Ashbourne Energy Master Plan

Report

IHER Energy Services Ltd

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1 Executive Summary

The Government's Climate Action Plan (2023) CAP 2023 re-establishes the target to achieve a 51% reduction in Greenhouse Gas (GHG) emissions by 2030 from the 2018 baseline.

It provides updated sectoral targets for 2030 including:

- 40% reduction in emissions from residential buildings
- 45% reduction in emissions from commercial/ public buildings
- 50% reduction in transport emissions
- 75% reduction in emissions from the power generation sector by adopting large scale renewables

The CSO reports that at the end of 2022, Ireland had achieved a 4.6% reduction from national greenhouse gas emissions from the 2018 baseline.

The Environmental Protection Agency (EPS) reported that Ireland had achieved a 7.83% reduction in national GHG emissions by end of 2023 compared to the 2018 baseline. That leaves 43% to be achieved over the remaining 6 years to 2030. So, progress has been poor to date and a huge amount of work needs to be done to get on track to achieve the 2030 target.

This Energy Master Plan looks specifically at Ashbourne and its hinterland to lay out a local roadmap showing how Ashbourne can contribute to the national effort to meet the Climate Action Plan targets. The Energy Master Plan presented in this report is an overall vision and will provide the local community with a clear pathway towards a low carbon future. This is possible if the recommendations in this report are implemented and built upon.

Ashbourne comprises 5,986 residential dwellings including the hinterland according to the SEAI BER mapping database (2023) and 288 non-domestic buildings/ units including three national schools (St Declan's, St Mary's and Gaelscoil Na Mi) and two post primary schools (Coláiste De Lacy and Ashbourne Community School).

The Ashbourne SEC falls within 45 Small Areas as defined for Census purposes as will be shown in map later in the report.

Baseline Methodology

The Ashbourne baseline for energy use and CO_2 emissions was established by looking at the residential housing stock, non-domestic buildings and transport. The desk research used the SEAI national BER dataset (2,958 dwellings have current BERs) and relevant available data from the Central Statistics Office.

Energy use in the 5 schools and the 283 non-domestic premises were estimated according to energy use benchmarks provided by SEAI. Actual annual energy billing data was used for three of these non-domestic buildings.

Energy use for transport has been estimated using mode data available from the 2022 Census, the

Department of Transport's Irish Bulletin of Vehicle and Driver Statistics (2022) and national transport data provided by the City of Dublin Energy Management Agency (Codema).

All data inputs were collated into an excel model that produced the summary baseline for Ashbourne SEC in the table below.

	Total CO2 Emissions (tonnes)	Total Energy Consumption (GWh)	Energy Costs
Residential	26,001	105.44	€22,404,800
Non-residential	34,197	146.83	€17,873,113
Transport	22,517	96.42	€19,396,696
Total	**82,715**	**348.7**	**€59,674,609**

Pathway to 2030 GHG Emissions Reduction Targets

As 2024 will be the first year of action, this study is presenting targets for a 10-year period out to 2033. Separate modelling has been done for residential buildings, non-domestic buildings and transport to establish energy and CO_2 emissions reduction targets.

Residential Energy Saving Targets

Based on the BER data available, the carbon emissions for all dwellings have been estimated at 26,001 tonnes per annum, equivalent to 7.33 tonnes per dwelling.

From a BER perspective, the BER score for a dwelling is based on the calculated kWh needed per square metre of floor area for space and water heating, pumps and fans and lighting. In Ashbourne, the average primary energy across 2958 BERs in 149.65 kWh/m2/year, equivalent to a C1 rating.

Our Ashbourne model shows that a 2% reduction in average BER primary energy per annum per dwelling would result in an 9.6% cumulative reduction by 2028 and an 18% reduction by 2033 with respective primary energy values shown in the table below.

Average BER-based Reduction Scenario

Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Primary Energy (kWh/m2/year)	150	146.7	143.7	140.8	138.0	135.3	132.6	129.9	127.3	124.8	122
		-2.0%	-4.0%	-5.9%	-7.8%	-9.6%	-11.4%	-13.2%	-14.9%	-16.6%	-18%

To get on this track, the EMP model assumes that approximately 25% of the 5,986 dwellings would need to be retrofitted between now and 2028 through a selection of measures such as wall insulation, roof insulation, heat pumps and solar PV panels. These measures are detailed in Section 9 of this report and are also laid out in the Register of Opportunities (ROO).

The 2022 Census advises that 62% of homes are heated by natural gas/ LPG, 20% by oil, 13% by electricity and 1% by solid fuel and 4% is not stated or none.

85% of homes in Ashbourne are heated by boilers, both non-condensing and condensing types with 8% heated by direct electric and 7% heated by heat pumps.

Amazingly, almost 2,000 homes in Ashbourne with fossil fuel boiler are heat pump ready.

The step up to switch to heat pumps is logical and progressive in terms of carbon emissions reduction and is totally in line with the Climate Action Plan.

Today's heat pump models are 4 to 5 times more energy efficient than gas/oil boilers though electricity prices are higher than gas or oil (which is factored into the case studies created for Ashbourne). It is clear that using heat pumps instead of traditional boilers will have significant potential to cut CO_2 emissions and SEAI is actively encouraging this measure with grants available of €6,500 for houses and €4,500 for apartments.

SEAI's One Stop Shop scheme does insist on an air permeability value of 5m3/hour/m2 being achieved via air tightness testing of a dwelling if seeking grant support for air tightness measures. Good air tightness in a dwelling is critical to ensure optimum results and performance for a heat pump installation. This air permeability target of 5m3/hour/m2 is also the air permeability target required for new buildings. This would represent a good target to aim for if a heat pump is being installed in a retrofit project.

Solar PV is also now very attractive to enable homes to generate their own electricity and reduce utility bills and grants are available also. The Government announced in 2023 that VAT will no longer apply to PV installations which is a further incentive.

As the carbon content of electricity will reduce continually into the future as more renewables are added to the mix, this will make a further contribution to energy and CO_2 emissions reductions by 2032.

As shown in the table below, these modified electricity factors will enable a 19% energy reduction scenario by 2028 and a 34% reduction by 2033.

Residential Energy Reduction Projection (2023-2033)

Residential - Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Primary Energy (GWh/m2/year)	105.44	103.33	101.26	99.24	97.25	95.31	93.40	91.53	89.70	87.91	86.15
		-2.00%	-3.96%	-5.88%	-7.76%	-9.61%	-11.42%	-13.19%	-14.92%	-16.63%	-18.29%
Primary Fossil Fuel (GWH/m2/yr)	84.35	82.66	81.01	79.39	77.80	76.25	74.72	73.23	71.76	70.33	68.92
Primary electricity use (GWh/m2/yr)	21.09	20.67	20.25	19.85	19.45	19.06	18.68	18.31	17.94	17.58	17.23
Adjusted Primary Electricity (GWh/m2/year)	21.09	18.63	16.27	13.99	11.79	9.68	7.65	5.69	3.81	2.01	0.27
Adjusted Total Primary Energy (GWh/m2/year)	**105.44**	**101.30**	**97.28**	**93.38**	**89.60**	**85.93**	**82.37**	**78.92**	**75.58**	**72.34**	**69.19**
Reduction with Modified Electricity factor		-4%	-8%	-11%	-15%	-19%	-22%	-25%	-28%	-31%	-34%

Commercial / Public Building Usage & Targets

Energy use data was only available for 3 non-domestic buildings. Otherwise, SEAI industry benchmark energy use data, (which is not considered accurate), had to be factored into the model for all other non-domestic buildings which is far from ideal. The estimated total annual energy usage for commercial and public buildings in estimated at 146,834,0000 kWh or 146.8 GWh (gigawatt-hours).

It is proposed that a 3% annual energy reduction target also be set for commercial and public buildings. This would result in a 14% reduction in energy use by 2028 and a 26% reduction by 2033.

3% reduction in Commercial/ Public Building Energy Usage

Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Primary Energy (GWh/m2/year)	146.83	142.43	138.16	134.01	129.99	126.09	122.31	118.64	115.08	111.63	108.28
		-3.0%	-5.9%	-8.7%	-11.5%	-14.1%	-16.7%	-19.2%	-21.6%	-24.0%	-26.3%

A new **Business Energy Upgrade Scheme** was launched by SEAI in October 2024 that will now provide grant supports to business when carrying our energy upgrade works.

Another key action item would be to secure the commitment of all non-domestic building owners/ tenants to submit their energy use data annually to the SEC team to record and track energy use changes. This task would be very useful for each business in their own right but would also engage the businesses in the goals of the SEC. The commercial baseline estimate could also be revised and treated with greater confidence. A further step would be to promote energy auditing and setting of long-term energy saving targets by local businesses to follow up on initial energy savings measures.

Transport Target

The Climate Action Plan 2023 promotes the Avoid-Shift-Improve approach.

Avoid encourages fewer journeys using fossil fuel-based transport and **Shift** encourages less carbon-intensive modes of transport.

Improve suggests reducing the carbon intensity of our transport fleets. In 2022, 7.8% of the vehicles in Ashbourne were estimated to be Battery Electric Vehicles (BEVs) based on national ratios. The Climate Action Plan has set a target that 30% of vehicles will be BEVs by 2030. This would essentially mean that of the current 8,052 vehicles in Ashbourne (from 2022 Census), 2,555 of these should be EVs by 2030. Achieving this level of EV market share by 2030 would equate to a 3.75% annual reduction in energy use in transport, dropping from 96.42 GWh to 73.78 GWh. The net result would be a 23.5% reduction in transport energy emissions by 2030 (and 32% by 2033).

Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Primary Energy (GWh/m2/year)	96.42	92.80	89.32	85.97	82.75	79.64	76.66	73.78	71.02	68.35	65.79
		-3.8%	-7.4%	-10.8%	-14.2%	-17.4%	-20.5%	-23.5%	-26.3%	-29.1%	-31.8%

However, the carbon projection for transport is the most valid. Assuming, EVs are projected to account for 30% of vehicles by 2030, the balance of 70% will be diesel or petrol cars whose carbon contribution will not alter unless the annual km usage per vehicle reduces in the interim. Data is emerging that shows that diesel and petrol cars fuel efficiencies will increase by 10 to 15% in the next 10 to 20 years. Thus, a 51% reduction in CO_2 emissions from transport is projected by 2033.

Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Total kilo tonnes carbon (kG/kWh)	22.52	21.88	21.18	20.40	19.53	18.55	17.44	16.16	14.68	12.95	10.93
		-2.84%	-5.96%	-9.41%	-13.26%	-17.61%	-22.56%	-28.24%	-34.82%	-42.48%	-51.47%

A strategy for the deployment of EV charging points is expected to be established by Meath County Council in 2025.

Summary Projections

The total energy use across all three sectors is projected to decrease from 348 GWh in 2023 to 243 GWh by 2033, equivalent to a 30% reduction in energy use.

The total CO_2 emissions across all three sectors is projected to decrease from 82.7 kTonnes in 2023 to 45.1 kTonnes by 2033, equivalent to 45.5% reduction.

Summary Adjusted Carbon Dioxide Emissions – All Sectors

Total kilo tonnes carbon	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Residential - adjusted	26.00	24.62	23.29	22.00	20.75	19.54	18.37	17.25	16.15	15.10	14.08
Commercial & Public	34.20	32.50	30.87	29.31	27.81	26.38	25.01	23.70	22.44	21.24	20.09
Transport	22.52	21.88	21.18	20.40	19.53	18.55	17.44	16.16	14.68	12.95	10.93
Total	**82.72**	**79.00**	**75.33**	**71.70**	**68.09**	**64.47**	**60.82**	**57.10**	**53.27**	**49.29**	**45.10**
% of Reduction comparing with 2023		4.5%	8.9%	13.3%	17.7%	22.1%	26.5%	31.0%	35.6%	40.4%	45.5%

The specific analysis of current conditions and proposed measures in all three sectors can be revisited and revised over time to fine tune target setting.

The assumptions used to create this EMP model are quite ambitious and show the scale of action that will be needed at a local level countrywide in order to reach our Climate Action goals.

Deployment of Renewables

Ashbourne is possibly unique in Ireland because the 10 local solar farms with a total capacity of 268MW could power 200,00 homes. The solar farms output will feed into the national grid and indirectly into homes and business es in Ashbourne.

In addition, local community building, businesses and homes should also be encouraged to install their PV generation.

On 30th October 2024, Minister for Education Norma Foley and Minister of State at the Department of the Environment, Climate and Communications, Ossian Smyth announced that the Solar for Schools Programme will be extended to all school nationwide. The scheme provides eligible schools with up to 6 kilowatts peak of roof-mounted solar photovoltaic (PV) installations on their roofs, which equates to approximately 14 solar panels.

Funding has now been approved to proceed with solar PV installations on all remaining eligible schools in 16 counties – Carlow, Cavan, Cork, Dublin, Kildare, Laois, Longford, Louth, Mayo, Meath, Monaghan, Roscommon, Sligo, Tipperary, Westmeath and Wexford. The schools in Ashbourne will hopefully proceed with their PV installations in the near future.

Mobilisation

This Energy Master Plan sets out the baseline and then scopes out a viable roadmap to 2030/ 2033 indicating the level of investment and change that will be needed to achieve the carbon reduction targets. The next challenge for Ashbourne SEC will be to put a framework into place to implement the actions suggested.

The Register of Opportunities, presented towards the end of the report, highlights a number of tangible projects that might be taken on by the Ashbourne community in the short term. Many Government supports including funding mechanisms are available to help the SEC in this work. It will also be important to work closely with key stakeholders including Meath County Councillors and other public representatives.

2 Introduction

The Ashbourne Energy Master Plan (EMP) study was commissioned in order to accelerate the transition to a more sustainable future for the local area and its population.

If we are going to make meaningful progress toward the new revised global climate targets set out in the new Climate Action Plan 2023 each and every one of us needs to switch from reactive mode to a proactive mode. The Sustainable Energy Community (SEC) initiative set up by SEAI is an initiative set up by SEAI to allow local communities to be proactive in this area and to become actively involved in drawing up plans to improve how energy is used and develop a sustainable energy system for the benefit of their community. The SEC will also help contribute to increasing public acceptance of renewable energy projects and make it easier to attract private investments in the clean energy transition. By coming together as a community and taking ownership of this issue, the local residents have the potential to provide direct benefits to their local community by increasing energy efficiency, lowering their electricity bills and creating local job opportunities.

Located in County Meath, Ireland, Ashbourne is a commuter town for Dublin with a growing population. Situated approximately 20 km north of Dublin and near the M2 motorway, it offers convenient access to the M50 Dublin Orbital Motorway in just 15 minutes and is only 21 minutes away from Dublin Airport. The town, along with the nearby village of Ratoath, has experienced rapid population growth, currently exceeding 20,000 residents and continuing to expand. Additionally, there is a significant catchment area population of nearly 1.5 million people within a 45-minute drive.

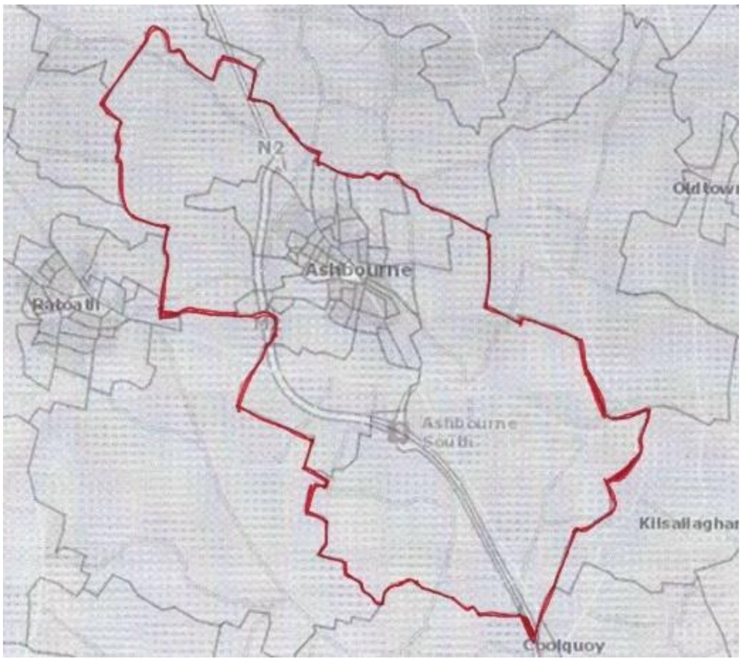

Figure 1 : Ashbourne EMP Area

Based on the 2022 Census, the Ashbourne EMP catchment area contains 5,986 dwellings. Based on a local survey, it is estimated that there are 288 non-domestic energy consuming buildings. Vacant buildings were not included. This non-domestic total includes three primary schools and two secondary schools.

This Energy Master Plan is intended to provide a framework setting out the transition to reduced energy usage and a low carbon future.

2.1 Deliverables

IHER Energy Services was appointed by the Ashbourne SEC in November 2023 to prepare an Energy Master Plan and Register of Opportunities.

The deliverables required included the following:

1. Quantify the current energy consumption of Ashbourne – baseline of electrical, thermal and transport energy demand.
2. Carry out Energy Audits of 6 x domestic, 3 x public/ commercial buildings
3. Create a Register of Opportunities (RoO)
    - Identifying projects that can avail of the Communities Energy Grant *and*
    - Identifying projects that can avail of the Better Energy Homes grant
    - Propose actions, based on baseline figures, to achieve a 50% reduction in energy usage/ CO_2 emissions by 2030.

The practical outputs Ashbourne SEC was seeking from the EMP are as follows:

- Consultants to conduct a <u>Desktop Review</u> and assess baseline energy usage for Ashbourne town and hinterland as defined in this application.
- Undertake a <u>Residential Review</u> to establish housing archetypes and current retrofit opportunities from selected housing estates. Select and review other common “one off” houses in the catchment area to assess retrofit opportunities.
- Conduct an <u>Energy Audit</u> of identified community buildings to inform retrofitting opportunities (in partnership with Ashbourne Development Forum)
- Research and identify <u>Renewable Energy Projects</u> in Ashbourne town and hinterland that the SEC could engage with as part of our overall 5-year plan (liaise with businesses and other community groups)
- Increase energy awareness and carbon awareness in the community
- Develop a ranked Register of Opportunities by cost, potential payback, emissions. This register will inform planning, priorities and action planning over a five-year period
- Develop and deliver Communications for our community outreach campaigns

The EMP report should include:

- Executive Summary of the findings of the overall EMP and recommendations
- All assessments and audits included in clearly identified and structured annexes
- The populated Register of Opportunities (RoO) spreadsheet
- The design of data gathering and analysis tools that will facilitate the on-going energy baseline review for the Community
- The EMP will explore long-term goals and will advise on establishing additional car charging points and improving the energy efficiency of shared community buildings.

2.2 Methodology

The analysis presented in this report is based on a mix of desk research using publicly available data from the Central Statistics Office, SEAI and elsewhere, as well as energy audits on residential and commercial buildings.

The main focus of the report is on the residential sector which provides the biggest opportunities for energy savings in the local area. Two primary data sources have been used in the residential buildings housing analysis. These are data extracted from the SEAI Building Energy Rating database[1] subset for dwellings within the Ashbourne SEC area and also the predicted energy performance based on BER analysis of archetypal homes that are representative of the local area. BER audits were conducted on five representative homes and proposed energy efficiency upgrades are presented in each case.

Data from Census 2022[2] for the Ashbourne Electoral Divisions and Small Areas provide statistical data on the local population and housing stock from 2022.

Estimates of energy use in the local community buildings, schools, creches and commercial units have been estimated according to energy use benchmarks provided by SEAI.

Estimates for energy use for transport have been estimated using commute length and mode data available in the census supplemented with data provided by Codema[3].

[1] https://ndber.seai.ie/BERResearchTool/ber/search.aspx

[2] https://www.cso.ie/en/releasesandpublications/ep/p-cpsr/censusofpopulation2022-summaryresults/keyfindings/

[3] City of Dublin Energy Management Agency

3 Ashbourne Small Areas / CSO Map

3.1 Ashbourne Small Areas

The CSO provides detailed census data at different geographical boundaries. All population and building data maps are available at https://cso.maps.arcgis.com

Small Areas are the smallest geographical boundaries used for Census purposes and typically comprise 50-200 dwellings. Electoral districts are a further level up.

The Ashbourne committee provided a list of all Small Areas (**Table 1**) contained within the EMP catchment area. It should be noted that two of the original small areas were further split as part of the 2022 Census thus increasing the total number of Small Areas.

Table 1 : Ashbourne Small Areas List

167025002	167025003	167025004	167025006
167025007	167025008	167025009	167025010
167025011	167025012	167025013	167025014
167025015	167025016	167025017	167025018
167025019	167025020	167025021	167025022
167025023	167025024	167025025	167025026
167025027	167025028	167025029	167025031
167025032	167025033	167025034	167042003
167042004	167042005	167042006	167042007
167042008	167042009	167078024	167078025
167025001/01	167025001/02	167025005/01	167025005/02
167025005/03	167025005/04	167025005/05	167025030/01
167025030/02	167025030/03	167042005/01	167042005/02

By clicking on the CSO mapping tool, the Ashbourne Small Areas can be displayed in map format as shown in Figure 2.

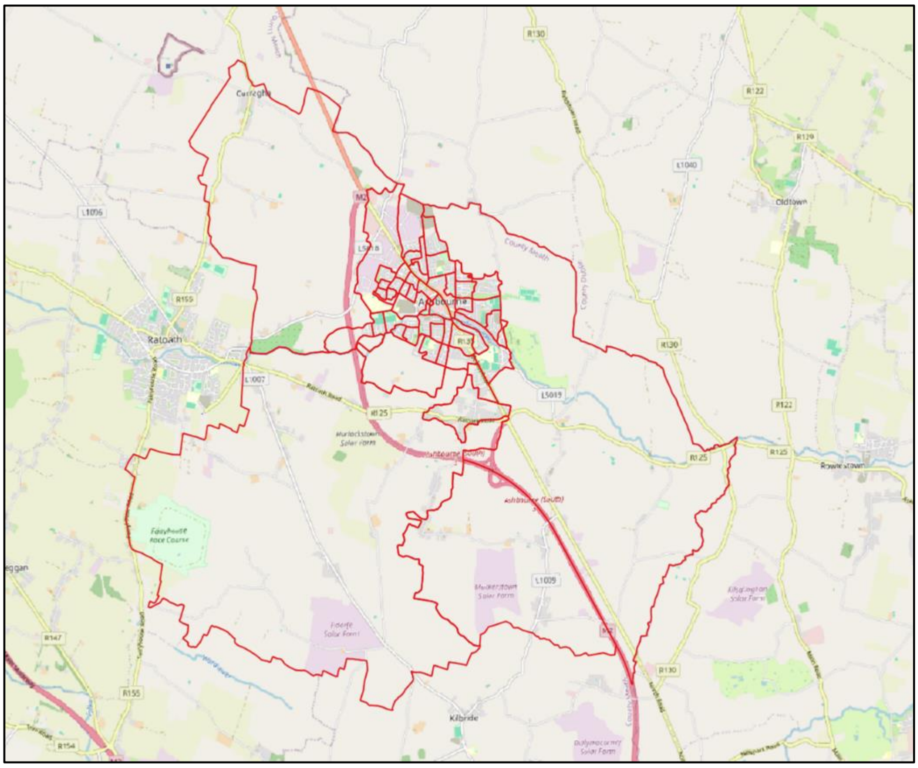

Figure 2 : Ashbourne Small Areas Map

3.2 National BER Mapping Application

All BERs in Ireland are published under a single National Administration System, managed by SEAI.

SEAI also provides a national mapping tool that is publicly available.
https://www.seai.ie/technologies/seai-maps/ber-map/

The current map for the Ashbourne area is shown in **Figure 3** below. The map is colour coded to the BER colour scale and the boundary conditions refer to small Area.

