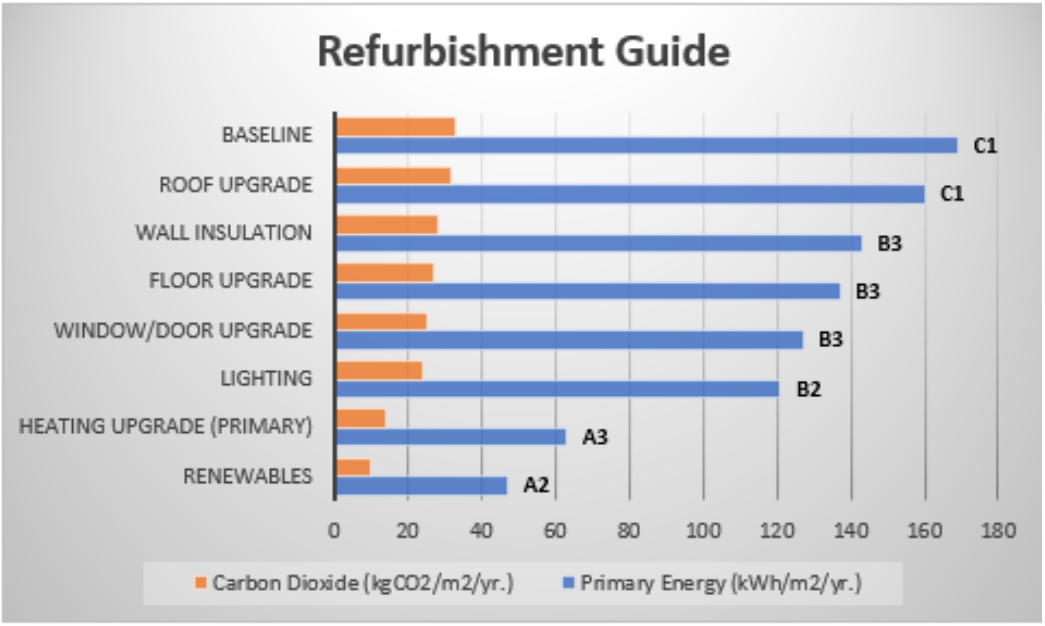

Estimated Cost Summary			
	Measure	Estimated Costs (€/m2)	Estimated Total Costs (€)
1	Roof Upgrade	10 - 15	€864
2	Cavity Wall upgrade	7 - 10	€1,503
3	Wall Insulation	90 - 140	€20,040
4	Floor Upgrade	80 - 100	€6,480
5	Window/Door upgrade	250 - 350	€6,000
6	Lighting	20/fitting	€200
7	Heating Upgrade (Primary)	9,500 (System)	€9,500
8	Solar PV	2,200 (1.2 kWp System)	€2,200
9	Demand Controlled Ventilation	3,000 (System)	€3,000
Total			**€49,787**
Total Cost to Homeowner at 35% Grant funding			**€32,362**

Savings Summary				
BER Rating	Energy Savings (kWh/m2/yr.)	Energy Savings (kWh/yr.)	Cost Savings (€)	Simple Payback in years (Including 35% Grant Funding)
A2	122	18300	€1,098	29

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