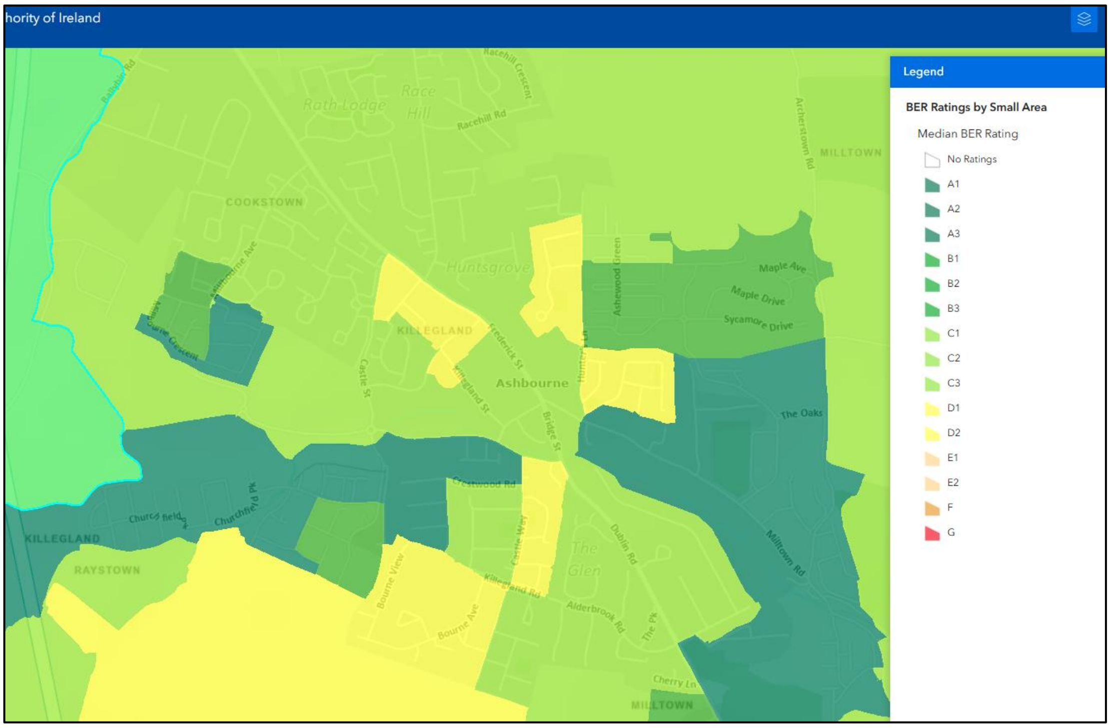

Figure 3 : Extract from National Residential BER map

When you click into any particular Small Area, additional data is available as shown in Figure 4.

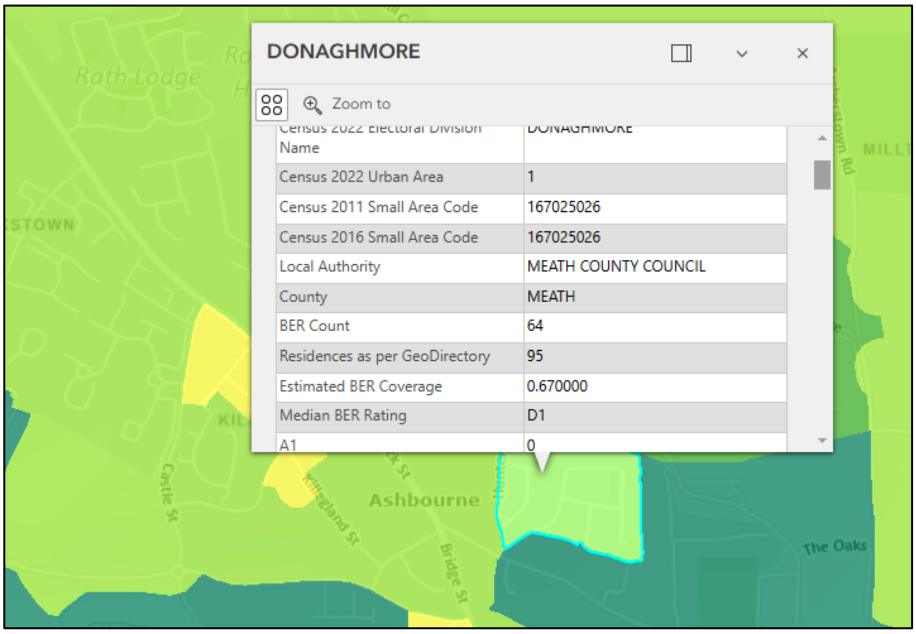

Figure 4 : Small Area Details -National Residential BER map

However, while this tool is useful and provides an excellent visual insight, it does not provide data in a summary format that would assist in further developing an energy master plan.

So, the BER dataset behind the tool was also reviewed and the relevant summary data for Ashbourne was collated. A similar map is also available via the BERWOW application.

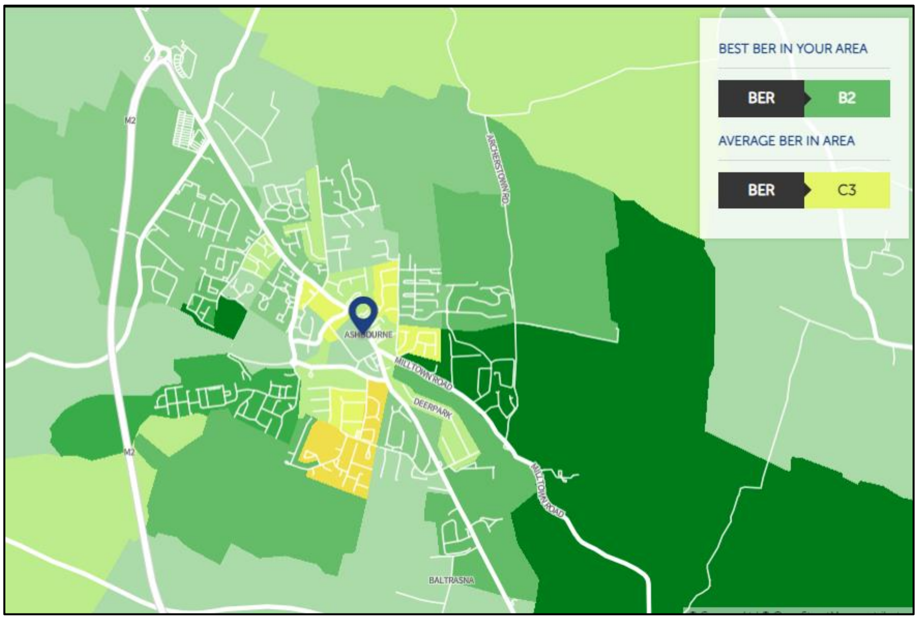

Figure 5 : BER Map via BERWOW tool

4 Residential BER Database Analysis

From the supporting table behind the BER map provided by SEAI in September 2023, the percentage of dwellings with BERs is shown for each Small Area. Overall, 47% of the dwellings have BER certs.

Table 2 : Small Area list with published BER Totals[4]

Small Area	ED Name	BER Count	Total Dwellings	% with BER Certs	Median BER Rating
167025002	DONAGHMORE	67	131	51%	D1
167025003	DONAGHMORE	48	137	35%	C2
167025004	DONAGHMORE	35	111	32%	D1
167025005	DONAGHMORE	412	518	80%	A3
167025006	DONAGHMORE	34	105	32%	C2
167025007	DONAGHMORE	74	121	61%	C3
167025008	DONAGHMORE	55	96	57%	C2
167025009	DONAGHMORE	47	97	48%	C1
167025010	DONAGHMORE	36	83	43%	C1
167025011	DONAGHMORE	54	115	47%	C2
167025012	DONAGHMORE	73	181	40%	C3
167025013	DONAGHMORE	48	108	44%	C1
167025014	DONAGHMORE	31	85	36%	C1
167025015	DONAGHMORE	54	75	72%	C1
167025016	DONAGHMORE	27	90	30%	C2
167025017	DONAGHMORE	58	130	45%	C1
167025018	DONAGHMORE	73	126	58%	C1
167025019	DONAGHMORE	50	121	41%	C3
167025020	DONAGHMORE	51	143	36%	C2
167025021	DONAGHMORE	34	93	37%	C2
167025022	DONAGHMORE	67	150	45%	C1
167025023	DONAGHMORE	74	146	51%	B3
167025024	DONAGHMORE	37	88	42%	C1
167025025	DONAGHMORE	92	114	81%	C2
167025026	DONAGHMORE	57	95	60%	D1
167025027	DONAGHMORE	36	93	39%	D1
167025028	DONAGHMORE	46	116	40%	B3
167025029	DONAGHMORE	44	107	41%	C1
167025030	DONAGHMORE	226	282	80%	A3
167025031	DONAGHMORE	157	224	70%	A3
167025032	DONAGHMORE	56	169	33%	B3
167025033	DONAGHMORE	35	93	38%	C3
167025034	DONAGHMORE	62	139	45%	C2
167042003	KILBREW	56	91	62%	B3
167042004	KILBREW	78	148	53%	C1
167042006	KILBREW	38	96	40%	C2
167042007	KILBREW	48	100	48%	C2
167042008	KILBREW	52	101	51%	C1
167042009	KILBREW	29	133	22%	C2
167078025	RATOATH	57	184	31%	C2
167025001/01	DONAGHMORE	24	102	24%	C2
167025001/02	DONAGHMORE	49	189	26%	C1
167042005/01	KILBREW	56	115	49%	B2
167042005/02	KILBREW	121	155	78%	A3
Total		2958	5896	47%	C1

4.1 National BER Database – Ashbourne

While this national BER map dataset is helpful, it only summarises all data to Small Area level. More granular data is contained in the SEAI national BER research tool.

The SEAI national BER database contains details of all 1,080,675 (at 2nd January 2025) published and current residential BER certificates. The BER database is publicly available, but it does not list actual addresses.

For this EMP study, a subset of the SEAI BER Database was created containing the data files for the 2,958 current BER records within the relevant Small Areas. These records were analysed in detail as explained in the next section.

4.2 BER Database Analysis

A range of charts and tables are provided in the following sections which provide insights into the current energy performance of the stock and provide key indicators to assist with identifying future strategy and objectives.

Table 3 : Average Residential BER for Ashbourne

Total Dwellings (Geodirectory)	5986	
Total Number Residential BERs	2958 (47%)	
Average Primary Energy kWh/m2/yr	149.65	C1
Average Floor Area (m2)	119.50	

Of the 2958 dwellings with BER certs, the average BER rating is C1, which is better than the national average of D1. The average floor area of the dwellings with BERs is 119.5m^2. Figure 6 below shows that the distribution across the BER bands.

Note that Census 2022 recorded 5,593 dwellings for the same Small Areas, which 393 less than the Geodirectory figure of 5986 supplied by SEAI.

The overall spread of BER ratings is shown in Figure 6.

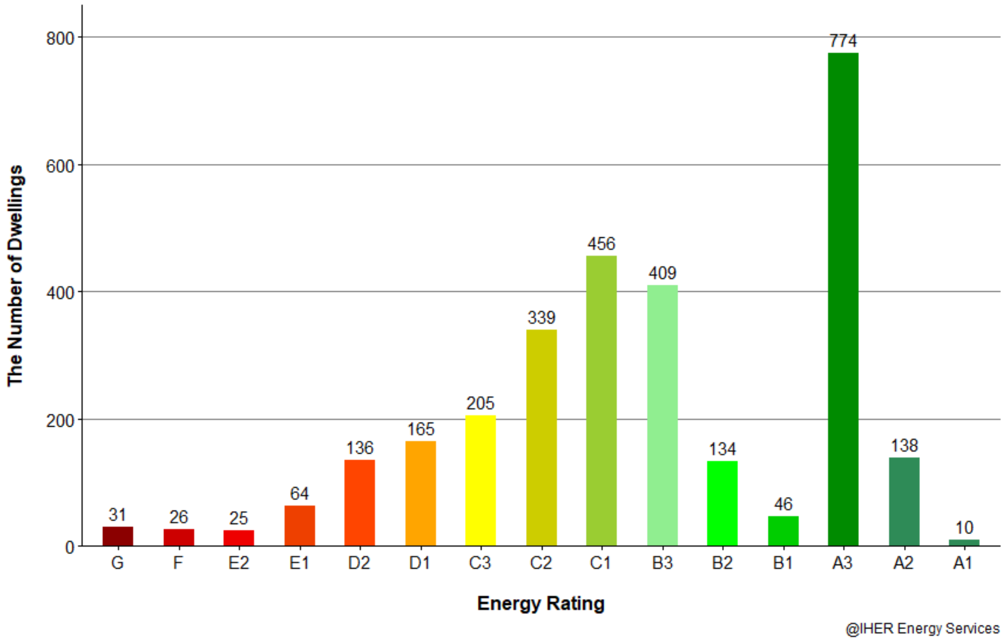

Figure 6 : Spread of BER Ratings

The following table and charts will dig deeper into the BER dataset and provide further insights.

4.2.1 Building Stock by Type and Age

Figure 7 shows stock by year of construction and dwelling type.

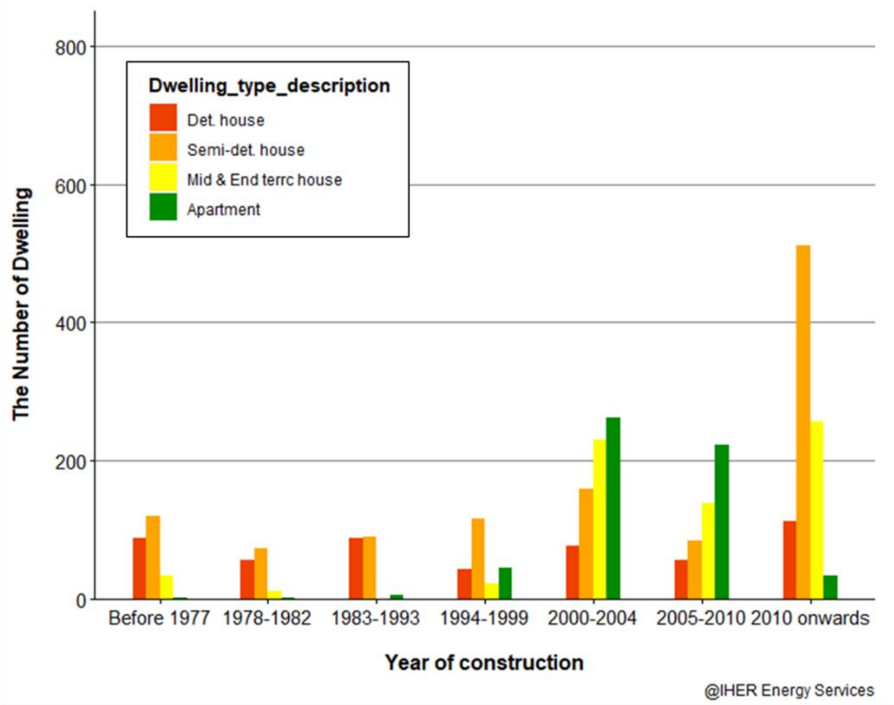

Figure 7 : Dwelling Type by Age Band

About 73% percentage of dwellings in Ashbourne with published BERs were built from 2000 onwards.

Figure 8 shows the same information in more detail from 2000 onwards.

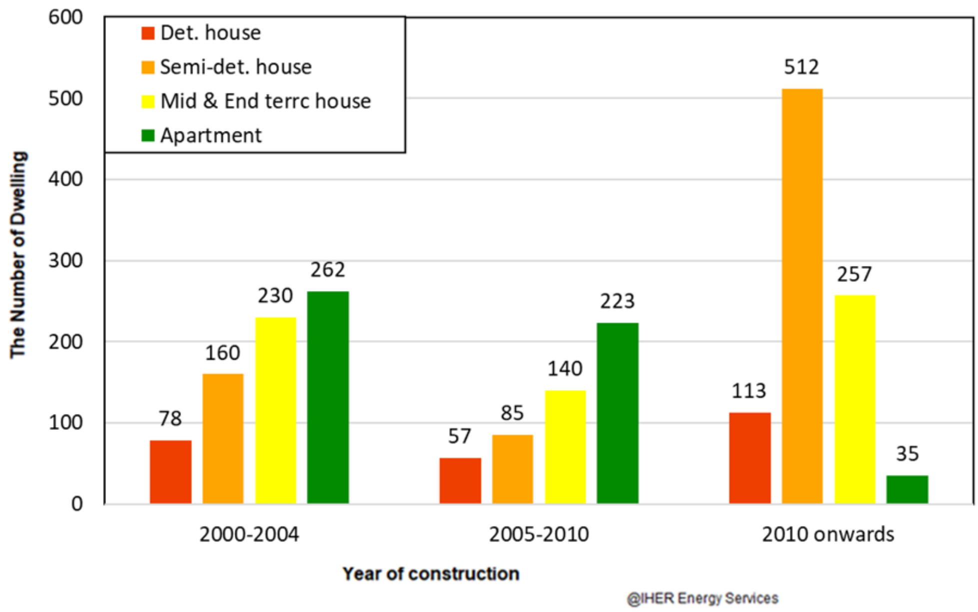

Figure 8 : Dwelling Type by Age Band (2000 onwards)

The main dwelling types (as recorded in BERs) from pre 1900 to the late 1990s were semi-detached houses and detached houses. From the 2000s onwards, apartments and terraced houses became more prominent. Table 4, also shows the associated numbers.

Table 4 : Dwelling Type by Age Bands

Row Labels	Apartment	Mid & End terrc house	Semi-det. house	Det. house	Grand Total
Before 1977	2	34	121	89	246
1978-1982	2	12	74	57	145
1983-1993	7	1	90	88	186
1994-1999	46	24	116	43	229
2000-2004	262	230	160	78	730
2005-2010	223	140	85	57	505
2010 onwards	35	257	512	113	917
Grand Total	**577**	**698**	**1158**	**525**	**2958**

However, it is important to also take account of the housing stock counts from Census 2022.

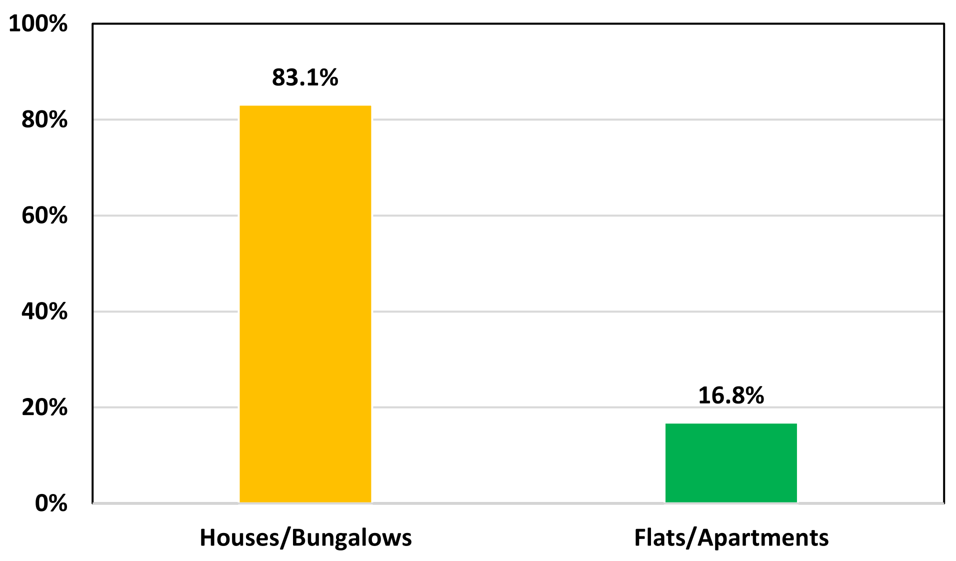

Figure 9 : Dwelling Type Counts – Census 2022

The 2022 Census in Figure 9 shows that 83.1% of dwellings are houses/bungalows, with 16.8% being apartments/flats.

Table 4 can also be summarised in chart format in Figure 10, by combining all dwellings up to 1977 (before Building Regulations) in a single group. While the BER age bands and the Census age bands are not exactly aligned, some useful observations can be made, nonetheless.

Figure 10 below shows that 75% of dwellings with BERs are dated from 2000 onwards.

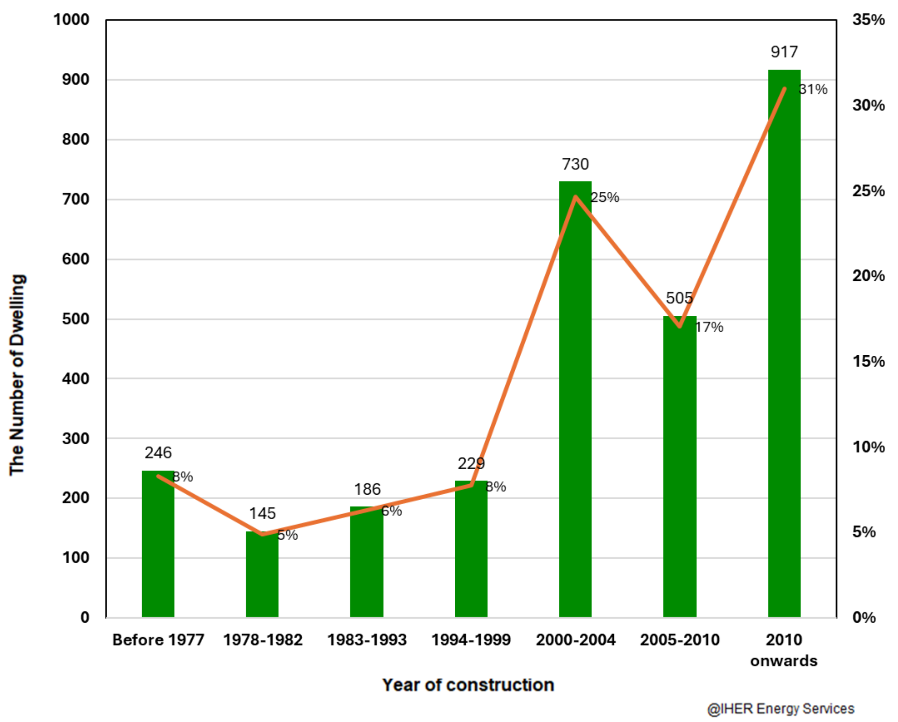

Figure 10 : Dwelling Totals by Age Band- BER Dataset

When the Census 2022 dwellings count is shown in 11, it is interesting to note that 56% of dwellings are dated from 2000 onwards.

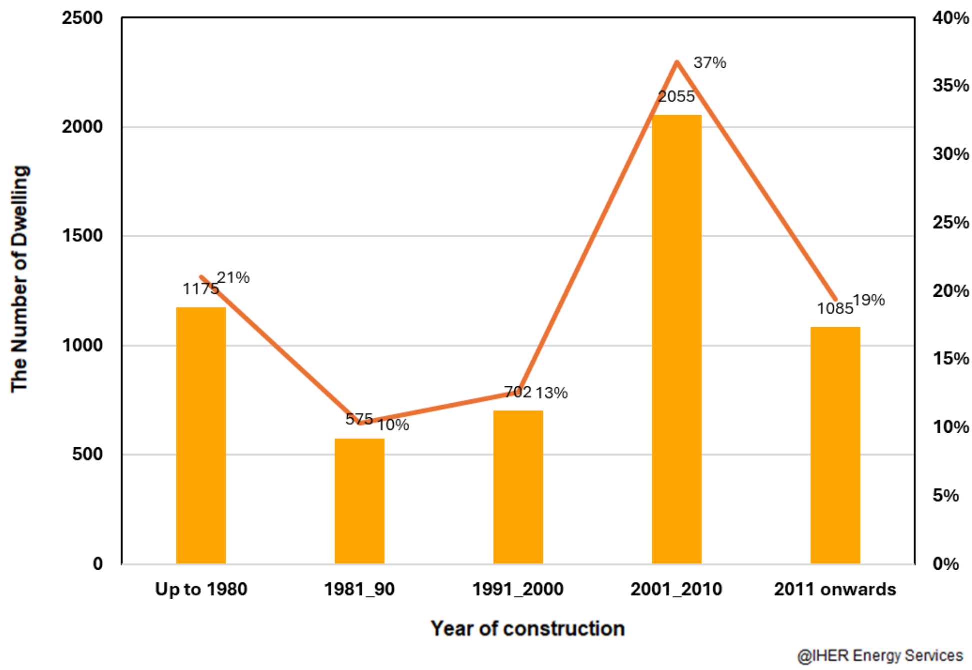

Figure 11 : Dwelling Total by Age Band- Census 2022

Looking at the numbers in Table 4, 2152 BER certs are for dwellings dated from 2000 onwards. Yet the Census records 3140 dwellings aged from 2001 onwards. As BERs only became mandatory for new dwellings for sale from 2007 onwards, this would partially explain the difference in numbers.

Only 8% of dwelling with BERs date from before 1977. The 2022 Census records that 21% of dwellings are built before 1980. So, it is reasonable to assume that the average BER score for the whole stock might be worse than indicated by the BER dataset.

4.2.2 BER Rating By Age Band

Table 5 shows stock by year of construction and BER rating band.

Table 5 : BER Ratings by Age Band

BER Ratings	Before 1977	1978-1982	1983-1993	1994-1999	2000-2004	2005-2010	2010 onwards	Total
A1							10	10
A2	1		1	1		2	133	138
A3	1	2	2	2	3	3	761	774
B1	1	2	2	7	18	10	6	46
B2	3	8	13	9	27	69	5	134
B3	13	13	23	32	185	141	2	409
C1	15	15	35	53	213	125		456
C2	23	20	33	54	143	66		339
C3	13	22	27	35	77	31		205
D1	37	28	22	24	34	20		165
D2	42	23	20	10	18	23		136
E1	28	6	6	2	10	12		64
E2	17	4	1			3		25
F	25				1			26
G	27	2	1		1			31
Total	**246**	**145**	**186**	**229**	**730**	**505**	**917**	**2958**

It is interesting that 122 dwellings built between 2000 and 2010 have ratings of D1 or worse. Many are electrically heated apartments (which are generally the worst performers) and some are houses with oil boilers.

The same data is shown graphically in Figure 12 : BER Ratings by Age Band.

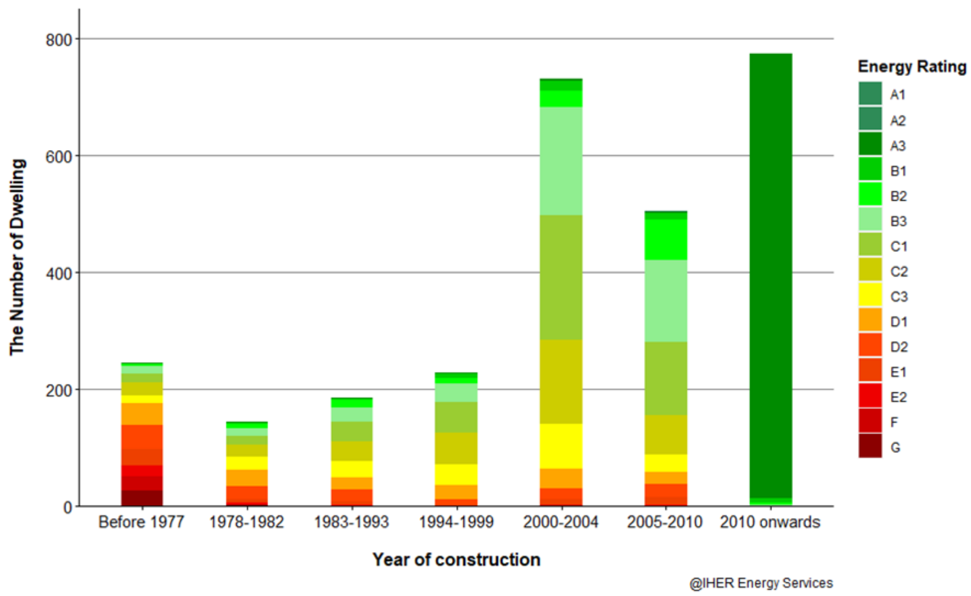

Figure 12 : BER Ratings by Age Band

4.3 Wall Types

The BER dataset also records the main wall type for each of the 2,958 dwellings with BER certs.

Up to 1977, solid block and hollow block walls are most common. Then from 1978 onwards, cavity wall construction is the dominant wall type.

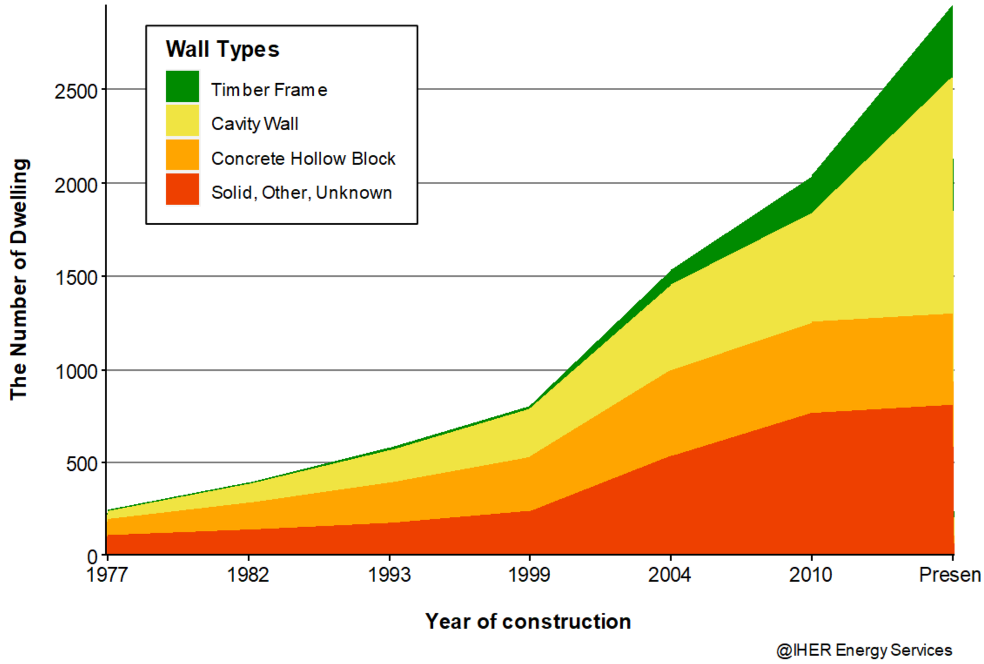

Figure 13 : Stock by Wall Types

Even from 2010 onwards, cavity wall construction dominates over timber frame construction.

Table 6 : Wall Types by Age Band

	Timber Frame	Cavity Wall	Concrete Hollow Block	Solid, Other, Unknown	Grand Total
Before 1977	3	44	90	109	246
1978-1982	1	57	57	30	145
1983-1993	8	73	68	37	186
1994-1999	6	84	77	62	229
2000-2004	63	199	168	300	730
2005-2010	120	129	27	229	505
2010 onwards	187	681	3	46	917
Grand Total	**388**	**1267**	**490**	**813**	**2958**

From 2000 onwards, 575 dwellings have walls listed as solid, other and unknown. These three categories are clustered together by SEAI. By filtering the BER database master, if "unknown" is selected, many of these correspond with apartments where BER assessors are often unsure of the wall construction type.

4.4 Wall Insulation Levels

BER data files also provide information on the levels of wall insulation by indicating the U value (in W/m^2K).

Draft Building Regulations were first introduced in Ireland in 1976 and there were revisions in 1981 (draft also), leading to full Building Regulations in 1991 with subsequent revisions in 1997, 2002, 2005, 2008 and 2011. Allowing for the transition interval between the commencement date for new regulations and the completion of the construction process, dwellings built two years after the introduction of the new regulations are deemed to meet the new regulations.

Thus, it is assumed that all dwellings built before 1977 were not insulated when constructed. The default U values defined in Appendix S of the SEAI DEAP manual v4.2.6 are shown in Table 7.

Table 7 : Exposed Wall U-values (Appendix S, DEAP Manual 4.2.6)

Age Band	A	B	C	D	E	F	G	H	I	J	K	L
Wall type	Before 1900	1900-1929	1930-1949	1950-1966	1967-1977	1978-1982	1983-1993	1994-1999	2000-2004	2005 - 2009	2010 - 2013	2014-0nwards
Stone	2.1	2.1	2.1	2.1	2.1	1.1	0.6	0.55	0.55	0.37	0.27	0.21
225mm solid brick	2.1	2.1	2.1	2.1	2.1	1.1	0.6	0.55	0.55	0.37	0.27	0.21
325mm solid brick	1.64	1.64	1.64	1.64	1.64	1.1	0.6	0.55	0.55	0.37	0.27	0.21
300mm cavity	2.1	1.78	1.78	1.78	1.78	1.1	0.6	0.55	0.55	0.37	0.27	0.21
300mm filled cavity	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.55	0.55	0.37	0.27	0.21
Solid mass concrete	2.2	2.2	2.2	2.2	2.2	1.1	0.6	0.55	0.55	0.37	0.27	0.21
Concrete hollow block	2.4	2.4	2.4	2.4	2.4	1.1	0.6	0.55	0.55	0.37	0.27	0.21
Timber frame	2.5	1.9	1.9	1.1	1.1	1.1	0.6	0.55	0.55	0.37	0.27	0.21

SEAI uses a performance ranging system as part of the advisory report generation process. See all ranking categories in Figure 14.

			Very Poor	Poor	Fair	Good	Very Good
Home Heat Loss (Heat Loss Indicator)[1]		$W/(K \cdot m^2)$	> 4.000	4.000-3.000	3.000-2.300	2.300-1.000	< 1.000
Roof U-Value[2]		W/m^2K	> 1.350	1.350-0.380	0.380-0.310	0.310-0.130	< 0.130
Walls U-Value[2]	Cavity Walls	W/m^2K	> 1.440	1.440-0.830	0.830-0.460	0.460-0.210	< 0.210
	Other Walls	W/m^2K	> 1.350	1.350-0.720	0.720-0.390	0.390-0.210	< 0.210
Floor U-Value[2]		W/m^2K	> 1.000	1.000-0.700	0.700-0.530	0.530-0.300	< 0.300
Windows U-Value[2]		W/m^2K	> 3.100	3.100-2.500	2.500-1.900	1.900-1.100	< 1.100
Doors U-Value[2]		W/m^2K	> 3.350	3.350-2.700	2.700-2.100	2.100-1.800	< 1.800
Space Heating – Primary Energy Efficiency[3]	Main	%	< 64	64-73	73-78	78-82	> 82
	Secondary	%	< 18	18-27	27-45	45-59	> 59
Space Heating Controls			No time control	Limited control	Basic control	Advanced control	Very advanced control
Water Heating Primary Energy Efficiency[3]		%	< 64	64-73	73-78	78-82	> 82
Lighting – Average Efficacy		Lm/W	< 15.00	15.00-25.00	25.00-50.00	50.00-60.00	> 60.00
Mechanical Ventilation Efficiency		%	< 50	50-60	60-70	70-80	> 80
Whole-house extract ventilation – Specific Fan Power		W/l/s	> 0.50	0.50-0.45	0.45-0.40	0.40-0.35	< 0.35
Renewable Energy Ratio		%	0	0-5	5-10	10-20	> 20

1. The Home Heat Loss Indicator (HLI) is a summary of the overall performance of the home. It includes all the fabric and ventilation upgrades listed in the table
2. A U-value is a measure of the heat loss through the building fabric. The higher the U-value, the greater the heat loss.
3. Primary Energy Efficiency is the efficiency divided by the primary energy conversion factor.

Figure 14 : SEAI Advisory Report – Ranking system

To determine if walls are insulated to a reasonable standard, analysis was done on all dwellings to divide them into 3 categories based on limits decided by SEAI within the standard advisory reports:

- **Well insulated (Good/ very good)**: wall U values of 0.46 W/ m^2 or less
- **Not well insulated (Fair)**: wall U values >0.46W/m2K and <= 0.72 W/ m^2K
- **Poorly insulated or Uninsulated (poor/ very poor)**: wall U values > 0.72 W/ m^2K

The results of the analysis are shown in Table 8.

Table 8 : Wall Insulation Analysis

Row Labels	Not well insulated	Insulated	Poorly Insulated	Grand Total
Before 1977	26	45	175	246
1978-1982	26	34	85	145
1983-1993	140	45	1	186
1994-1999	180	43	6	229
2000-2004	588	94	48	730
2005-2010	71	380	54	505
2010 onwards		917		917
Grand Total	**1031**	**1558**	**369**	**2958**

The same data is shown in graph format in Figure 15.

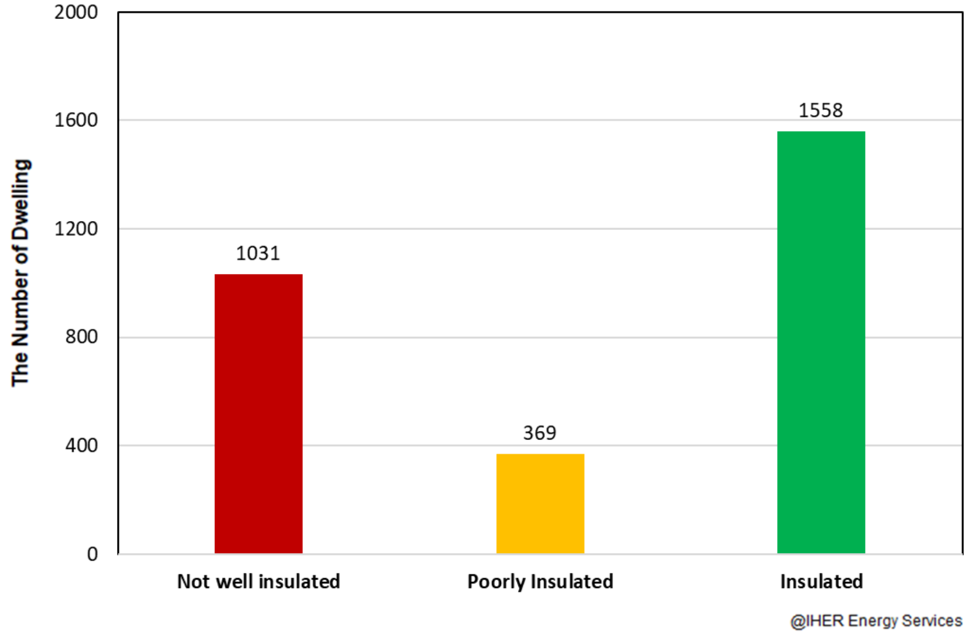

Figure 15 : Wall U-Value Analysis

The Ashbourne wall insulation data is also shown by age band in Figure 16.

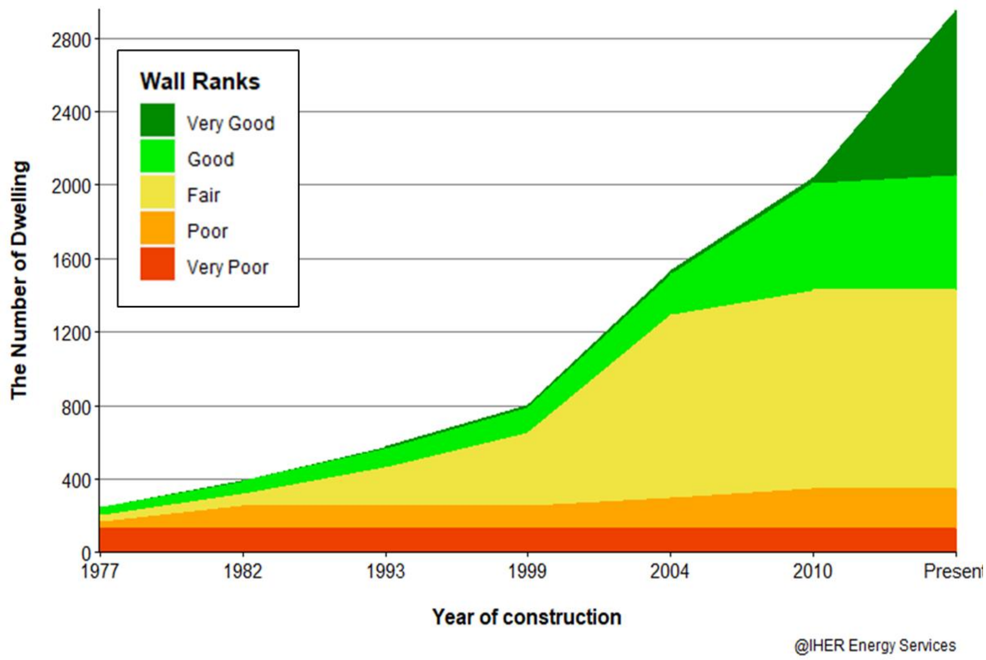

Figure 16 : Wall Insulation Ratings

4.5 Windows

For a new house or following retrofit works on a dwelling, the BER assessor is normally provided with test certificates for windows that states their U value performance.

When a BER assessor surveys an existing dwelling, typically window test certs would not be available. In such cases, the BER Assessor will select the U value based on the age on the dwelling, glazing type and the frame type. The default U values for double glazing are shown in Table 9.

Table 9 : Double Glazing Default U-values

Double Glazing	U Value (Metal-frame)	U Value (Wood/PVC frame)
Pre 2004	3.7	3.1
2004-2009	2.7	2.2
2010 onwards	2.5	2.0

In analysing window performance for the purposes of this report, windows were subdivided into three categories:

- **Very Good**: U < 1.1 W/m2K
- **Good**: 1.9 W/m2K <U> 1.1 W/m2K
- **Fair**: 2.5 W/m2K < U> 1.9 W/m2K
- **Poor**: 3.1 W/m2K < U> 2.5 W/m2K
- **Very Poor**: U > 3.1 W/m2K

The window type counts are shown in Table 10. The analysis shows just 33.4% of the dwellings with BERs are rated as having good /very good quality windows, i.e. with window U values less than or equal to U=1.9.

Table 10 : Windows U-Value Analysis

Age Band	Very Poor	Poor	Fair	Good	Very Good	Grand Total
Before 1977	64	94	69	17	2	246
1978-1982	19	70	41	14	1	145
1983-1993	26	86	59	11	4	186
1994-1999	24	168	29	7	1	229
2000-2004	67	353	293	16	1	730
2005-2010		29	466	9	1	505
2010 onwards			26	800	91	917
Grand Total	**200**	**800**	**983**	**874**	**101**	**2958**

The same data is shown in Figure 17.

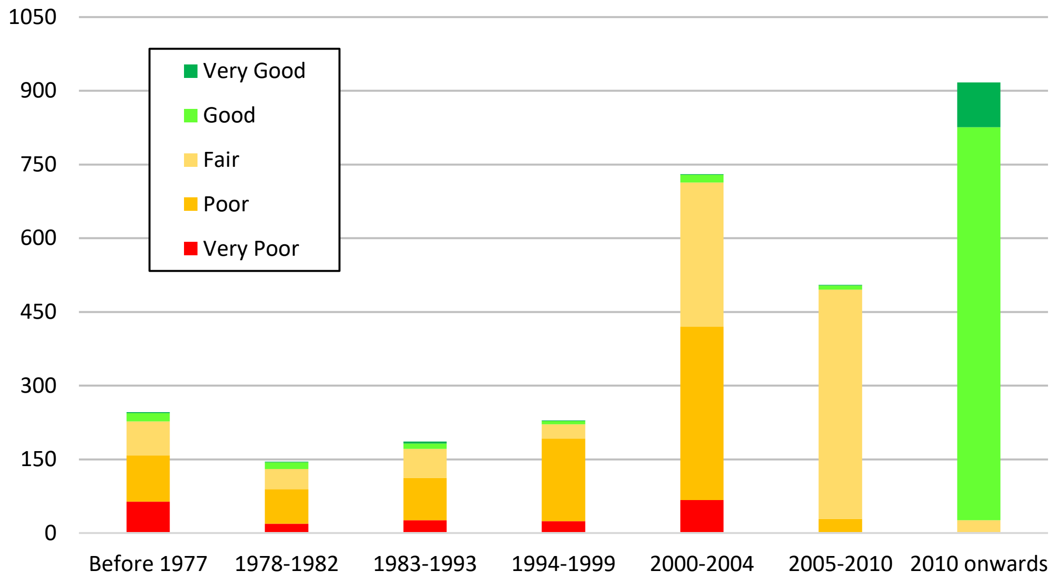

Figure 17 : Windows U-Value Analysis

4.6 Summary of Building Fabric based on SEAI Advisory Report Rankings

Using the SEAI advisory report ranking criteria, the summary charts for Ashbourne are presented in Figure 18.

By focussing on the charts dominated by green segments (good/ very good), floors and roofs are performing quite well within the Ashbourne stock. Walls are the next best performing with windows deemed to be the lowest performing category.

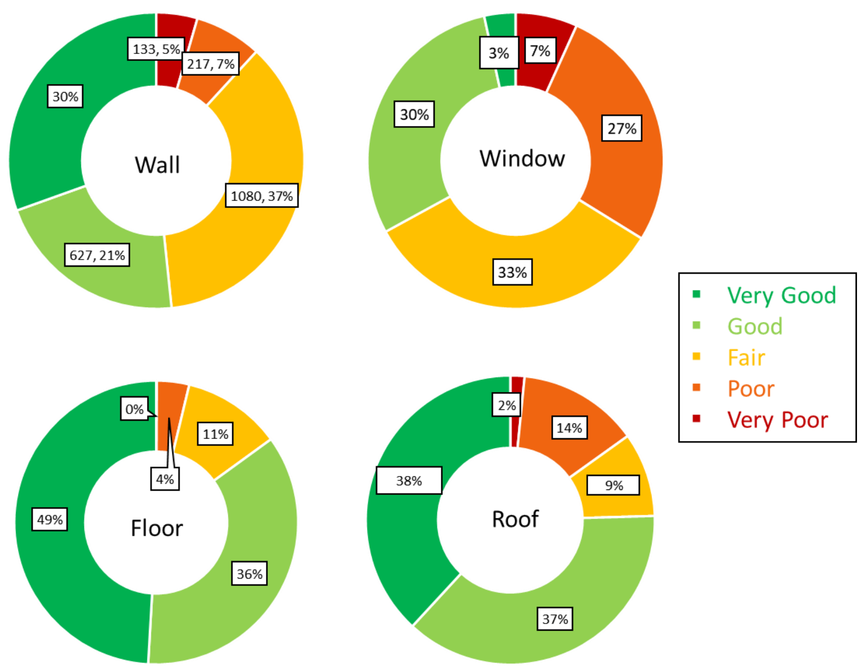

Figure 18: Summary of Fabric Advisory Brands Level

4.7 Fuel Types

The main fuel types recorded in the BER dataset are shown in Table 11.

Table 11 : Main Space Heating Types by Age Band

Row Labels	Electricity	Heating Oil	Natural Gas	Solid Smokeless Fuel	Grand Total
Before 1977	9	118	112	7	246
1978-1982	3	59	81	2	145
1983-1993	14	94	77	1	186
1994-1999	11	25	193		229
2000-2004	79	10	641		730
2005-2010	138	3	363	1	505
2010 onwards	191	1	725		917
Grand Total	**445**	**310**	**2192**	**11**	**2958**

As shown in Figure 19, natural gas is dominating at 74.1%, followed by electricity at 15% as electricity became more significant from 2000 onwards.

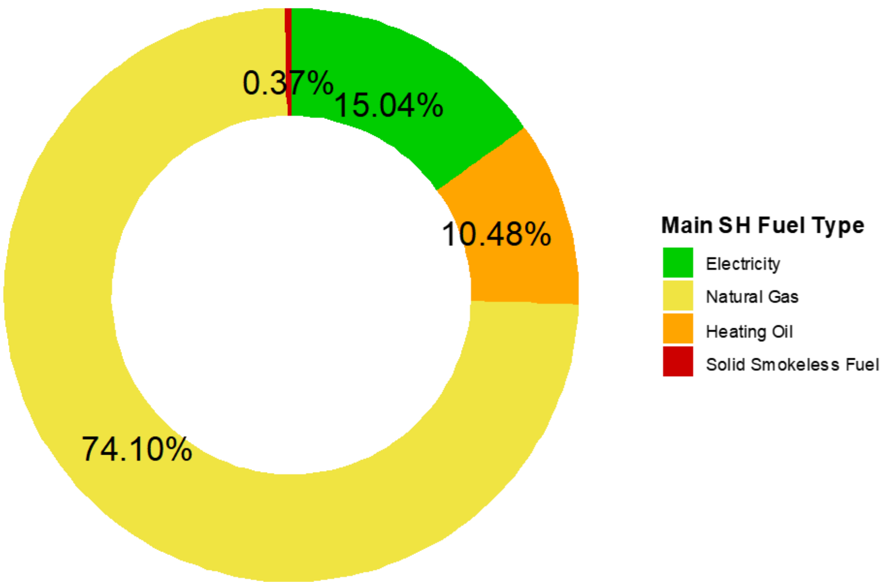

Figure 19: Main Space heating fuel (BER dataset)

The 2022 Census also provides heating fuel information to compare with the BER dataset figures.

The 2022 Census results are shown in Table 12 below for 5592 dwellings in Ashbourne. Interestingly the proportion with electricity heating is similar at 13%, whereas gas is down at 62%, oil is higher at 20% with solid fuel including wood pellets up at 1%.

Table 12: **Main Space Heating Fuel (Census 2022)**

None	Other/Not Stated	Solid fuel	Oil	Gas/LPG	Electricity
28	193	64	1093	3486	728
1%	3%	1%	20%	62%	13%

These comparative results are again explained possibly due to the fact that a higher proportion of older dwellings will not have BER certs. Also, these older dwellings will be more likely to have oil and solid fuel heating systems.

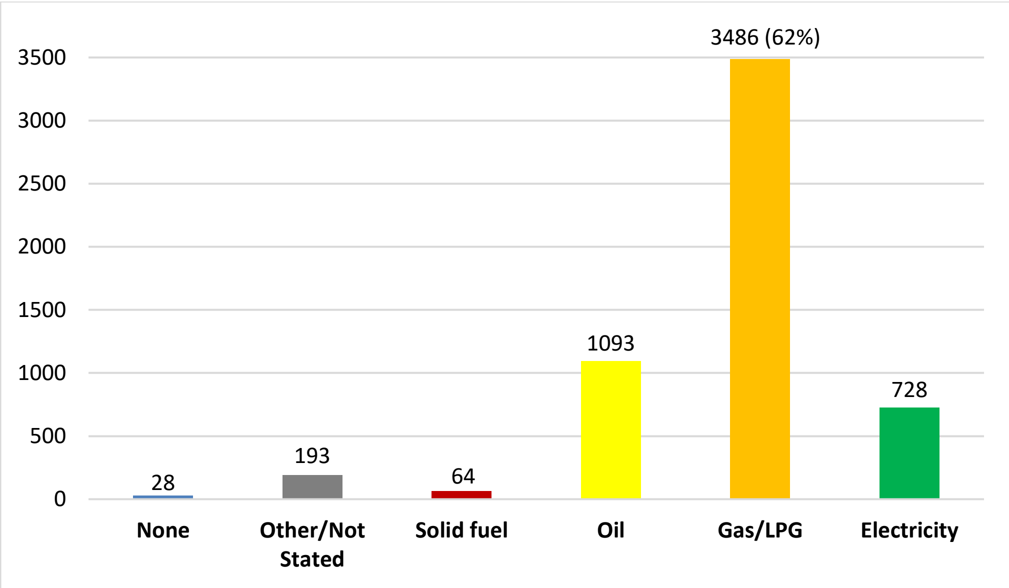

Figure 20 : Main Heating Fuel - Census 2022

4.8 Heating System Types

Table 13 shows heating system types used in houses and apartments.

Table 13: Main Space Heating Types by Age Band

Row Labels	Non-Condensing Boiler	Condensing Boiler	Electric Heating	Heat Pump	Grand Total
Before 1977	123	114	6	3	246
1978-1982	72	70	2	1	145
1983-1993	70	101	10	5	186
1994-1999	66	152	8	3	229
2000-2004	326	325	77	2	730
2005-2010	187	180	133	5	505
2010 onwards		726		191	917
Grand Total	**844**	**1668**	**236**	**210**	**2958**

It is interesting to observe that from 2010 onwards, 191 homes have heat pump systems and 726 have had condensing fossil fuel boilers fitted. Table 13 also lists 191 homes from 2010 onwards heated by electricity which matches the number with heat pumps.

More than 1000 homes built between 2000 and 2010 have boiler systems and 50% of these are non-condensing boilers. Just 12 dwellings built before 2000 have had heat pumps fitted.

The data is also presented in chart format in Figure 21 .

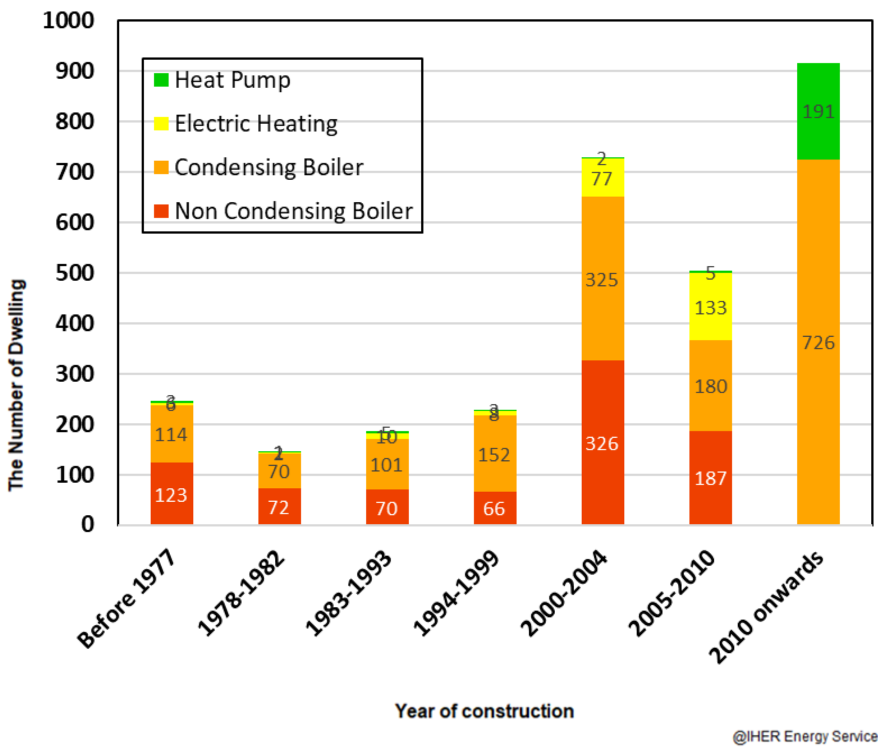

Figure 21 : Main Heating Type by Age Band

4.9 Space Heating System Efficiency Ranges

The average space heating efficiency values from the BER datasets is shown in Figure 22 below.

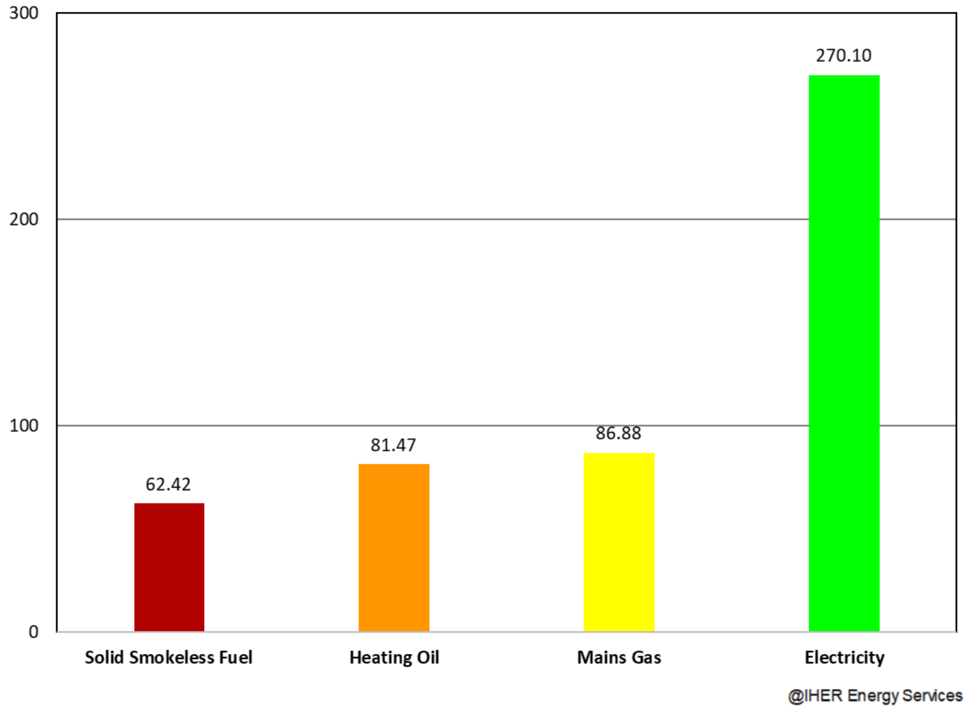

Figure 22 : Average Space Heating Efficiencies by Fuel Type

The efficiency of heat pumps for space heating is typically more than 400%. When blended with dwellings with direct acting heating or storage heating which have 100% efficiency values, this gives an average efficiency of 270% for electrically heated dwellings. This compares to just an average efficiency of 82% - 87% for gas and oil boilers.

4.10 Heat Loss Indicator (HLI)

In relation to residential buildings, the Climate Action Plan is seeking to get 500,0000 Irish homes upgraded to a B2 BER by 2030 and to have 400,000 heat pumps installed in existing Irish homes. SEAI provides a €6,500 grant for heat pump installations in houses and €4,500 for heat pump installations in apartments.

SEAI wants to ensure that heat pumps are only retrofitted in homes where heat loss is equivalent to a new home built in 2005, so that the heat pump will perform satisfactorily. Thus, all older homes will need to have significant insulation upgrades if applying for the grant. The level of heat loss (fabric and ventilation losses) is specifically measured in the BER software, and this value is called the Heat Loss Indicator (HLI). The HLI is required to be less than or equal to 2.3 W/Km2 in order to qualify for the heat pump grant.

Table 13 above shows that there are currently 210 heat pumps installed in the Ashbourne area based on published BER certificates. Table 14 below, extracted from the Ashbourne BER database, shows that 1705 (or 58% of those dwellings with BER certs already) have a HLI < 2. So, where these dwellings have boilers, they are ideally suited for changing over to heat pumps, assuming their building performance is confirmed as satisfactory. A further 475 dwellings (or 16% of those with BER certs already) have a HLI between 2 and 2.3 and are also deemed to be "heat pump ready" and will qualify for the SEAI heat pump grant. In total, 2,180 homes in Ashbourne have a HLI < 2.3 but only 210, (10%) have heat pumps fitted.

Table 14 : HLI banding by Age of Construction

Row Labels	**HLI<2**	**HLI=2-2.3**	**HLI=2.3-2.6**	**HLI=2.6-3**	**HLI>3**	**Grand Total**
Before 1977	5	9	23	36	173	246
1978-1982	14	18	25	40	48	145
1983-1993	18	42	57	49	20	186
1994-1999	52	98	55	18	6	229
2000-2004	342	223	92	20	53	730
2005-2010	358	84	30	13	20	505
2010 onwards	916	1				917
Grand Total	**1705**	**475**	**282**	**176**	**320**	**2958**
Percentage %	58%	16%	10%	6%	11%	

Figure 23 illustrates the heat pump upgrade opportunity that exists within the newer Ashbourne housing stock.

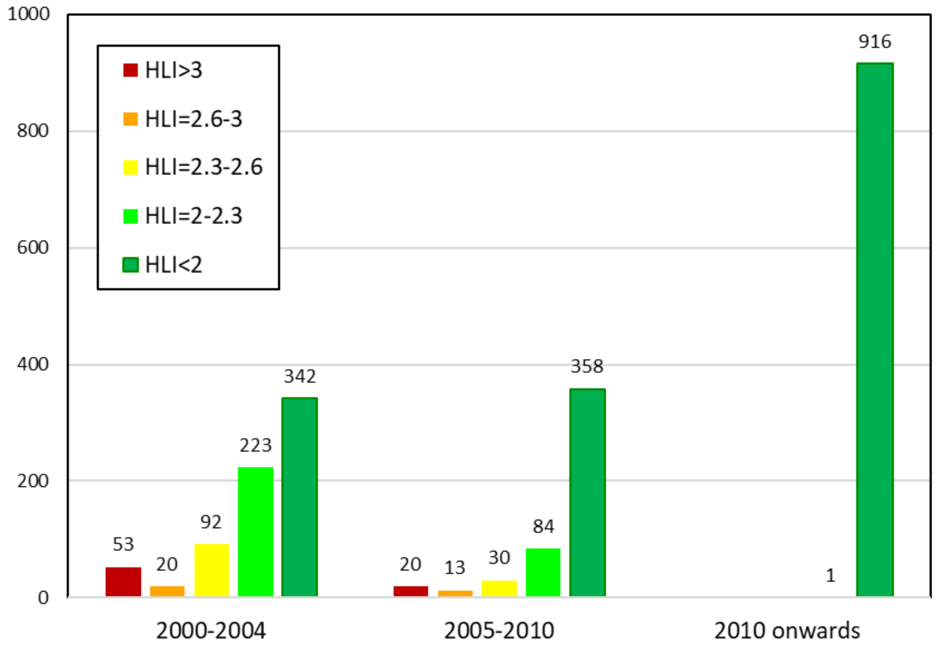

Figure 23 : HLI banding by Age of Construction

5 Baseline of Electrical, Thermal and Transport Demand

The baseline energy demand comprises energy used in the 5896 residential dwellings, 288 commercial units/ public buildings and transport. The energy use in each of these sectors is outlined in the following sections.

5.1 Residential Buildings

From the BER database analysis of 2958 published BER certs, we can derive the following:

- The average primary energy value of a Ashbourne dwelling is 149.65 kWh/ m^2/year, equivalent to a C1 rating. This shows that the Ashbourne stock is better than the national average of D1.
- The average floor area of a Ashbourne dwelling is 119.50m^2.

As shown in Table 15, the average primary energy per dwelling in Ashbourne is 17,833 kWh per year based on published BER data. Note that the BER calculates energy used for space heating, water heating, pumps and fans and lighting. It does not include energy used for cooking or other appliances. (The average primary energy for a new dwelling would be roughly 7,500 kWh per annum, not including renewable generation which is mandatory at a minimum of 20%). So, the average Ashbourne home is estimated to use two times more energy per annum than a new house built to current building regulations.

Table 15 : Average Primary Energy Per Dwelling

Average Primary Energy (kWh/m2.yr)	Average Floor Area (m2)	Average Primary Energy per dwelling (kWh/ annum)
149.65	119.5	17,883

Expanding this to the total stock of 5,896 dwellings, the total estimated primary energy consumption of all dwellings is 105,439,200 kWh per annum or also expressed as 105.44 GWh (gigawatt hours) – see Table 16.

Table 16 : Total Estimated Annual Primary Energy of all Dwellings

Total Number of Dwellings	Total Primary Energy of all dwellings (kWh)
5896	105,439,200

Another useful metric is the annual energy spend. The SEAI SEC Guidelines advise that the average Irish household spend for heating and electricity is €3,800 per annum.

For the 5,896 dwellings in Ashbourne, this indicates an annual energy spend of €22.4m (Table 17).

Table 17 : Total Estimated Annual Energy Spend - all Dwellings

Total Dwellings (Source: SA summary)	Annual Energy Bill (heating & electricity) *SEAI	Annual Residential Energy Costs
5896	€3,800	€22,404,800

5.2 Commercial and Public Buildings

In an ideal world, a register would be available listing the annual energy use and energy costs data for all commercial and public businesses/ buildings. While this is rarely available, it is a process that all SECs should aspire to create.

As the kick-of meeting, the SEC committee were asked to provide a list of all non-domestic energy consuming buildings/ businesses in Ashbourne to enable a rough estimate to be calculated. It was hoped that actual energy data could also be provided by some of the non-domestic buildings.

The Ashbourne SEC team designed a short energy use survey and issued it to local businesses asking for completion. Despite a very determined effort by the local SEC team including calling in to several businesses, there was a very poor response to the survey from the business community and only one survey response was returned.

As a result, a second approach more standard approach was adopted. The local SEC team provided a full list of all businesses/ commercial buildings and public buildings. Then each non-domestic energy user was classified as either a small, medium or high energy users to line up with baseline energy use values supplied by SEAI.

The SEAI publication EMP Funding Update (October 2022), advises an average energy spend for small businesses of €30,600 per annum (split €10,200 for electricity and €20,400 for gas) and an average spend of €114,000 for large business (split €42,000 for electricity and €72,000 for gas). Medium sized users are assumed to have an annual spend of €72,300 (split €26,100 for electricity and €46,200 for gas).

Table 18: Energy Costs by Business Size

	Electricity costs per biz	Natural Gas costs per biz
Small businesses	€10,200	€20,400
Medium business*	€26,100	€46,200
Large businesses	€42,000	€72,000

The SEAI benchmark assumes a 33:67 cost split for electricity and gas/ oil usage by businesses. Using current prices per kWh for electricity and gas, the equivalent kWh of energy and associated CO_2 emissions can be calculated.

The SEAI published prices at 01/10/2024 are shown in Table 19.

https://www.seai.ie/sites/default/files/publications/Commercial-Fuel-Cost-Comparison.pdf

Table 19 : Energy Costs/ kWh by Fuel Type

	Elec c/kWh (Band 1B)	Gas/kWh (Band I1, I2)
Small businesses	0.330	0.120
Medium business	0.330	0.086
Large businesses	0.330	0.086

Then assuming 33 cents / kWh for electricity and 8.6c – 12c/ kWh for natural gas, the annual kWh for the respective fuel sources for all business types is shown in Table 20.

Table 20 : Energy Use (kWh) Split by business size

	Estimated Elec kWh (per biz)	Estimated Gas kWh (per biz)
Small businesses	30,909	169,858
Medium business	79,091	540,351
Large businesses	127,273	842,105

The census of business premises in Ashbourne yielded the summary listing in Table 21 of 288 non-domestic energy users and assigned usage categories.

Table 21 Business/ Public Buildings List

	Number
Small businesses	96
Medium business	160
Large business	29
St Declan's National School	1
REM	1
Hugh Maguire Butchers	1
Total	**288**

Annual energy use and costs recorded from the energy audits is as follows:

Table 22 Energy Audits Billing Data

Billing Data - Audits	Annual Elec costs	Annual Gas costs	Total Energy Costs
St Declan's National School	€9,983	€25,793	€35,776
REM	€7,653	€1,724	€9,377
Hugh Maguire Butchers	€15,359	€1,001	€16,360
Total: Audit Billed	**€32,995**	**€28,518**	**€61,513**

Then, the estimated annual energy/ fuel costs for all non-domestic buildings are summarised in Table 23 below.

Table 23 : Total Estimated Annual Energy Spend – Commercial & Public Buildings

	Annual Est Elec cost - All businesses per type	Annual Est Gas/oil cost - All businesses per type	Summary Total - Biz Energy Costs
Small businesses	€979,200	€1,958,400	
Medium business	€4,176,000	€7,392,000	
Large businesses	€1,218,000	€2,088,000	
Total: S/M/L	**€6,373,200**	**€11,438,400**	**€17,811,600**
Audit billed data	**€32,995**	**€28,518**	**€61,513**
Total	**€6,406,195**	**€11,466,918**	**€17,873,113**

The recorded annual energy use from the audit reports is shown in Table 24.

Table 24 : Total Annual Energy Usage from 3 x Audits

	Electricity (kWh)	Annual Gas (kWh)	Total kWh
St Declans National School	55,200	169,947	225,147
REM	25,512	19,155	44,667
Hugh Maguire Butchers	59,467	8,197	67,664
Total	140,179	197,299	337,478

Then using the energy use per business type (Table 23), the counts of all business users (Table 21) and the energy use from the 3 audits (Table 24), the estimated total non-domestic buildings energy us is shown in Table 25.

Table 25: Total Estimated Annual Energy Use – Commercial/ non-domestic

	Total Elec (kWh)	Total Gas (kWh)	Total Primary Energy (kWh)
Small businesses	2,967,273	16,306,411	19,273,684
Medium business	12,654,545	86,456,140	99,110,686
Large businesses	3,690,909	24,421,053	28,111,962
Total: S/M/L (KWh)	**19,312,727**	**127,183,604**	**146,496,332**
Total: Billed Non-Dom (KWh)	**140,179**	**197,299**	**337,478**
Grand Total (KWh)	**19,452,906**	**127,380,903**	**146,833,810**

To calculate the associated CO2 emissions, the kWh/CO_2 conversion factors in **Table 26** are used.

Table 26: kgCO2/ kWh Conversion Factors

Elec (kgCO2/kWh)	Gas (kgCO2/kWh)
0.409	0.206

The total annual carbon dioxide emissions for non-domestic buildings are then calculated as shown in Table 27.

Table 27 : Total Estimated Annual CO2 emissions – Commercial/ non-domestic

Non-Domestic	Elec (kgCO2)	Gas (kgCO2/kWh)	Total (kgCO2)
CO2 Emissions	7,956,239	26,240,466	**34,196,705**

All non-domestic summary figures are shown in Table 28.

Table 28 : Non-Domestic Baseline Summary

	Electricity	Fossil Fuel	Total
Total Primary Energy (kWh)	19,452,906	127,380,903.31	146,833,810
Total CO2 (tonnes)	7,956	26,240	34,197
Total Spend (€)	€6,406,195	€11,466,918	€17,873,113

Note: The commercial energy use baseline calculation includes significant assumptions that need to be treated with caution. It is likely that these numbers are higher than the actual case, but these can only be challenged if actual energy use data can be provided.

A simple template is shown in Appendix D that could be shared with businesses to submit their annual kWh usage across different fuel types. This can be provided in excel format and modified for use by any business.

5.3 Transport

According to the 2022 Census (Table 29), there were 2070 cars in the Ashbourne EMP catchment area. 127 dwellings reported having no car.

Table 29 : 2022 Census Car Count Ashbourne

	no_car	1_car	2_car	3_car	4_plus_car	
Addresses surveyed	127	572	513	100	43	1355
Total Cars		572	1026	300	172	**2070**

Table 30 Department of Transport's Irish Bulletin of Vehicle and Driver Statistics (2022) provides national figures for the total number of vehicles by fuel type.

https://www.gov.ie/en/publication/f392d-bulletin-of-vehicle-and-driver-statistics/#2022

Table 30 : 2022 National Car split by fuel type

	Petrol & Other cars	Diesel cars	BEVs	Total
Private Cars	807,673	1,272,840	175,458	2,255,971
Total (%)	35.8%	56.4%	7.8%	100%

SEAI's Funding Update (24/10/2022) gives an assumed average fuel spend of €2,287 per annum for petrol cars and €2,520 for diesel cars. The annual running cost per BEVs is estimated at €477 using the annual distance of 12,858 km in Table 32 below and SEAI's published cost of €3.86/100 km for BEVs.

Applying the national car split by fuel type and SEAI fuel spend data to the Ashbourne car count from the 2022 Census yields the annual running cost estimate of €19.4m for car transport as shown in Table 31.

Table 31 : Estimated Fuel / Energy Costs of Car Transport

	Petrol & Other cars	Diesel cars	BEVs	Total
Cars split (DOT-2022)	35.8%	56.4%	7.8%	
No. of Cars	3,049	4,805	662	8,516
Fuel spend per car p.a.	€2,287	€2,520	€477	
Total Spend	€6,972,746	€12,108,114	€315,836	€19,396,696

In terms of energy use, national statistics on average distances travelled by vehicle type are shown in Table 32. It also shows kWh/km and gCO_2/km values so energy and carbon emissions can be calculated.

Table 32 National Vehicle Performance Values

		National average annual km	kWh/km (TPER)	gCO_2/km
Car	*Petrol*	*12,113*	*0.73*	*167*
	Diesel	*19,681*	*0.7*	*167*
	BEV	*12,958*	*0.38*	*65*
Motorcycle		*2,741*	*0.41*	*94*
Van		*19,787*	*1.01*	*243*
Truck		*44,671*	*3.47*	

The data in Table 32 was supplied by Codema using data from a variety of sources:

Private (ICE) car, public transport emissions	https://www.cie.ie/Enviromental-Corporate-Responsibility/Climate-action
BEV efficiency	https://www.iea.org/reports/global-ev-outlook-2020
Motorbike emissions	https://www.co2nnect.org/help_sheets/?op_id=602&opt_id=98
LCV emissions	https://www.transportenvironment.org/sites/te/files/publications/CE_Delft_4L06_Van_use_in_Europe_def.pdf
HGV emissions	https://aems.ie/download/hgv-fuel-consumption-white-paper-icct/
E-bikes	https://www.bosch-ebike.com/en/service/range-assistant/
SUV emissions uplift	https://www.transportenvironment.org/sites/te/files/publications/2018_04_CO2_emissions_cars_The_facts_report_final_0_0.pdf

Combining the data in Table 31 and Table 32 enables the annual energy use and CO_2 emissions for the Ashbourne transport fleet to be estimated for 2023 in Table 33.

Table 33 : Transport: Annual kWh and CO2 emissions estimate

2023 Baseline	Petrol	Diesel	Battery EV	Totals
National annual average km	12,113	19,681	12,958	0
kWh per car/annum	8,842	13,777	4,924	-
kg CO2 per car/annum	2,023	3,287	842	-
total Cars split	3,049	4,805	662	8,516
kWh -all cars/Ashbourne	26,959,528	66,194,386	3,261,346	96,415,260
kg CO2 - all cars/Ashbourne	6,167,454	15,792,089	557,862	22,517,405

Public Transport Links

Ashbourne Connect operates the 193 and 194 weekday bus service from Ratoath and Ashbourne direct to IFSC, Eden Quay & St. Stephen's Green.

Ashbourne is also served by the:

- 103 to Dublin City Centre
- 103X to UCD Belfield
- 105 to Blanchardstown
- 109A to DCU
- 195 to Balbriggan (Local Link)
- 197 to Airside, Swords.

Commuting Patterns To Work, School, College or Childcare

Table 11_1 of Census 2022 provides useful data on the means of travel work, school, college or childcare. The Census results for Ashbourne are presented in the pie chart in Figure 24 below.

Green modes such as walking, bike, bus and train are grouped together. Then private transport (by car, motorbike, van) is also grouped together.

In time, private car transport will increasing be switching over to electric vehicles so that should be factored into future models.

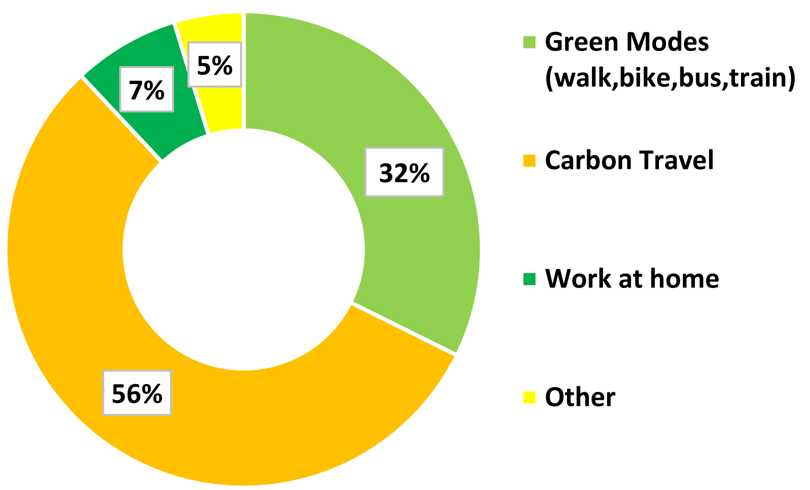

Figure 24 : Means of Commuting, Census 2022 Ashbourne

Duration of Commute

Table 11_3 of Census 2022 provides useful data on the duration of commute. The Census results for Ashbourne are presented in the pie chart in Figure 24 below. Only 56% of the population reported a commute of less than 30 minutes.

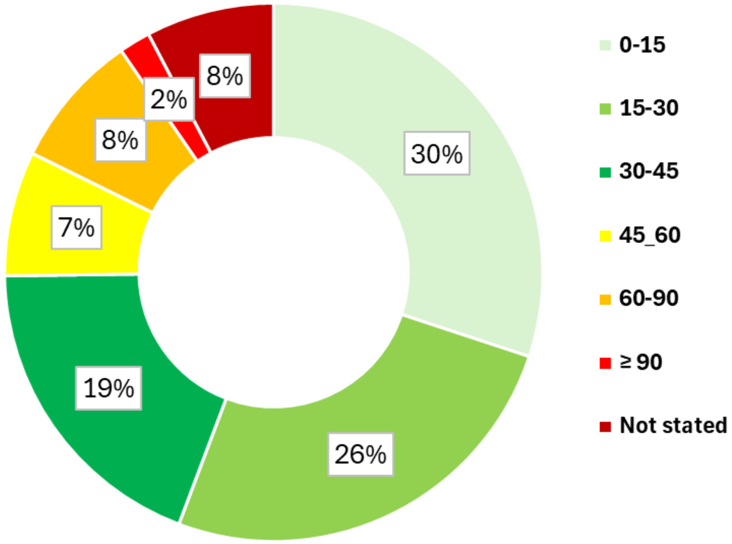

Figure 24: Duration of Commute, Census 2022 Ashbourne

5.4 Summary Baseline CO_2 emissions, Energy Usage and Spend

The baseline energy, CO_2 emissions and energy costs for Ashbourne across all sectors is summarised Table 34.

Table 34 : Baseline EMP Summary – Ashbourne

	Total CO2 Emission (tonnes)	Total Energy Consumption (GWh)	Energy Costs
Residential	26,001	105.44	€22,404,800
Non-residential	34,197	146.83	€17,873,113
Transport	22,517	96.42	€19,396,696
Total	**82,715**	**348.7**	**€59,674,609**

6 Energy Audits of Residential Buildings & Upgrade Measures/ Grants

6.1 Methodology

IHER Energy Services met with the Ashbourne SEC team to fully explore the desired outputs from the project work.

It was decided to conduct energy audits on 6 house types. Two surveys were done in the Tudor Estate producing similar results.

The full list of addresses is shown in Table 35 below representing some of the common dwelling types in Ashbourne.

Table 35: Survey addresses

Address	Year Built	Description
Ballybin	c1800 with 1990 extension	Two-storey detached, uninsulated stone wall in original part
Westview	1975	Two-storey semi-detached, uninsulated concrete block walls
Deeerpark	1980	Two-storey semi-detached, concrete block walls / cavity wall front
Tudor Close	1990	Two-storey semi-detached, cavity walls
Johnstown Park	2000	Two-storey semi-detached, cavity walls
Brindley Park	2003	Two-storey semi-detached, cavity walls

Energy retrofit analysis was done on each of the 6 house types and the impact of 3 levels of upgrade measure packages were assessed in each case. The three retrofit packages were as follows:

Starter Package

The starter package typically includes roof insulation and heating controls measures.

These include:

- Increase attic insulation to 300mm and insulate sloped and flat roofs
- A heating controls upgrade to SEAI Grant standards: This measure includes the provision of a room thermostat, thermostatic radiator valves, a cylinder thermostat, two motorised valves and a 7-day programmer that allows independent time and temperature control for space and water heating
- Installation of low energy lights

Standard Package

The standard package adds the following measures to the starter package:

- Internal or external wall insulation or Cavity wall insulation (where applicable)
- Upgrade windows to double glazing (U=1.4) and new high spec doors
- A condensing boiler (91% efficient)
- A wood burning stove (75% efficient) to replace an open fire (30% efficient)

Advanced Package

The advanced package adds further measures to the standard package but moves away from the boiler solution to a heat pump providing space heating and hot water. The advanced package would include:

- Install an air-source heat pump to deliver space heating and hot water. Make necessary alterations to radiators and pipework as required to ensure optimum heat pump performance
- Install a 2KW photovoltaic panel system on the roof

Note: Triple glazing could also be considered.

Optional Measures

Additional measures that would not be directly reflected in the BER calculation should always be considered on a case-by-case basis particularly if the starter package only is being considered for the interim.

These include:

A: Carry out sensible air-tightness steps to minimise draughts.

- Draught-proof front & rear door / porch if required
- Draught-proof hot-press pipe holes, attic hatch door, install chimney balloons

B: Upgrade existing double glazing with new low e glass.

Replace old double-glazing with more efficient up-to-date double glazing by replacing the glass panels. Must be evaluated on a case-by-case basis to assess existing frames and quality of window installation.

C: Partial internal / external wall insulation for selected colder rooms. This will reduce heat loss and improve heat loss in individual rooms.
Please note: None of the measures listed above in A, B or C are eligible for grant support.

- **PV Only**

Many homeowners are choosing PV panel installations as a stand-alone measure to offset high imported electricity prices and to make their own contribution to reducing greenhouse gas emissions.

In our case study analyses, we consider 6 x 400W panel arrays, i.e. 2.4kW. Some homes are getting 4kW and higher systems. Additional PV options can also be explored on the BERWOW tool - see www.berwow.ie.

6.2 Retrofit Calculator & Brochure for each House Type

A retrofit calculator was used to calculate all of the key metrics for the retrofit options for all seven dwellings that were surveyed. A pdf version is shown in Appendix A.

The calculator was designed as a workshop version showing the following:

- calculation values taken from the BER software
- SEAI grants per measure
- typical industry average costs for upgrade measures
- estimated running costs
- estimated payback period.

In addition, the key results from the retrofit analysis were placed into a separate 2-page brochure for each of the seven dwelling types. The brochure for all seven house types are shown in Appendix B. These brochures can be adapted for use as required.

6.3 Assumptions

In developing the typology analysis, IHER made a number of important assumptions:

Typical Current Conditions:

Each house that was surveyed was treated as a house type and so any recent energy upgrades such as attic conversions or new boilers etc were not considered for the basic case studies. Nevertheless, a separate version of each brochure reflecting the actual performance of the houses surveyed has also been separately prepared for each homomer to provide them with their personal retrofit roadmap.

Source Data including Industry Average Cost of Works and Energy Costs

The costs of measures used in the retrofit calculator were sourced by IHER in 2024 from an independent quantity surveying expert. The typical industry average costs are listed in Appendix C.

Contractor quotations will naturally vary from these industry average costs.

Calibration Factors and Payback Analysis

Care needs to be taken when using BER-based energy usage results to calculate annual energy costs. The BER methodology assumes the house is heated from October to May for 8 hours per day with the living room heated to 21ºC and the rest of the habitable rooms heated to 18ºC. This same assumption applies equally to a G-rated house or an A-Rated house. While there is no major study in Ireland exploring this topic, several EU studies have shown that a G-rated house might only use 50% of the energy predicted by the BER calculation as it would be too expensive to heat it to the assumed heating pattern. This calibration factor should then be applied to the BER-calculated energy values to reflect more accurately running costs and savings arising from upgrade measures.

Energy Costs

SEAI publishes updated energy costs on a quarterly basis. Using the SEAI domestic fuel price values (01 October, 2024) the fuel prices listed in Table 36 were established and used in the retrofit table calculator.

Note that for heat pumps, as heat pumps operate 24 hours per day, the electricity price (ElHP.Water and El.HP.SH) is based on a combination of day and night rate electricity. For water heating, it is assumed that the day-night ratio is 20:80. For space heating the day-night ratio is 60:40.

Table 36 Energy Prices (per kWh delivered) - 2024

Gas	€0.12
Oil	€0.09
Electricity	€0.34
Smokeless	€0.09
El.HP.Water	€0.21
El.HP.SH	€0.28

Better Energy Homes Grants

SEAI provides grants to homeowners through two main schemes:

- The Better Energy Homes (BEH) scheme – single measures grants
  https://www.seai.ie/grants/home-energy-grants/individual-grants/
- The One Stop Shop Service
  https://www.seai.ie/grants/home-energy-grants/one-stop-shop/

The current BEH single measures grants are listed in Table 37. It should be noted that oil & gas condensing boilers no longer receive any grant funding.

Table 37 : SEAI Better Energy Homes Grants

<table>
<tr><th></th><th>Detached</th><th>Semi/
End Terrace</th><th>Terrace</th><th>Apartment</th></tr>
<tr><td>Roof insulation</td><td>€1,500</td><td>€1,300</td><td>€1,200</td><td>€800</td></tr>
<tr><td>Cavity Wall insulation</td><td>€1,700</td><td>€1,200</td><td>€800</td><td>€700</td></tr>
<tr><td>External Wall Insulation</td><td>€8,000</td><td>€6,000</td><td>€3,500</td><td>€3,000</td></tr>
<tr><td>Internal Wall Insulation</td><td>€4,500</td><td>€3,500</td><td>€2,000</td><td>€1,500</td></tr>
<tr><td>Heat Pump - A2W, exhaust A2W, W2W, ground source</td><td colspan="3">€6,500</td><td>€4,500</td></tr>
<tr><td>Heat Pump - air to air</td><td colspan="4">€3,500</td></tr>
<tr><td>Heating Controls</td><td colspan="4">€700</td></tr>
<tr><td>Solar Water Heater</td><td colspan="4">€1,200</td></tr>
<tr><td>Solar PV</td><td colspan="4">0 to 2kWp, €800 per/kWp, 2 to 4 kWp €250/kWp</td></tr>
<tr><td>BER</td><td colspan="4">€50</td></tr>
<tr><td>Technical Assessment</td><td colspan="4">€200</td></tr>
</table>

SEAI launched the National One Stop Shop (OSS) service in February 2022. Homeowners must submit their applications to one of the registered OSS providers to avail of this scheme. A wider range of grant support is available through the One Stop Shop scheme as indicated by the figures in red in Table 38.

The OSS scheme has two key criteria that must be met to qualify for these higher grant amounts :

- The post works BER must achieve a B2 rating or better, i.e. <= 125 kWh/m^2/ year
- There must be an uplift of a minimum of 100 kWh/m^2/year from the pre works BER primary energy value

Table 38 : SEAI One Stop Shop Scheme Grants

	Detached	Semi/ End Terrace	Terrace	Apartment
Roof insulation- rafter	€3,000	€3,000	€2,000	€1,500
Roof insulation- ceiling level	€1,500	€1,300	€1,200	€800
Cavity Wall insulation	€1,700	€1,200	€800	€700
External Wall Insulation	€8,000	€6,000	€3,500	€3,000
Internal Wall Insulation	€4,500	€3,500	€2,000	€1,500
Floor insulation	€3,500			
Windows	€4,000	€3,000	€1,800	€1,500
External doors (per door)	€800			
Heat Pump - A2W, exhaust A2W, W2W, grnd sce	€6,500			€4,500
Central heating system for heat pump	€2,000			€1,000
Heat Pump - air to air	€3,500			
Heating Controls	€700			
Mechanical ventilation	€1,500			
Air Tightness	€1,000			
Solar Water Heater	€1,200			
Solar PV	0 to 2kWp, €800 per/kWp, 2 to 4 kWp €250/kWp			
BER	€50			
Home Energy Assessment	€350			
Project Management	€2,000	€1,600	€1,200	€800
OSS Bonus for B2 with heat pump	€2,000			

Note: Grant values shown in red are only available through the One Stop Shop Scheme.

6.4 Key Survey Findings & Presentation of Results

According to Figure 11 in Census 2022, 21% of the Ashbourne housing stock was built before 1980 so this stock pre-dates Building Regulations and will perform poorly overall. At the other end of the scale, 56% of the stock dates from 2001 onwards and so will be built to reasonably good energy efficiency standards. The balance of 23% of the stock falls between 1980 and 2000 and would need its energy performance uplifted.

Wall & Floor Insulation:

Approximately 21% of the houses in Ashbourne were constructed prior to the first Draft Building Regulations in 1976. Thus, these houses were built originally without wall insulation or floor insulation.

The upgrade solution for these wall constructions is primarily external or internal wall insulation. External is preferred where physically possible as it ensures intermediate floors and dividing walls are fully insulated. Where boundary issues or sensitive brick finishes present a challenge, internal insulation is a good alternative.

The upgrade solution for these wall types is external or internal wall insulation or a mixture of both. External is preferred where physically possible as it ensures intermediate floors and dividing walls are fully insulated and minimises the effect of thermal bridges. No one solution will work for all dwellings in the area and every case will need to analysed separately and no doubt in some of the older houses with poor levels of insulation/maintenance there will be condensation and mould risks that need to be identified and specific case solutions proposed to remedy this. This is of course not limited to old houses as even well insulated houses can suffer from high relative humidity and high moisture content with the resulting interstitial condensation and mould in their building assemblies. A holistic approach will be followed assessing options for upgrading the thermal fabric of these buildings and the health of the occupants will be the primary focus of such analysis.

Where boundary issues or sensitive brick finishes present a challenge, internal insulation can be considered but, in such cases, a Hygrothermal Risk analysis (HRA) should be used to assess the risk of interstitial condensation and mould. Older buildings in the area would have traditional stone walls and again a hygrothermal risk analysis (HRA) would be recommended before proceeding with either IWI or EWI as more than likely unsympathetic building materials/decorative finishes may have been used in subsequent upgrades which may or may not be contributing to the problem. Cavity built walls may have had their cavities pumped previously thermal imagery may be required to determine the adequacy of the installation.

Houses built from 1977 onwards will have varying levels of wall insulation. Each house would need to be assessed on a case-by-case basis to determine if adding additional or replacement internal insulation, adding external insulation or cavity wall insulation would be recommended.

Some older house types may have suspended timber floors which should be insulated whenever the opportunity arises.

Ventilation and Air Tightness

The question of adequate ventilation, air tightness and indoor air quality (IAQ) in dwellings will need to be addressed alongside any proposed insulation upgrades. The majority of the houses in the BER certificates issued are using natural ventilation. While a natural ventilation system ensures sufficient fresh air is supplied to the living space, as the stale heated indoor air is replaced by fresh possibly cooler external air, the heat from the outgoing indoor air is lost. This is referred to as a "ventilation loss".

A mechanical ventilation system with heat recovery not only exchanges the stale indoor air with fresh outdoor air, but it also recovers the heat from the outgoing stale air and exchanges this into the cool fresh incoming air. Hence the "ventilation losses" can be dramatically reduced. If a building is very "leaky", then cool external air will leak into the building, which will then dramatically reduce the efficiency of the heat exchange unit. In this way ventilation and airtightness should be considered collectively.

With increasing levels of insulation and air tightness, there are a number of factors to consider when evaluating ventilation options for a building. First and foremost is to recognise the level of uncontrolled background air leakage (infiltration via gaps, cracks and holes in the building fabric). This should be reduced as far as practicable and then offset this with purposed provided, controllable ventilation. This can take many forms but can include Intermittent Extract Ventilation (IEV), Mechanical Extract Ventilation (MEV), Positive Input Ventilation (PIV), Mechanical Ventilation with Heat Recovery (MVHR) etc.

Ignoring an assessment of the background ventilation (or indeed simply assuming about how much of it there is) can lead to properties either being over ventilated (excess air changes and thus heat loss) or mechanical ventilation systems not working efficiently because the leakiness of the building does not allow the systems to balance and effectively draw and expel air from the property itself.

The first port of call when considering the ventilation strategy for a building therefore is to conduct an air tightness test. This is important not only as a simple means of assessing fabric efficiency i.e. less leaky equals good but also because it provides that all important assessment of the level of uncontrolled background air leakage and thus what the optimal ventilation strategy is likely to be. Of course, the funding isn't always there to go to added lengths to reduce the air leakage or specify advanced ventilation systems and therefore again, this is why it's important to use the air tightness testing as a means of assessing risk and at the very least ensuring that the installed ventilation solution is at least proportionate to the level of air tightness.

The Air tightness test is the only real quality control measure that the homeowner has at their disposal and can provide the homeowner with a lot of information on actual leakage areas in their dwelling which can be quantified. Thermal imagery can also be used to assist the homeowner identify heat loss paths such as missing insulation, moisture saturated insulation, thermal bridges at junctions, point thermal bridges and poor airtightness.

An Airtightness test, thermal imagery and if necessary, a Hygrothermal Risk analysis are all valuable tools which the homeowner can avail of when assessing upgrade options and when combined with a BER can provide the homeowner with clear pathway to achieving an energy efficient home.

SEAI's One Stop Shop schemes requires that an air permeability of $5m^3/hour/m^2$ be achieved via air tightness test for a dwelling in order to obtain the air tightness grant listed in Table 38. This is also the air permeability target required for new buildings and would represent a good target to aim for if a heat pump is being installed in a retrofit project.

7 Energy Audits of Non-Domestic Buildings & Upgrade Measures / Grants

7.1 Methodology

Energy audits to Ashrae Level 1 (The American Society of Heating, Refrigerating, and Air-Conditioning Engineers) were conducted on three non-domestic buildings:

- St. Declan's National School
- REM Unit 20A Ashbourne Business Centre
- Hugh Maguire Butchers Shop

Detailed energy audit reports were conducted and a separate report has been produced for each building. The two energy audit reports are standalone documents that have been forwarded separately.

More generally, ASHRAE outlines three different levels of energy audits. The audit levels differ based on how intensive they are and what type of outcome you can expect.

An ASHRAE Level 1 audit is the most basic level of audit, designed to give businesses a starting point for making changes or further in-depth auditing.

In a Level 1 audit, the auditor takes a high-level view of the commercial building's operations and energy usage.

This audit can include steps such as:

- Interviewing key operations personnel
- Reviewing facility utility bills
- Walking through the site

The goal of an ASHRAE Level 1 audit is to identify glaring areas of energy inefficiency. All gathered data is then compiled into a report detailing no-cost or low-cost changes that can be made to the building, as well as other potential capital improvements earmarked for further study.

A Level 1 audit can give stakeholders a picture of where the building currently stands, how it compares to other similar buildings, and what areas need further investigation or improvement. For businesses looking to just get started with improving energy efficiency, or for businesses who find it difficult to "sell" the need to energy improvements, a Level 1 audit is a good starting point.

7.2 Audit Results

The content of the energy audit reports will not be repeated here but a range of improvements were recommended for each building, some with short to medium terms paybacks and others with very long-term paybacks.

Overall, Ashbourne has a wide range of non-domestic buildings, and each has its own unique profile and building type. Thus, by way of contribution to a medium-term Energy Master Plan, one proposal to consider would be that each non-domestic business should conduct its own energy audit in order to set out its individual energy saving target looking out to 2030. See further recommendations in Section 9.4.

7.3 SEAI Business Energy Upgrade Scheme

SEAI launched a new business energy upgrade scheme in October 2024. Full details are available on https://www.seai.ie/grants/business-grants .

The level of grants available is summarised in Table 39.

Table 39 : SEAI BEUS Scheme Grants

Technical Assistance		Commoditised Grants	
BMS Optimisation	Up to €2,000 / 50%	Pumps	Up to €10,000 / 30%
Design Assistance	Up to €25,000 / 50%	Ventilation/ Heat Recovery	Up to €25,000 / 30%
		Solar Thermal	Up to €15,000 / 30%
		Automatic Controls	Up to €30,000 / 30%
		Heat Pumps (incl. System)	Up to €100,000 / 30%
		Fabric	Up to €120,000 / 30%

The Scheme provides support across two main categories:

- Technical Assistance: These measures include support for specialist costs for surveys and optimisation of existing building management systems and scheme design packages for planned projects.
- Commoditised Grants: This commoditised is based on an estimated investment cost which is calculated from technical details provided by the Applicant regarding their building and the planned retrofit measures. The application approach is designed to minimise the information required from the Applicant to receive a grant offer, ensuring a streamlined decision can be provided on grant support.

Some key feature of the scheme include:

- Installer companies who carry out the work must be registered with SEAI.
- The selected Installer company must complete the Pre-App Info Form for the measures
- Applications should be made online and grant approval is instantaneous. The grant is calculated on the basis of your input data. Grant value is 30% of the typical cost for the measure in your building.
- When the work is complete your Installer will provide you with the required documentation to complete a payment request, and SEAI will begin to progress your grant payment.
- SEAI will operate an inspection process whereby audits will be conducted on a random basis.
- Works must be completed within 8 months of the grant award date

This new scheme will provide anew stimulus to Irish businesses to invest in energy upgrade/ carbon reduction measures.

8 Community Renewable Energy Initiative

The Government Climate Action Plan for 2023 includes a commitment to support at least 500 MW of local community-based renewable energy projects and increased levels of new micro-generation and small-scale generation.

Ashbourne Solar Farms

The Climate Action Team from Meath County Council provided the list of ten solar farms in the Ashbourne area in that Table 30 have received planning permissions. These farms are either constructed, under construction or are yet to begin construction.

Table 40 : Ashbourne Solar Farms

	Applicant	Approx Area (Hectares)	Location	Megawatt (MW)
1	Wexford Solar Limited	9.81	Kilbreckstown	4
2	Power Capital Renewable Energy Limited	10.82	Irishtown	8.7
3	Starrus Lfg Ltd	13.7	Knockharley	3
4	Bnrgn Hilltown Ltd.	25.87	Hilltown	19
5	Jbm Solar Development Ltd	89.22	Ballymacarney & Part of Baytown	65
6	Lightsource Renewable Energy Ireland Ltd	68.3	Muckerstown	34
7	Energia Solar Holdings	35.19	Ballaghaweary, Ashbourne	18.27
8	Kilbrew Eco Developments Ltd	42.88	Townlands of Reask and Loughlinstown, Kilbrew, Ashbourne	18
9	Solar Farmers Ltd (Part of Energia Group)	23.52	BALLYBIN (KILBREW)	13.5
10	Obton Limited	124.07	Hawkinstown, Riverstown (Ardcath), Scatternagh, Balgeeth, Ardcath, Co. Meath	85
				268.47

One gigawatt (GW) of solar PV power is deemed enough to power 750,000 homes. With 268 MW equal to 0.268 GW, the ten Ashbourne solar farms will have capacity to power 200,00 homes, just shy of the total of 220,000 homes for all of County Meath (Census 2022).

While these solar farms will provide zero carbon electricity to the national grid, they will not specifically provide green energy to Ashbourne energy users.

So, the Ashbourne community should consider promoting its own community renewable energy initiative. The preferred option is to promote photovoltaic generation on a large scale on both residential and commercial / public rooftops.

Solar PV for Businesses: Grants are also now available to non-domestic energy users including businesses, farms, schools, community centres or other non-profit organisationhttps://www.seai.ie/grants/business-grants/commercial-solar-pv

Schools: On 30th October 2024, Minister for Education Norma Foley and Minister of State at the Department of the Environment, Climate and Communications, Ossian Smyth announced that the Solar for Schools Programme will be extended to all school nationwide.

The scheme provides eligible schools with up to 6 kilowatts peak of roof-mounted solar photovoltaic (PV) installations on their roofs, which equates to approximately 14 solar panels.

Since the launch of the first phase of the programme late last year, more than 1,100 schools have been approved for PV panels on their roofs in eleven areas around the country. More than 1,000 installations have been confirmed so far in Clare, Donegal, Galway, Kerry, Kilkenny, Leitrim, Limerick, Offaly, Waterford, Wicklow and the Dublin City Council area.

Funding has now been approved to proceed with solar PV installations on all remaining eligible schools in 16 counties – Carlow, Cavan, Cork, Dublin, Kildare, Laois, Longford, Louth, Mayo, **Meath**, Monaghan, Roscommon, Sligo, Tipperary, Westmeath and Wexford.

This means that up to 4,000 primary, post-primary and special schools in the country are now eligible for PV panels.

Homes: There are reasonable grants already for homeowners and the is a strong case that grants should be more attractive to ensure PV is installed on every available roof in the country.

For homeowners, 6 and 8 panels systems are most common. Assuming 400W panels are used, this equates to a 2.4kW system for 6 panels or a 3.2kW system for 8 panels.

More information on typical PV systems sizing, annual kWh produced and SEAI grant amounts are shown in Table 41.

Table 41 : Typical PV System Sizing and SEAI Grant Amounts

Nr Panels	Panel (Wp)	Total kWp	Grant
6	400	2.4	€1,700
8	400	3.2	€1,900
10	400	4	€2,100
12	400	4.8	€2,100

9 2028 & 2033 EMP Modelling

9.1 Assumptions

The Government's Climate Action Plan (2023) CAP 2023 re-establishes the target to achieve a 51% reduction in Greenhouse Gas (GHG) emissions by 2030 from the 2018 baseline.

As shown in Table 42 below, the EPA reports total national greenhouse gas emissions to have been 65.77 million tonnes in 2018.

In effect, Ireland had achieved a 7.83% reduction in national GHG emissions by end of 2023 compared to the 2018 baseline. Emissions dropped during Covid but increased again afterwards in 2021 before dropping again in 2022 and 2023.

Table 42 : Ireland's reduction rate of greenhouse emissions - 2018 baseline GHG EPA 2023

	2018	2019	2020 (COVID-19)	2021	2022	2023	2030
Greenhouse Gas emissions incl LULUCF (Mt CO2eq)	65.77	64.03	62.76	64.82	62.99	60.62	31.20 (Target)
Reduction Rate (2018 Baseline)		2.65%	4.58%	1.44%	4.23%	7.83%	51.00%

Separately at an EU level, on 12th December 2020, at the UN Climate Summit, the EU committed to a 55% cut in greenhouse gas emissions by 2030.

9.2 Residential Strategy for 5 Year Plan (2024-2028) & Retrofit Targets

For the Ashbourne EMP, 2023 will be used as the base year for modelling purposes.

As indicated in Section 6.4, 21% of the Ashbourne housing stock was built before 1980 so this stock pre-dates Building Regulations and will perform poorly overall. At the other end of the scale, 56% of the stock dates from 2001 onwards and so will be built to reasonably good energy efficiency standards. The balance of 23% of the stock falls between 1980 and 2000 and would need its energy performance uplifted.

To create a strategy model for 2028 and beyond, the following needs to be taken into account:

- **Current state**: 2958 dwellings have BER certs with an average primary energy value of 149.65 kWh/ m^2/annum (at the B3/ C1 border).
- **Additional BER per annum (2024-2028)**: The number of new BERs published per annum over the last 5 years are shown in Table 43. On average, 363 new BERs (approx..) were published per annum over the last 5 years in Ashbourne.

Table 43: BER published in Ashbourne- last 5 years

Year	New BERs per Annum	Built in Year of Survey	Averaged Primary Energy (KW/m2y)
2019	432	141	146
2020	417	15	170
2021	510	2	195
2022	144	40	156
2023	310	2	164
Average	**363**	**40**	166

Thus, it is reasonable to assume that an 1800 additional residential BERs (360*5) will be published over the next 5 years.

For the purposes of modelling, it will be assumed that these BERs will also have an average primary energy value of 166 kWh/ m^2/annum, i.e. C1 rating.

Residential Retrofit Scenario (2024-2028)

A residential buildings energy model from 2024 to 2028 is outlined below based on the following assumptions:

- 1,800 additional residential BERs will be published over the next 5 years. Assumed average primary energy is 166 kWh/ m^2/year.
- 25% of existing dwellings, i.e. 1475 out of a total of 5,896 (See Table 2), will be upgraded from 2024-2028.

- Different levels of retrofit will be carried out on segments of the existing housing stock, e.g. starter pack, standard measures, advanced measures, PV only, heat pumps only (for more recent homes with HLI <2.3)
- In total, 2,180 homes in Ashbourne have a HLI < 2.3 but only 210 homes (i.e. 10%) have heat pumps fitted. The other 90% are "heat pump ready". All homeowners, including private landlords, whose homes were built and occupied before 2021 can apply for the SEAI heat pump grant.

The range of energy upgrade measures proposed over the next 5 years for energy upgrades and the number of dwellings for each set of measures along with the predicted BER scores are shown in Table 46 to give an indication of the level of investment that needs to be undertaken to match the Climate Action plan goals. The Retrofit targets (2024-2028) have also been separately added into the Register of Opportunities spreadsheet.

The data behind Table 44 is elaborated further in Table 45.

Table 44: Retrofit Measure Targets 2024-2028

	Up to 1980	1981_90	1991_2000	2001_2010	2011 onwards	Census Total
Census Total	1175	575	702	2055	1085	5592
PV Only	60	30	40	60	60	**250**
Starter	75	50	50	50	0	**225**
Starter &PV	25		25	25		**75**
Std	50	25	25	50		**150**
Std & PV	50	25	25	50		**150**
Adv	25	25	25	125	0	**200**
Adv & PV	25	25	25	125		**200**
HP only				200	300	**500**
Rounded Total	**310**	**180**	**215**	**685**	**360**	**1750**
	26%	31%	31%	33%	33%	**31%**

The impact of this combination of assumptions would be to achieve an average primary energy per dwelling of 137.6 kWh/m^2 /year by 2028 as shown in Table 45.

Table 45: 2028 Residential Scenario

Row Labels	G	F	E2	E1	D2	D1	C3	C2	C1	B3	B2	B1	A3	A2	A1	Grand Tot
2023 total	31	26	25	64	136	165	205	339	456	409	134	46	774	138	10	2958
Upgrades on 20% of C1 or worse: 2024-2028	-6	-5	-5	-13	-27	-33	-41	-68	-91							-289
Altered 2023 Total	25	21	20	51	109	132	164	271	365	409	134	46	774	138	10	2659
2024-2028 - additional BERs									1800							1800
Adjust C1 average for those doing PV only									-250							
2024-2028 upgrades only						75			100	50	475		650	200	200	1750
2028 - Estimated BER Count	25	21	20	51	109	207	164	271	2015	459	609	46	1424	338	210	5759
Primary Band (kWh/m2/year)	680	415	360	320	280	245	215	185	165	135	115	85	65	35	20	
Primary Band (kWh/m2/year) - all BERs	16,864	8,632	7,200	16,384	30,464	50,715	35,260	50,172	332,442	61,965	70,035	3,910	92,560	11,830	4,200	792,633
Average Primary Energy (kWh/m2/year)																137.64

Table 46: Retrofit Measure Targets 2024-2028

Category	Measure	Number of homes upgraded	New Rating
1	**PV only**	**250**	B2
2	Roof insulation and heating controls: pre 1980	**75**	D1
	Roof insulation and heating controls: 1981-2000	**100**	C1
	Roof insulation and heating controls: 2001-2010	**50**	B3
2A	**Roof insulation, heating controls &PV**	**75**	B2
3	Standard measures package (roof insulation, internal or external wall insulation, boiler and heating controls, wood stove)	**150**	B2
3A	**Standard measures package (roof insulation, internal or external wall insulation, boiler and heating controls, wood stove) &PV**	**150**	A3
4	Advanced Measures (Standard with heat pump and whole house ventilation)	**200**	A3
4A	**Advanced Measures (Standard with heat pump and whole house ventilation) &PV**	**100**	A2
	Advanced Measures (Standard with heat pump and whole house ventilation) &PV	**100**	A1
5	Heat pump only -2001-2010	**300**	A3
5A	**Heat pump &PV only -2011 onwards**	**100**	A2
	Heat pump &PV only -2011 onwards	**100**	A1
	Total Dwellings Upgraded	**1750**	

This level of retrofit of the residential stock roughly equates to a 2% annual reduction is primary energy by 2028.

A 2% reduction per annum would result in an 9.6% cumulative reduction by 2028 and an 18% reduction by 2033 with respective primary energy values shown in Table 47.

Table 47 : 2% Reduction in Residential BER average

Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Primary Energy (kWh/m2/year)	150	146.7	143.7	140.8	138.0	135.3	132.6	129.9	127.3	124.8	122
		-2.0%	-4.0%	-5.9%	-7.8%	-9.6%	-11.4%	-13.2%	-14.9%	-16.6%	-18%

This data in Table 47 is shown in full in Appendix E. The energy reduction trend is illustrated in Figure 25.

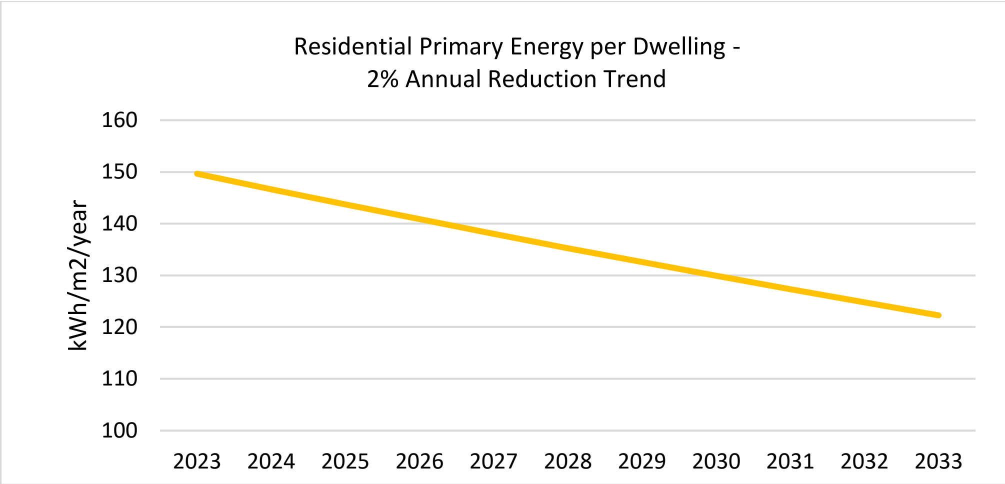

Figure 25: 2% Reduction Trend Per Annum

Impact of Ongoing Decarbonisation of the National Electricity Grid

When modelling the energy and CO_2 reduction roadmap, there are a number of important factors to bring into the equation.

As renewable outputs primarily from windfarms have increasingly been added to the national generation mix, the carbon content of electricity has reduced. This can be seen from the reducing primary conversion factor in the SEAI DEAP method since 2011 – Figure 26 : DEAP Electricity Factors.

Fuel Factors

	Energy	Emissions
Current	1.75	0.224

Simulate assessment using previous years:

Date	Energy	Emissions
7th Apr 2017 - 31st Jan 2023	2.08	0.409
7th Jan 2016 - 6th Apr 2017	2.19	0.473
17th Dec 2014 - 6th Jan 2016	2.37	0.522
11th Dec 2013 - 16th Dec 2014	2.45	0.555
11th Dec 2012 - 10th Dec 2013	2.42	0.524
1st Dec 2011 - 10th Dec 2012	2.58	0.556
Pre 30th Nov 2011 - 30th Nov 2011	2.70	0.643

Figure 26 : DEAP Electricity Factors

So, a house or business heated by electricity would see a significant improvement in its BER and drop in its primary energy and CO_2 emissions from 2011 to 2021 simply through the passage of time and without doing any upgrades.

The energy and CO_2 factors for electricity will continue to reduce year on year out to 2030 and beyond due to the addition of more renewable generation to the national generation mix. In the "Our Zero emissions Future" study by Dr Paul Deane of the MaREI Institute, 2020, a value of 0.649 or electricity and 0.118 kgCO_2/kWh is the assumed carbon intensity in the 2030 Base Case Scenario. The study assumes 70% renewable electricity penetration by 2030. Of course, solar farms have begun to be connected to the grid and this will further reduce the carbon content in the generation mix. And the Ashbourne areas will have many solar farms connected by 2030.

Based on the assumptions of this MaREI study, the 2030 primary energy and CO_2 factors in Table 48 are assumed.

Table 48 : Electricity Factors - 2030

	2020	2030
Primary Energy Factor- electricity	2.08	0.647
CO_2 emissions-electricity (kg/kWh)	0.409	0.118

9.3 2028/ 2030/ 2033 Residential Target

When these modified electricity factors are taken into account a more optimistic and realistic energy reduction scenario is produced. In Table 49 below, it is assumed that 20% of residential energy use is electrical with 80% coming from fossil fuel heating sources. Then, when thee modified electricity factors are applied each year to 22033, a 34% reduction is primary energy is forecast.

Table 49 : Residential Energy Reduction Projection (2023-2033)

Residential - Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Primary Energy (GWh/m2/year)	105.44	103.33	101.26	99.24	97.25	95.31	93.40	91.53	89.70	87.91	86.15
		-2.00%	-3.96%	-5.88%	-7.76%	-9.61%	-11.42%	-13.19%	-14.92%	-16.63%	-18.29%
Primary Fossil Fuel (GWH/m2/yr)	84.35	82.66	81.01	79.39	77.80	76.25	74.72	73.23	71.76	70.33	68.92
Primary electricity use (GWh/m2/yr)	21.09	20.67	20.25	19.85	19.45	19.06	18.68	18.31	17.94	17.58	17.23
Adjusted Primary Electricity (GWh/m2/year)	21.09	18.63	16.27	13.99	11.79	9.68	7.65	5.69	3.81	2.01	0.27
Adjusted Total Primary Energy (GWh/m2/year)	**105.44**	**101.30**	**97.28**	**93.38**	**89.60**	**85.93**	**82.37**	**78.92**	**75.58**	**72.34**	**69.19**
Reduction with Modified Electricity factor		-4%	-8%	-11%	-15%	-19%	-22%	-25%	-28%	-31%	-34%

The associated residential CO2 emissions projection is provided in Section 9.7.

9.4 Commercial and Public Building Strategy

Due the range of energy usage patterns of typical businesses and public buildings, it is more challenging to both establish current energy usage and CO_2 emissions and then to set out energy retrofit /reduction targets.

The baseline energy usage and CO_2 emissions for commercial and public buildings are set out in Section 5.2. The current total annual energy usage for commercial and public buildings in estimated at 146,834,000 kWh or 146.8 GWh (gigawatt-hours). As stated in Section 5.2, ***the commercial baseline estimate needs can be reviewed if and when actual energy use data becomes available.***

For EMP modelling purposes, it is proposed that a 3% annual energy reduction target also be set for commercial and public buildings.

This would result in the reduction target shown in Table 50.

Table 50: 3% reduction in Commercial/ Public Building Energy Usage

Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Primary Energy (GWh/m2/year)	146.83	142.43	138.16	134.01	129.99	126.09	122.31	118.64	115.08	111.63	108.28
		-3.0%	-5.9%	-8.7%	-11.5%	-14.1%	-16.7%	-19.2%	-21.6%	-24.0%	-26.3%

The commercial / public building programme requires a specific plan that would include:

- For the commercial units, schools and public buildings, as a minimum, each non-domestic building should make a commitment to record and track their own energy use and CO_2 footprint annually.
- In addition, each non-domestic business should be encouraged to conduct its own energy audit in order to set out its individual energy saving target looking out to 2030.
- Provide a simple energy saving menu for local businesses in conjunction with local business association. It is recommended that the Ashbourne SEC engage a consultant to carry out high level assessment of energy use in businesses and prepare a menu of behavioural energy saving measures for businesses including tracking energy use.

9.5 Transport Strategy

9.5.1 Transition to EVS

The Climate Action Plan 2023 promotes the **Avoid-Shift-Improve** approach.

Avoid encourages fewer journeys using fossil fuel transport and **Shift** encourages less carbon-intensive modes of transport.

Improve suggests reducing the carbon intensity of our transport fleets including the transition from petrol and diesel vehicles to electric vehicles.

The Irish Bulletin of Vehicle and Driver Statistics 2022[4] produced by the Department of Transport estimates that there were 175,000 battery electric vehicles estimates on Irish roads in 2022 equal to 7.8% of the total of 2.65 million private cars and good vehicles in the country.

The 2023 Climate Action Plan (Table 15.6) set a 30% target for EV market share of the total car passenger fleet by 2030. Also, EVs should represent 100% of new car registrations in 2030. (The CAP also sets out targets for the commercial fleet).

To model the energy profile for transport out to 2030, the following assumptions have been made:

- The proportion of EVs in the total stock will increase to 30% by 2030.
- Motor vehicle stock has a shorter life than building stock and it is upgraded annually with more energy efficient models. CODEMA (City of Dublin Energy Management Agency) has provided good transport data to assist with EMP projections. Average new car emissions estimate from the European Environment Agency indicate the expected reduction in energy use and CO_2 emissions expected in the coming years. The EU dashboard facility http://co2cars.apps.eea.europa.eu/ compares Ireland against the rest of Europe and allows selection of individual fuel types. For estimating future emissions, the EU emissions requirements are given for the average across a manufacturer's entire fleet and assume a certain percentage of EVs to bring the average down. So, for internal combustion engine (ICE) emissions, CODEMA is not projecting much of a decrease out to 2030, particularly due to the increased proportion of SUVs being sold. Working off the assumption that the 2019 new car emissions will represent the average ICE car on the road in 2030, this represents a reduction from 167 gCO_2/km now to 144 gCO_2/km by 2030. For the purposes of this study, it is being assumed that the efficiency of the petrol/ diesel stock will improve by 15% by 2030.

Table 53 estimates current energy use for transport at 96,415,000 kWh or 96.4 GWh.

Assuming a 30% EV market share by 2030, Table 51 shows the projected split by car fuel types.

[4] https://www.gov.ie/en/publication/f392d-bulletin-of-vehicle-and-driver-statistics/#2022

Table 51 : Vehicles by Type (2030)

Ashbourne 2030	petrol	diesel	BEV	Total
2030 Target Split	25.1%	39.5%	30%	
Revised Cars split	2,134	3,363	2,555	8,052

The projected annual energy use and CO_2 emissions for Ashbourne transport fleet by 2030 is shown in Table 52.

Table 52 : Projected 2030 Annual kWh and CO2 emissions estimate from Transport

Ashbourne 2030	Petrol	Diesel	Battery EV	Totals
National annual average km	12,113	19,681	12,958	
kWh per car/annum	7,516.12	11,710.20	4,924.04	
kg CO2 per car/annum	1,719	2,794	842	
Total cars split	**2134**	**3363**	**2555**	8052
kWh -all cars/a	16,040,919	39,385,660	12,579,937	**68,006,516**
kg CO2 - all cars/a	3,669,635	9,396,293	2,151,831	**15,217,759**

The net result would be a 23.5% reduction in transport energy emissions by 2030 (and 31.8% by 2033). This is equivalent to a 3.75% reduction in transport energy use per annum as shown in Table 53.

Table 53 : 3.75% reduction in Transport Energy Usage

Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Primary Energy (GWh/m2/year)	96.42	92.80	89.32	85.97	82.75	79.64	76.66	73.78	71.02	68.35	65.79
		-3.8%	-7.4%	-10.8%	-14.2%	-17.4%	-20.5%	-23.5%	-26.3%	-29.1%	-31.8%

9.5.2 EV Charging Points

EV Charging Points:

Meath County Council plans to publish its EV charger strategy in 2025, so no formal plan is available yet.

Cycling Strategy

For the **Avoid-Shift** aspects of the transport strategy, the ambition is to reduce the need for travel, shifting to public transport, walking and cycling.

9.6 EMP Energy Reduction Target Summary

The individual targets for all three sectors are summarised in Table 54 and presented in Figure 27.

Table 54 : Summary of Annual Energy Reduction Model Targets

Primary Energy (GWh/m2/year)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Residential - adjusted	105.44	101.30	97.28	93.38	89.60	85.93	82.37	78.92	75.58	72.34	69.19
Commercial & Public	146.83	142.43	138.16	134.01	129.99	126.09	122.31	118.64	115.08	111.63	108.28
Transport	96.42	92.80	89.32	85.97	82.75	79.64	76.66	73.78	71.02	68.35	65.79
Total	**348.69**	**336.52**	**324.75**	**313.36**	**302.33**	**291.66**	**281.34**	**271.34**	**261.67**	**252.32**	**243.26**
Total reduction rate		3%	7%	10%	13%	16%	19%	22%	25%	28%	30%

The net overall reduction from 348 GWh to 243 GWh by 2033 is equal to a 30% reduction in energy usage.

The specific analysis of current conditions and proposed measures in all three sectors can be revisited and revised over time to fine tune target setting.

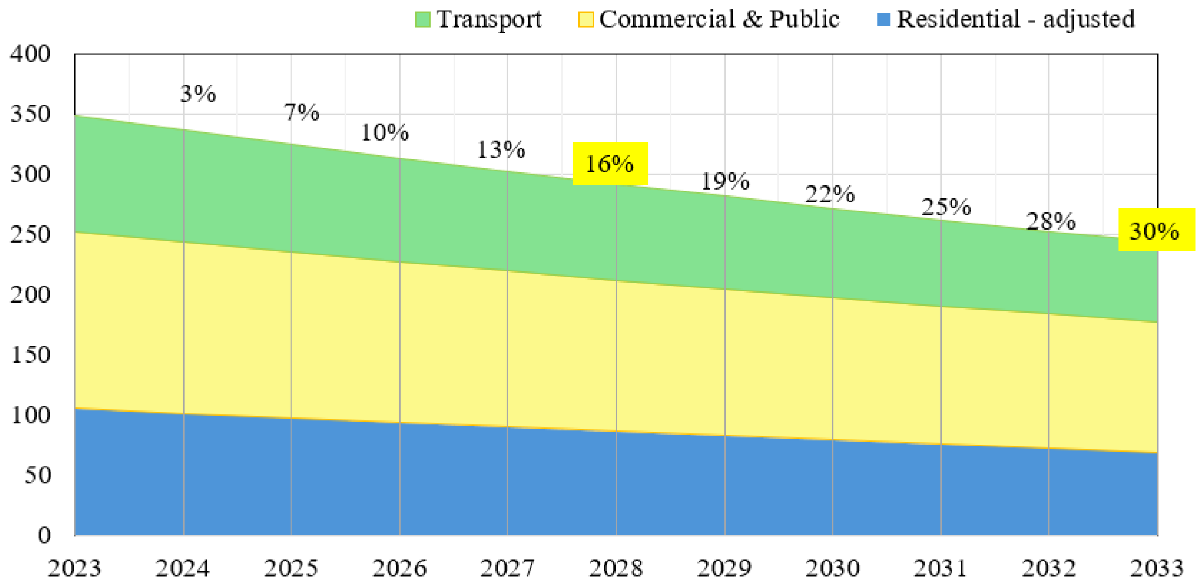

Figure 27 : 2032 Energy Reduction Target

9.7 EMP CO_2 Reduction Target Summary: All Sectors

When modelling the CO_2 reduction roadmap, there are a number of important factors to bring into the equation.

As explained in section 9.3, the carbon content of electricity will continue to reduce annually as a higher proportion of renewable generation is added to the national electricity generation mix.

Table 55 shows the projected CO_2 emissions factor from 2022-2033 based on the assumptions of the MaREI study.

Table 55 : CO2 emissions factor to 2033

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
CO2 emissions (kG/kWh)	0.409	0.224	0.209	0.194	0.179	0.163	0.148	0.133	0.118	0.103	0.088	0.073

This is also illustrated more graphically in Figure 28:

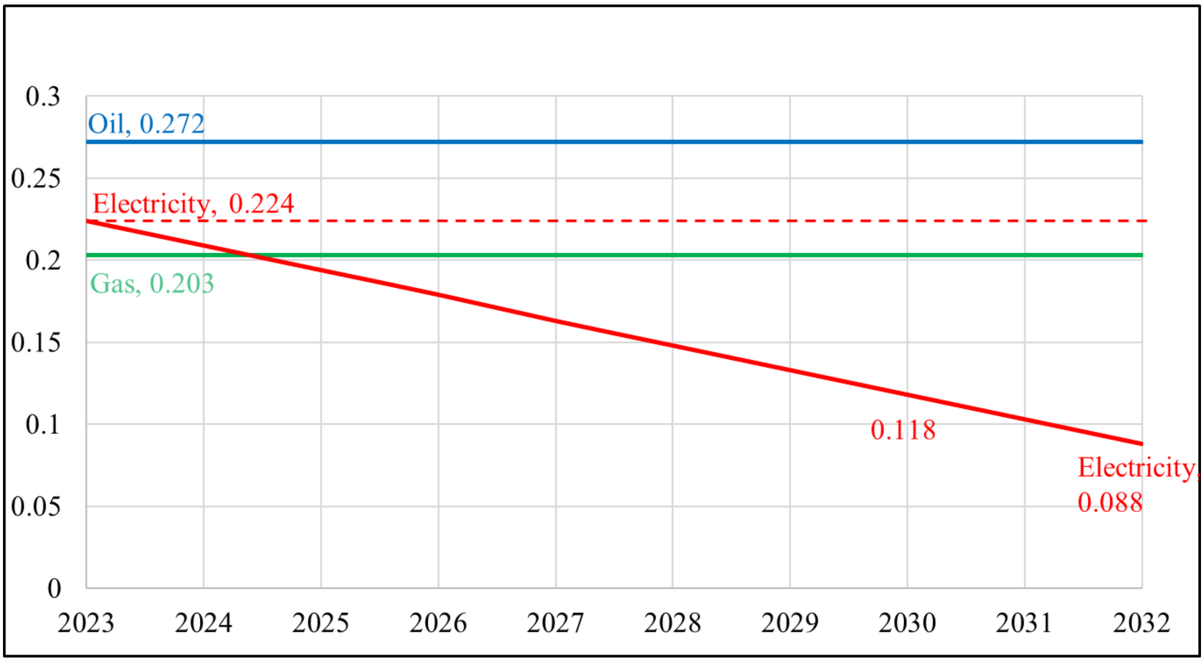

Figure 28 : Projected Reduction in CO2 Emission (kg/kWh) in generated electricity in Ireland

By combining the CO_2 factors with the predicted energy use, the CO_2 reduction out to 2033 is calculated in Table 56. This equates to a 45% reduction in CO_2 emissions.

Table 56 : Adjusted Carbon Dioxide Emissions – All Sectors

Total kilo tonnes carbon (kG/kWh)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Residential - adjusted	26.00	24.62	23.29	22.00	20.75	19.54	18.37	17.25	16.15	15.10	14.08
Commercial & Public	34.20	32.50	30.87	29.31	27.81	26.38	25.01	23.70	22.44	21.24	20.09
Transport	22.52	21.88	21.18	20.40	19.53	18.55	17.44	16.16	14.68	12.95	10.93
Total	**82.72**	**79.00**	**75.33**	**71.70**	**68.09**	**64.47**	**60.82**	**57.10**	**53.27**	**49.29**	**45.10**
% of Reduction comparing with 2023		4.5%	8.9%	13.3%	17.7%	22.1%	26.5%	31.0%	35.6%	40.4%	45.5%

This CO_2 reduction trajectory is shown in Figure 29 below.

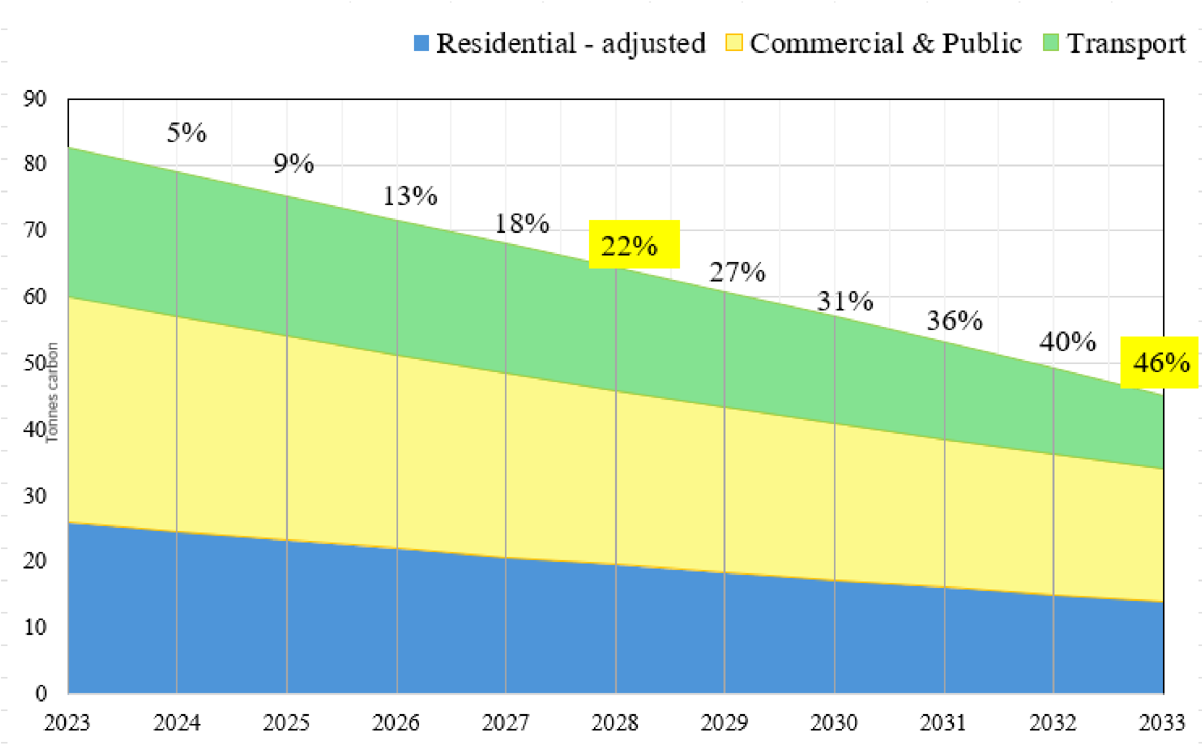

Figure 29: 2032 CO2 Reduction Target

9.8 Register of Opportunities Results

The recommended lists of actions, both practical measures and behavioural measures are summarised in the Register of Opportunities (RoO), which is a separate SEAI-formatted excel document.

The RoO contains two key elements:

1. Specific energy efficiency measures identified in the residential strategy and the rooftop PV studies.
2. Behavioural and organisational actions.

The RoO also summarises the key measures, and the associated estimated annual savings and the net capital costs.

Return on Investment (ROI)

The register of opportunities refers to the payback period for a range of upgrades. Some like PV will have a shorter payback period than that of say heat pumps. The ROI is metric that should be used when considering options as it is a tangible benefit, but the homeowner should also consider the intangible benefits that will occur from upgrading. Unfortunately, intangible benefits are often difficult to measure and monetise. This increase in the thermal comfort of the building to the occupants of building does not have a measurable metric as well as making the space more usable and to improved productivity of the space. Properly specified retrofits can provide substantial health benefits to occupants due to the improved indoor air quality (IAQ) which can be brought about by improving the airtightness of their buildings and introducing mechanical ventilation.

There are also societal benefits that will arise if this project successfully demonstrates the benefits of implementing an Energy Master Plan with the resultant reductions in emissions and other communities elsewhere realise that they too have a role to play in meeting our Climate Action goals.

Mobilisation

This Energy Master Plan sets out the baseline and then scopes out a viable roadmap to 2030/ 2033 indicating the level of investment and change that will be needed to achieve the carbon reduction targets. The next challenge for Ashbourne SEC will be to put a framework into place to implement the actions suggested.

The Register of Opportunities highlights a number of tangible projects that might be taken on by the Ashbourne community in the short term. Many Government supports including funding mechanisms are available to help the SEC in this work. It will also be important to work closely with key stakeholders including Meath County Councillors and public representatives.

10 Supporting Information on Measures & Technologies

While many of the recommended measures are well known, additional information is provided below on the less well-known technologies.

10.1 Heating Controls Package

To subdivide the home into independently controlled space heating and water heating zones, motorized controlled valves must be installed, along with at least one room thermostat and/ or thermostatic radiator valves (TRVs), a hot water cylinder thermostat (if required) and a 7-day programmable timer. The cylinder and room thermostats can then operate to create a boiler interlock to ensure your boiler only operates when required.

10.2 Air-to Water Heat Pump

In the last decade **air-to-water heat pumps** have become a popular renewable choice for heating and hot water systems, suitable for new and retrofit projects. As this is a relatively new technology, a lot of questions arise which give rise to many misconceptions.

What is a Heat Pump and what is an Air-to-water heat pump?

Heat Pump technology is being used in one of the most common appliances in our homes – the fridge. The principle of a heat pump is to move energy by the means of electricity, refrigerant gas and a compressor and in doing so, can provide both space heating, hot water and cooling.

To cool, the heat pump extracts heat from a warmer ambient e.g. the food in the fridge; and dumps it. To provide heat, the heat pump extracts heat from the air outside our homes and transfers it inside our homes.

An AIR-TO-WATER heat pump transfers the heat obtained from the outside air to the water in our heating systems.

How does the Air-to-water heat pump work?

Air passes the heat exchanger outside called the EVAPORATOR and the refrigerant gas absorbs heat from outside air and evaporates. The vapour passes into the compressor and by compression increases its temperature and pressure. Hot vapour is condensed in the 2nd heat exchanger, the heat being passed via water to the space heating or domestic hot water system. The liquid refrigerant passes back through the expansion valve, reducing its pressure ready to start the cycle again.

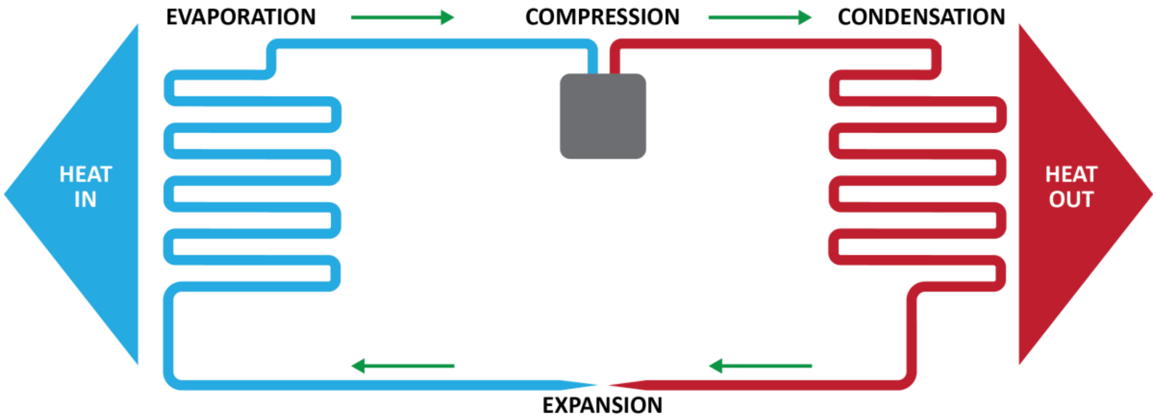

Figure 30 : Heat Pump Diagram

What happens when outside temperature are very low?

Most air-to-water heat pumps are equipped with an electrical back-up heater, which can be programmed to provide heating when external temperatures fall below a specified point. This point is called equilibrium temperature and is usually set at -3 °C but in most cases the electrical back-up is not required for heating at all. Traditionally, manufacturers in the heat pump industry have their air-to-water heat pumps designed to suit the European climate working even at outdoor temperatures of -25 °C.

What is the efficiency of an Air-to-Water heat pump?

A heat pump's efficiency is often referred to as a **Coefficient of Performance (COP).** The COP describes the **ratio of electrical power used to heating power produced** under fixed input and output conditions by the heat pump unit only. A COP is used for examining the performance of a heat pump unit at ideal test conditions, usually in a laboratory.

A COP of 4 means for every 1kW of electrical energy used, 4kW of useful energy is produced – a net 3kW of useful energy will be 'free' generated by the heat pump. The COP decreases with falling ambient air temperatures and rising flow temperatures.

The Seasonal Performance Factor (SPF) or Seasonal Coefficient of Performance (SCOP) describes the ratio of the amount of electrical energy used by all components associated with the heat pump system, to the amount of heat energy delivered to the heating system, over a long period of time (e.g. season or year).

SPF is a better indicator of performance for the purposes of examining the "real-life" performance of a heat pump than COP and takes into account the full heating system installed.

Does the type of heat emitter have an effect on the SPF?

SPF values may vary depending on the type of heat emitters used and aiming for a low flow temperature will result in high SPF figures. Ideally with an Air-to-water heat pump we should use an UFH – underfloor heating system because this only requires flow temperatures up to 35°C, resulting in SPFs over 500%.

We can also use low temperature radiators, aluminium or steel panel or fan coils which require flow temperatures up to 55 °C, resulting in SPF's around 400%.

The hot water production efficiency though for any heat pump it is not that high due to the high flow temperature required to heat water. This figure is in around the 200% mark and takes into account that most air-to-water heat pumps require an electrical immersion to raise the temperature in the tank to 60 °C, as an anti-legionella protection.

Are there any specific requirements when applying for a heat pump grant?

SEAI launched a new heat pump grant in April 2018. Before applying for the heat pump grant, a homeowner must be able to demonstrate their house has good levels of insulation and air tightness. The homeowner needs to engage the services of an SEAI registered Technical Advisor to perform an energy audit and BER calculation to prove that total heat loss is less than or equal to 2 Watts/m^2 as calculated in the BER software. More details are available on https://www.seai.ie/grants/home-grants/better-energy-homes/heat-pump-systems/

10.3 Demand Control Ventilation

Demand control ventilation (DCV) provides a smart whole-house ventilation system. DCV is particularly appropriate in retrofit projects as it avoids the needs for extensive ductwork associated with mechanical heat recovery ventilation (MHRV) systems.

DCV works using humidistat-based vents in bedrooms and living rooms. These vents have a clever material strip that expands and opens the vents wider when humidity levels are higher and contracts and thus closes the vent again when humidity levels are returned to normal. These inlet vents have no mechanical or electrical parts.

DCV uses extract grilles to take air away from wet rooms like kitchens and bathrooms in ducts connected to a central point. A central fan exhausts unwanted air out of the building.

Both the inlets and the extract grilles react to indoor air quality (IAQ) and thus adjust the rate of airflow; the fan detects these changes in pressure, which means there are no cables or controls needed, and adjusts its running speed accordingly. The fan is typically very quiet (about the same as a PC) and uses minimal electricity (about the same as a low energy light bulb). It does not require filter changes or regular servicing.

1. Air inlets - supply fresh air
2. Extract grilles – take air from wet rooms
3. Fan – exhausts air from the building

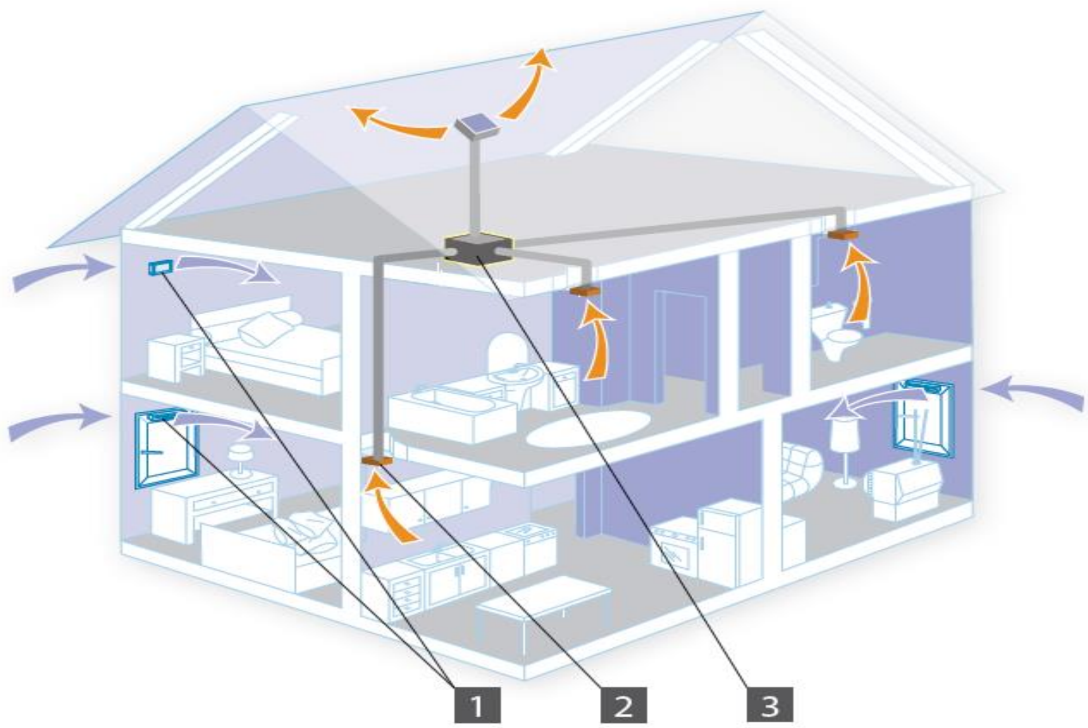

Figure 31 : Ventilation System

10.4 Solar Photovoltaic (PV)

Solar PV panels generate electricity that is then fed via an inverter into the home's distribution board. It is important that the number of PV panels and thus the power generated in watts matches the base/ minimum electrical load of the house.

As well as supplying electricity for normal household devices, PV-generated electricity can also be used to supply heat pumps, electric car batteries and also can be diverted to electric immersions in hot water tanks. New battery technologies will also enable some of the electricity generated to be stored.

Before 15th Feb 2022, there was no feed-in tariff in Ireland. This meant that if you generated more electricity than you used, you gave the excess away for free to the grid. In early 2022, the CRU (Commission for Regulation of Utilities) introduced a new arrangement that allows micro-generation customers to get paid for the excess energy they export to the grid.

Under this initiative, all homes and businesses that generate their own electricity will receive a payment for the surplus electricity which they export to the grid. This payment, known as the Clean Export Guarantee (CEG) tariff, is available to both new and existing micro-and small-scale generators who fulfil the eligibility criteria. Feed-in tariffs for residential customers vary from supplier to supplier and are current about 18c – 20c /kWh exported.

10.5 BER Evidence

All building owners need to be aware that they should retain appropriate technical evidence if they get energy efficiency works carried out so that this evidence can be used for any future BER certification. That is particularly important if these works are done outside of the SEAI grant process. BER assessors are subject to strict proofs of evidence and a comprehensive auditing regime.

So, for example, if new windows are installed, it is vital to ensure the window suppliers provide test certificates meeting SEAI standards. Or if internal wall insulation or say flat roof insulation is carried out, it is important to make sure that a formal statement is provided by the installer confirming exactly what product type and what thickness of insulation was installed. If this quality evidence is not available to the BER assessor, the latter will need to use more conservative default values which will results in a poorer BER score.

For BERs, SEAI advises on how best to prepare and present evidence to the BER assessor. See extract of SEAI advice below.

This actually can present a challenge if the dwelling was newly built in the recent past as the technical supporting data may not be available.

Step 3: Prepare your paperwork

Preparing all your documents and paperwork in advance of your BER assessment will reduce the time it takes to receive your BER Certificate and Advisory Report.

For an assessment of a **new building**, your assessor will need a considerable amount of documentation including for example, wall, roof and floor specifications and copies of certificates of performance for construction products and appliances installed in the property.

For an assessment of an **existing building**, you will need to provide your BER assessor with documentation of any upgrade works done to your property. Any documentation you may have regarding the original construction of the dwelling will also be beneficial.

Documentation includes certifications, receipts, invoices and/or specification documents from the architect, engineer or contractor who managed the works. These should clearly indicate the address of the property, the works carried out, and the products used.

If you cannot provide your BER Assessor with sufficient documentation of works on your home, they will use default values. Default values are based on construction type and the age of the building and are conservative estimates of the energy performance and as such, may result in your home receiving a lower BER rating than expected. Further information on how a BER is calculated is available here. Your BER assessor can advise you on the paperwork required to support your BER and you can download the homeowner's checklist to assist you in gathering the required documentation.

We recommend you retain a copy of all information and documentation supporting the inputs in your BER. This is important information and should be retained by you for use in any subsequent BER ratings.

Homeowner's checklist

Download this checklist to prepare for your BER.

Appendix A – Retrofit Calculator:

Variant	BER	Energy (kWh/m²/y)	Running Costs Calculation (kWh/y per fuel) Main SH	Sec SH	Main WH	Suppl WH	Pumps/fans	Lighting	Calib. Fac	Energy costs	Savings	Investment costs	SEAI Grants	Costs net of SEAI grants	Payback (years)	HLI
Current state	F	443.9	49916 Oil	5717 Smokeless	3946 Oil	0 Electricity	1157 Electricity	311 Electricity	0.8	€ 5,249	N/A	N/A	N/A	N/A	N/A	5.79
Starter package	E1	303.31	31034 Oil	4032 Smokeless	2414 Oil	0 Electricity	1118 Electricity	286 Electricity	0.8	€ 3,426	€ 1,823	€ 4,794	€ 2,200	€ 2,594	1.4	4.45
Standard measures	B2	118.77	9793 Oil	1659 Smokeless	1857 Oil	0 Electricity	1118 Electricity	286 Electricity	1	€ 1,816	€ 3,433	€ 58,294	€ 10,200	€ 48,094	14.0	2.02
Advanced measures	A2	34.36	1469 El.HP.SH	1533 Smokeless	694 El.HP.Water	0 Electricity	988 Electricity	286 Electricity	1	€ 1,091	€ 4,158	€ 73,844	€ 17,600	€ 56,244	13.5	2.00

Proposed measures & costs breakdown

Measure	Starter	Standard	Advanced	Area (m2)	Starter	Standard	Advanced
Attic insulation	☑	☑	☑	89.81	€ 2,694	€ 2,694	€ 2,694
Sloping Roof ins.	☐	☐	☐		€ -	€ -	€ -
Flat Roof ins.	☐	☐	☐		€ -	€ -	€ -
Cavity fill	☐	☐	☐		€ -	€ -	€ -
IWI	☐	☐	☐		€ -	€ -	€ -
EWI	☐	☑	☑	143	€ -	€ 28,600	€ 28,600
Exp/Susp. Floor insul.	☐	☐	☐		€ -	€ -	€ -
2G Windows	☐	☑	☑	32		€ 16,000	€ 16,000
3G Windows	☐	☐	☐		€ -	€ -	€ -
Doors	☐	☐	☑	2	€ -	€ -	€ 2,050
Condensing Boiler	☐	☑	☐	N.A	€ -	€ 4,500	€ -
Heating Controls	☑	☑	☐	N.A	€ 2,000	€ 2,000	€ -
Wood Stove	☐	☑	☑	N.A	€ -	€ 4,400	€ 4,400
AS Heat Pump	☐	☐	☑	N.A	€ -	€ -	€ 14,000
MVHR	☐	☐	☐	N.A	€ -	€ -	€ -
DCV & AT measures	☐	☐	☐	N.A	€ -	€ -	€ -
Photovoltaics	☐	☐	☑	N.A	€ -	€ -	€ 6,000
Project Mgt	☐	☐	☐	N.A	€ -	€ -	€ -
Low energy lights	☑	☑	☑	N.A	€ 100	€ 100	€ 100
					Starter	Standard	Advanced*
Totals:					€ 4,794	€ 58,294	€ 73,844
Grants					€ 2,200	€ 10,200	€ 17,600

Typical Current Conditions (modest upgrades only to date)

PARK VIEW		v1
Type	Detached	
Built	1976 with garage conversion	
Walls	Masonry concrete block with internal insulation	
Floors	Solid	
Roofs	100mm insulation at ceiling level, garage conversion roof unknown	
Windows	Mostly double-glazed PVC with 6mm gap	
Doors	Solid wood	
Ventilation	Natural ventilation with 1x chimney and 1x flue	
Heating system	Central heating oil boiler (70% eff.) + Stove (60% eff.) + Open Fire	
Space & Htg Controls	Programmer only	
Hot water cylinder	117 litre cylinder, 30mm factory insulated, no cylinder thermostat	

Appendix B - Brochures

Type 01 Johnswood Park, Ashbourne

Typical Current Conditions (modest upgrades only to date)	
Type	Semi-Detached / End of Terrace
Year built	2000
Walls	Masonry block wall
Floor	Solid
Roofs	100mm insulation at ceiling level
Windows	Double-glazed PVC with 6mm gap
Doors	Solid wood
Ventilation	Natural ventilation with 1x flue
Heating system	Central heating oil boiler (83% eff.) + Gas fire appliance (40% eff.)
Heating Controls	Programmer only
Hot water	114 litre cylinder, 30mm factory insulated, no cylinder thermostat

Upgrade Measures Package 1: The Starter

	Measures
1	Attic insulation – increase to total thickness of 300mm
2	Heating controls (to SEAI grant standard)*
3	Low energy lights

Optional step A: Carry out sensible air-tightness steps to minimise draughts.
- Draught-proof front & rear doorif required
- Draught-proof hot-press pipe holes, attic hatch door

Optional step B:
Partial internal / external wall insulation for selected colder rooms (improves energy efficiency but no grant available).

*Heating controls would need to be further upgraded if heat pump is installed later

Upgrade Measures Package 2: Standard Retrofit

	Measures
1	Attic insulation – increase to total thickness of 300mm
2	External insulation to all external walls (U= 0.27)
3	Heating controls (to SEAI grant standard)*
4	Double Glazed Windows (U=1.4)
5	Condensing Boiler 91% efficiency
6	Replace gas fireplace by wood burning stove
7	Low energy lights
	*Heating controls would need to be further upgraded if heat pump is installed later

Upgrade Measures Package 3: Advanced Measures/ Deep Retrofit*

	Measures
1	Attic insulation – increase to total thickness of 300mm
2	External insulation to all external walls (U= 0.27)
3	Air to Water Heat Pump (including full heating controls)
4	Double Glazed Windows (U=1.4)
5	Replace gas fireplace by wood burning stove
6	Photovoltaic panels (2kW)
7	Low energy lights

BER and Financial Analysis

Variant	BER	Energy Cost	Savings	Investment Cost	SEAI Grants	Costs inc. grants	Payback (years)	HLI
Current state	C3	€2,394	N/A	N/A	N/A	N/A	N/A	2.32
Starter package	C1	€1,946	€448	€3,720	€2,000	€1,720	3.8	2.20
Standard measures	B2	€1,439	€955	€41,720	€8,000	€33,720	35.3	1.77
Advanced measures	A2	€938	€1,457	€55,220	€15,400	€39,820	27.3	1.71

Important to Note:

1. All measures are presented in a logical order. Ideally it is important to address all insulation, window and air tightness upgrades first of all to minimise heat loss.
2. Heat pumps should only be considered after minimal heat loss has been achieved. A review of ventilation strategy and an air tightness test is recommended with satisfactory results ahead of heat pump installation.
3. Higher grants would be possible if applying through an SEAI-approved One Stop Shop. A home is eligible for the One Stop Shop Scheme if the home:
   a. Was built before 2011
   b. Will achieve a minimum B2 after upgrades & achieves reduction of 100 kWh/m2 /yr.
4. A formal survey would be required for each individual dwelling for to accurately scope out each project. Single measure grant amounts available from SEAI are used in this analysis.
5. Explore further options on www.berwow.ie

Type 02 Brindley Park, Ashbourne

Typical House - Current Conditions (modest upgrades only to date)	
Type	Semi-Detached / End of Terrace
Year built	2003
Walls	Masonry cavity wall
Floor	Solid
Roofs	150mm insulation at ceiling level
Windows	Double-glazed PVC with 6mm gap
Doors	Solid wood
Ventilation	Natural ventilation
Heating system	Central heating gas boiler (83% eff.)
Heating Controls	Programmer only
Hot water	117 litre cylinder, 30mm factory insulated, no cylinder thermostat

Upgrade Measures Package 1: The Starter

	Measures
1	Attic insulation – increase to total thickness of 300mm
2	Heating controls (to SEAI grant standard)*
3	Low energy lights

Optional step A: Carry out sensible air-tightness steps to minimise draughts.

- Draught-proof front & rear door if required
- Draught-proof hot-press pipe holes, attic hatch door

Optional step B: Upgrade existing double glazing with new low e glass
Replace double-glazing windows with more efficient up-to-date double glazing by replacing the glass panels. Must be evaluated on a case-by-case basis to assess existing frames and quality of window installation.

*Heating controls would need to be further upgraded if heat pump is installed later

Upgrade Measures Package 2: Standard Retrofit

	Measures
1	Attic insulation – increase to total thickness of 300mm
2	Cavity insulation to all external walls (U= 0.35)
3	New double-glazed windows (U=1.4)
4	Condensing boiler 91%
5	Heating controls (to SEAI grant standard)*
6	Low energy lights
	*Heating controls would need to be further upgraded if heat pump is installed later

Upgrade Measures Package 3: Advanced Measures/ Deep Retrofit*

	Measures
1	Attic insulation – increase to total thickness of 300mm
2	Cavity insulation to all external walls (U= 0.35)
3	New double-glazed windows and doors (U=1.4)
4	Air to Water Heat Pump (including full heating controls)
6	Photovoltaic panels (2kW)
7	Low energy lights

BER and Financial Analysis

Variant	BER	Energy Cost	Savings	Investment Cost	SEAI Grants	Costs inc. grants	Payback (years)	HLI
Current state	C1	€2,090	N/A	N/A	N/A	N/A	N/A	2.13
Starter package	B3	€1,679	€412	€5,330	€2,000	€3,330	8.1	2.03
Standard measures	B2	€1,297	€794	€20,190	€4,500	€15,690	19.8	1.64
Advanced measures	A1	€837	€1,253	€35,740	€11,900	€23,840	19.0	1.61

Important to Note:

1. All measures are presented in a logical order. Ideally it is important to address all insulation, window and air tightness upgrades first of all to minimise heat loss.
2. Heat pumps should only be considered after minimal heat loss has been achieved. A review of ventilation strategy and an air tightness test is recommended with satisfactory results ahead of heat pump installation.
3. Higher grants would be possible if applying through an SEAI-approved One Stop Shop. A home is eligible for the One Stop Shop Scheme if the home:
    a. Was built before 2011
    b. Will achieve a minimum B2 after upgrades
    c. Achieves reduction in primary energy in excess of 100 kWh/m2 /yr. as measured in BER.
4. A formal survey would be required for each individual dwelling for to accurately scope out each project. Single measure grant amounts available from SEAI are used in this analysis.
5. Explore further options on www.berwow.ie

Type 03 Westview, Ashbourne

Typical House - Current Conditions (modest upgrades only to date)	
Type	Semi-Detached / End of Terrace
Year built	1975 with garage conversion
Walls	Masonry concrete block
Floor	Suspended
Roofs	100mm insulation at ceiling level, garage conversion roof unknown
Windows	PVC Double-glazed 6mm
Doors	Solid wood
Ventilation	Natural ventilation with 1x chimney
Heating system	Central heating gas boiler (73% eff.) + Open Fire
Heating Controls	Programmer only
Hot water	114 litre cylinder, 30mm factory insulated, no cylinder thermostat

Upgrade Measures Package 1: The Starter

	Measures
1	Attic insulation – increase to total thickness of 300mm
2	Heating controls (to SEAI grant standard)*
3	Low energy lights

Optional step A: Carry out sensible air-tightness steps to minimise draughts.

- Draught-proof front & rear door if required
- Draught-proof hot-press pipe holes, attic hatch door, install chimney balloons

Optional step B: Upgrade existing double glazing with new low e glass

Replace double-glazing windows with more efficient up-to-date double glazing by replacing the glass panels. Must be evaluated on a case-by-case basis to assess existing frames and quality of window installation.

Optional step C:

Partial internal / external wall insulation for selected colder rooms (improves energy efficiency but no grant available).

*Heating controls would need to be further upgraded if heat pump is installed later

Upgrade Measures Package 2: Standard Retrofit

	Measures
1	Attic insulation – increase to total thickness of 300mm
2	External insulation to all external walls (U= 0.27)
3	New double-glazed windows (U=1.4)
4	Condensing boiler
5	Heating controls (to SEAI grant standard)*
6	Replace fireplace by wood burning stove
7	Low energy lights
	*Heating controls would need to be further upgraded if heat pump is installed later

Upgrade Measures Package 3: Advanced Measures/ Deep Retrofit*

	Measures
1	Attic insulation – increase to total thickness of 300mm
2	External insulation to all external walls (U= 0.27)
3	New double-glazed windows and doors (U=1.4)
4	Air to Water Heat Pump (including full heating controls)
5	Replace fireplace by wood burning stove
6	Photovoltaic panels (2kW)
7	Low energy lights

BER and Financial Analysis

Variant	BER	Energy Cost	Savings	Investment Cost	SEAI Grants	Costs inc. grants	Payback (years)	HLI
Current state	**E1**	**€3,715**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**3.45**
Starter package	**D1**	**€2,880**	**€835**	**€4,140**	**€2,000**	**€2,140**	**2.6**	**3.27**
Standard measures	**B2**	**€1,352**	**€2,363**	**€39,890**	**€8,000**	**€31,890**	**13.5**	**1.78**
Advanced measures	**A2**	**€934**	**€2,781**	**€57,890**	**€15,400**	**€42,490**	**15.3**	**1.78**

Important to Note:

1. All measures are presented in a logical order. Ideally it is important to address all insulation, window and air tightness upgrades first of all to minimise heat loss.
2. Heat pumps should only be considered after minimal heat loss has been achieved. A review of ventilation strategy and an air tightness test is recommended with satisfactory results ahead of heat pump installation.
3. Higher grants would be possible if applying through an SEAI-approved One Stop Shop. A home is eligible for the One Stop Shop Scheme if the home:
    a. Was built before 2011
    b. Will achieve a minimum B2 after upgrades & achieves reduction in primary energy of 100 kWh/m2 /yr. as measured in BER.
4. A formal survey would be required for each individual dwelling for to accurately scope out each project. Single measure grant amounts available from SEAI are used in this analysis.

Type 04 Deerpark, Ashbourne

Typical House - Current Conditions (modest upgrades only to date)	
Type	Semi-Detached / End of Terrace
Year built	1980
Walls	Masonry concrete block/brick
Floor	Suspended
Roofs	100mm insulation at ceiling level
Windows	PVC double-glazed with 6mm gap
Doors	Solid wood
Ventilation	Natural ventilation with 1x chimney
Heating system	Central heating oil boiler (83% eff.) + Open Fire
Heating Controls	Programmer only
Hot water	140 litre cylinder, 30mm factory insulated, no cylinder thermostat

Upgrade Measures Package 1: The Starter

	Measures
1	Attic insulation – increase to total thickness of 300mm
2	Heating controls (to SEAI grant standard)*
3	Low energy lights

Optional step A: Carry out sensible air-tightness steps to minimise draughts.
- Draught-proof front & rear door if required
- Draught-proof hot-press pipe holes, attic hatch door, install chimney balloons

Optional step B: Upgrade existing double glazing with new low e glass
Replace double-glazing windows with more efficient up-to-date double glazing by replacing the glass panels. Must be evaluated on a case-by-case basis to assess existing frames and quality of window installation.

Optional step C:
Partial internal / external wall insulation for selected colder rooms (improves energy efficiency but no grant available).

*Heating controls would need to be further upgraded if heat pump is installed later

Upgrade Measures Package 2: Standard Retrofit

	Measures
1	Attic insulation – increase to total thickness of 300mm
2	External insulation to all external walls (U= 0.27)
3	New double-glazed windows (U=1.4)
4	Condensing boiler
5	Heating controls (to SEAI grant standard)*
6	Replace fireplace by wood-burning stove
7	Low energy lights
	*Heating controls would need to be further upgraded if heat pump is installed later

Upgrade Measures Package 3: Advanced Measures/ Deep Retrofit*

	Measures
1	Attic insulation – increase to total thickness of 300mm
2	External insulation to all external walls (U= 0.27)
3	New double-glazed windows and doors (U=1.4)
5	Air to Water Heat Pump (including full heating controls)
6	Replace fireplace by wood-burning stove
7	PV Panels (2kW)
8	Low energy lights

BER and Financial Analysis

Variant	BER	Energy Cost	Savings	Investment Cost	SEAI Grants	Costs inc. grants	Payback (years)	HLI
Current state	D1	€2,621	N/A	N/A	N/A	N/A	N/A	2.92
Starter package	C2	€2,125	€496	€6,990	€2,000	€4,990	10.1	2.80
Standard measures	B2	€1,398	€1,223	€49,490	€9,300	€40,190	32.9	1.88
Advanced measures	A2	€1,100	€1,521	€67,090	€16,700	€50,390	33.1	1.80

Important to Note:

1. All measures are presented in a logical order. Ideally it is important to address all insulation, window and air tightness upgrades first of all to minimise heat loss.
2. Heat pumps should only be considered after minimal heat loss has been achieved. A review of ventilation strategy and an air tightness test is recommended with satisfactory results ahead of heat pump installation.
3. Higher grants would be possible if applying through an SEAI-approved One Stop Shop. A home is eligible for the One Stop Shop Scheme if the home:
    a. Was built before 2011
    b. Will achieve a minimum B2 after upgrades
    c. Achieves reduction in primary energy in excess of 100 kWh/m2 /yr. as measured in BER.
4. A formal survey would be required for each individual dwelling for to accurately scope out each project. Single measure grant amounts available from SEAI are used in this analysis.

Type 05 Ballybin, Ashbourne

Typical House - Current Conditions (modest upgrades only to date)	
Type	Detached
Year built	Circa 1800's with extension circa 1900's
Walls	Mix of stone and brick solid walls
Floor	Elevated
Roofs	100mm insulation at ceiling level
Windows	PVC double-glazed 6mm gap
Doors	Solid wood
Ventilation	Natural ventilation with 4x chimneys
Heating system	Central heating gas boiler (73% eff.) + 4x Open Fire
Heating Controls	Programmer only
Hot water	140 litre cylinder, 30mm factory insulated, no cylinder thermostat

Upgrade Measures Package 1: The Starter

	Measures
1	Attic insulation – increase to total thickness of 300mm
2	Heating controls (to SEAI grant standard)*
3	Low energy lights

Optional step A: Carry out sensible air-tightness steps to minimise draughts.

- Draught-proof front & rear door if required
- Draught-proof hot-press pipe holes, attic hatch door, install chimney balloons

Optional step B: Upgrade existing double glazing with new low e glass
Replace double-glazing windows with more efficient up-to-date double glazing by replacing the glass panels. Must be evaluated on a case-by-case basis to assess existing frames and quality of window installation.

Optional step C:
Partial internal / external wall insulation for selected colder rooms (improves energy efficiency but no grant available).

*Heating controls would need to be further upgraded if heat pump is installed later

Upgrade Measures Package 2: Standard Retrofit

	Measures
1	Attic insulation – increase to total thickness of 300mm
2	Internal insulation to all external walls (U= 0.27)
3	New double-glazed windows & doors (U=1.4)
4	Condensing Boiler
5	Heating controls (to SEAI grant standard)*
6	Replace fireplace by wood burning stove
7	Low energy lights
	*Heating controls would need to be further upgraded if heat pump is installed later

Upgrade Measures Package 3: Advanced Measures/ Deep Retrofit*

	Measures
1	Attic insulation – increase to total thickness of 300mm
2	Internal insulation to all external walls (U= 0.27)
3	New double-glazed windows and doors (U=1.4)
4	Air to Water Heat Pump (including full heating controls)
5	Replace fireplace by wood burning stove
6	Photovoltaic panels (2kW)
7	Low energy lights

BER and Financial Analysis

Variant	BER	Energy Cost	Savings	Investment Cost	SEAI Grants	Costs inc. grants	Payback (years)	HLI
Current state	F	€10,009	N/A	N/A	N/A	N/A	N/A	4.47
Starter package	E1	€8,017	€1,991	€6,240	€2,200	€4,040	2.0	4.38
Standard measures	B2	€3,063	€6,945	€63,460	€6,700	€56,760	8.2	1.97
Advanced measures	A2	€2,060	€7,949	€76,960	€14,100	€62,860	7.9	1.97

Important to Note:

1. All measures are presented in a logical order. Ideally it is important to address all insulation, window and air tightness upgrades first of all to minimise heat loss.
2. Heat pumps should only be considered after minimal heat loss has been achieved. A review of ventilation strategy and an air tightness test is recommended with satisfactory results ahead of heat pump installation.
3. Higher grants would be possible if applying through an SEAI-approved One Stop Shop. A home is eligible for the One Stop Shop Scheme if the home:
    a. Was built before 2011
    b. Will achieve a minimum B2 after upgrades
    c. Achieves reduction in primary energy in excess of 100 kWh/m2 /yr. as measured in BER.
4. A formal survey would be required for each individual dwelling for to accurately scope out each project. Single measure grant amounts available from SEAI are used in this analysis.

Type 06 Tudor Close (A), Ashbourne

Typical House - Current Conditions (modest upgrades only to date)	
Type	Semi-Detached / End of Terrace
Year built	1990
Walls	Masonry concrete block/brick
Floor	Solid
Roofs	100mm insulation at ceiling level, garage conversion roof unknown
Windows	Timber single-glazed
Doors	Solid Wood
Ventilation	Natural ventilation with 1x chimney
Heating system	Central heating gas boiler (83% eff.) + Open Fire
Heating Controls	Programmer only
Hot water	117 litre cylinder, jacket insulation, no cylinder thermostat

Upgrade Measures Package 1: The Starter

	Measures
1	Attic insulation – increase to total thickness of 300mm
2	Heating controls (to SEAI grant standard)*
3	Low energy lights

Optional step A: Carry out sensible air-tightness steps to minimise draughts.

- Draught-proof front & rear door / porch if required
- Draught-proof hot-press pipe holes, attic hatch door, install chimney balloons

Optional step B: Upgrade existing double glazing with new low e glass

Replace single-glazing windows with more efficient up-to-date double glazing by replacing the glass panels. Must be evaluated on a case-by-case basis to assess existing frames and quality of window installation.

*Heating controls would need to be further upgraded if heat pump is installed later

Upgrade Measures Package 2: Standard Retrofit

	Measures
1	Attic insulation – increase to total thickness of 300mm
2	External insulation to all external walls (U= 0.27)
3	New double-glazed windows and doors (U=1.4)
4	Condensing Gas boiler (91% efficiency)
5	Heating controls (to SEAI grant standard)*
6	Replace fireplace by closed stove
7	Low energy lights
	*Heating controls would need to be further upgraded if heat pump is installed later

Upgrade Measures Package 3: Advanced Measures/ Deep Retrofit*

	Measures
1	Attic insulation – increase to total thickness of 300mm
2	External insulation to all external walls (U= 0.27)
3	New double-glazed windows and doors (U=1.4)
4	Air to Water Heat Pump (including full heating controls)
5	Photovoltaic panels (2kW)
6	Low energy lights

BER and Financial Analysis

Variant	BER	Energy Cost	Savings	Investment Cost	SEAI Grants	Costs inc. grants	Payback (years)	HLI
Current state	D1	€2,900	N/A	N/A	N/A	N/A	N/A	2.84
Starter package	C1	€2,063	€837	€4,110	€2,000	€2,110	2.5	2.47
Standard measures	B2	€1,421	€1,478	€39,960	€8,000	€31,960	21.6	1.80
Advanced measures	A2	€1,042	€1,857	€57,960	€15,400	€42,560	22.9	1.80

Important to Note:

1. All measures are presented in a logical order. Ideally it is important to address all insulation, window and air tightness upgrades first of all to minimise heat loss.
2. Heat pumps should only be considered after minimal heat loss has been achieved. A review of ventilation strategy and an air tightness test is recommended with satisfactory results ahead of heat pump installation.
3. Higher grants would be possible if applying through an SEAI-approved One Stop Shop. A home is eligible for the One Stop Shop Scheme if the home:
    a. Was built before 2011
    b. Will achieve a minimum B2 after upgrades
    c. Achieves reduction in primary energy in excess of 100 kWh/m2 /yr. as measured in BER.
4. A formal survey would be required for each individual dwelling for to accurately scope out each project. Single measure grant amounts available from SEAI are used in this analysis.
5. Explore further options on www.berwow.ie

Appendix C

Industry-Average Cost of Measures

Measure Pricing (Industry Average) - 2023	
Attic insulation (m^2)	€30
Sloping roof insulation (m^2)	€170
Flat roof insulation (m^2)	€123
Cavity fill insulation (m^2)	€30
Internal wall insulation (m^2)	€120
External wall insulation (m^2)	€200
Suspended floor insulation (m^2)	€120
2G Windows (m^2)	€500
3G Windows (m^2)	€520
Doors (m^2)	€1,025
Condensing boiler	€4,500
Heating controls package	€2,000
Wood stove	€4,400
Air-to-water Heat Pump	€14,000
Demand Control Ventilation	€4,500
Photovoltaic panels (6 units)	€8,500

Appendix D

Simple Annual Energy/ Billing Data Tables

Electricity

Electricity Meter Reading		Usage Year	Elec KWh pa	Elec kg/kWh	Elec CO2 pa
Jan-19	15877				
Jan-20	19931	2019	4054	0.409	1,658
Jan-21	23959	2020	4028	0.409	1,647
Jan-22	27441	2021	3482	0.409	1,424
Jan-23	30321	2022	2880	0.409	1,178

Natural Gas

Gas Meter Reading		Con Factor	Adjusted reading	Usage Year	Gas KWh pa	Gas kg CO2 pa
Jan-19	41	11	451			
Jan-20	479	11	5269	2019	7189	1,459
Jan-21	1183	11	13013	2020	7744	1,572
Jan-22	1872	11	20592	2021	7579	1,539
Jan-23	2514	11	27654	2022	7062	1,434

Appendix E - 2028 Residential Projection – Excluding New Build

Row Labels	G	F	E2	E1	D2	D1	C3	C2	C1	B3	B2	B1	A3	A2	A1	Grand Tot
2023 total	31	26	25	64	136	165	205	339	456	409	134	46	774	138	10	2958
Upgrades on 20% of C1 or worse: 2024-2028	-6	-5	-5	-13	-27	-33	-41	-68	-91							-289
Altered 2023 Total	25	21	20	51	109	132	164	271	365	409	134	46	774	138	10	2659
2024-2028 - additional BERs									1800							1800
Adjust C1 average for those doing PV only									-250							
2024-2028 upgrades only						75			100	50	475		650	200	200	1750
2028 - Estimated BER Count	25	21	20	51	109	207	164	271	2015	459	609	46	1424	338	210	5759
Primary Band (kWh/m2/year)	680	415	360	320	280	245	215	185	165	135	115	85	65	35	20	
Primary Band (kWh/m2/year) - all BERs	16,864	8,632	7,200	16,384	30,464	50,715	35,260	50,172	332,442	61,965	70,035	3,910	92,560	11,830	4,200	792,633
Average Primary Energy (kWh/m2/year)																137.64

Appendix F

Definitions:

CODEMA: City of Dublin Energy Management Agency

EMP: Energy Master Plan

EWI: External Wall Insulation

kWh (kilowatt-hour) Standard unit of energy (1 kWh) where a 1kW (or 1000-Watt load) is powered for 1 hour.

GWh (Gigawatt-hour): equal to 1,000,000 kWh

Tonnes CO_2: 1000kg CO_2

MTonne CO_2: 1000 Tonnes CO_2

ICE: internal combustion engine including all hybrids, including plug-ins

IAQ: Indoor Air Quality

IEV: Intermittent Extract Ventilation

IWI: Internal Wall insulation

HGA: Hygrothermal Risk Assessment

MEV: Mechanical Extract Ventilation

MVHR: Mechanical Ventilation with Heat Recovery

PIV: Positive Input Ventilation (PIV)

Primary Energy: In the energy world, energy can be categorised as delivered energy or primary Energy. Delivered energy is that delivered to the meters or oil storage tanks of a building and is the energy on which fuel bills are based. Primary energy included the delivered energy plus the energy required to transmit that energy from its fossil fuel source. All BER certificates are based on primary energy. The associated conversion factors from delivered to primary for most popular fuels are as follows:

	Primary Energy Conversion Factor	**CO_2 emission Factor (kg/kWh)**
Gas	1.1	0.203
Oil	1.1	0.272
Electricity* (2023 values)	1.75	0.224
Wood logs	1.1	0.025
Smokeless fuel	1.2	0.392

RoO: Register of Opportunities – this is a standard SEAI excel template for listing recommended measures and actions

Appendix G

Business Energy Use Survey

Survey on Energy Consumption in the Public & Commercial Sector in Ashbourne

This research is being undertaken as part of the Ashbourne Energy Masterplan (EMP). The EMP is an initiative to build a sustainable energy community in Ashbourne, so that local renewable and sustainable energy initiatives can be formed to bring tangible financial and environmental benefits, to both local businesses and the community. The masterplan is supported by, and works in coordination with regional and national organisations.

If you scan this QR code with your camera phone, you can fill it out online!

Also, you can fill it out online at https://forms.gle/CaBXqYtfjpea9Ja9A

We ask a few minutes of your time to complete the following information for your business. All of the data will be kept confidential; will only be used for the purposes for which it is being gathered; and will be subject to GDPR. At the end we will ask you for your e-mail, should you wish to be considered for initiatives arising from this research, or if you would like to be included in the sustainable energy community in Ashbourne.

Thank you for your time.

Business Name: ________________________________

Business Address: ________________________________

In which industrial sector do you operate?

□ Manufacturing, Processing	□ Hotel, B&B, Other Accommodation	□ Restaurant, Pub, Cafe	□ Leisure (Gym, Cinema, etc)
□ Education	□ Medical, Hospital, Nursing Home, Dental, Veterinary	□ Retail	□ Professional \Consumer Services
□ Storage, Logistics	□ Agriculture	□ Transportation	□ Construction

In what year was your premises constructed? ________________________________

What is the size of your premises? (m^2) ________________________________

Does your premises have a BER rating? □ Yes □ No

If Yes, please select your BER rating

□ A1	□ A2	□ A3
□ B1	□ B2	□ B3
□ C1	□ C2	□ C3
□ D1	□ D2	
□ E1	□ E2	
□ F	□ G	□ No BER Rating

How much electricity has your business consumed over the past 12 months? (kWh) ________

How much has your business spent on electricity over the past 12 months (€, ex-VAT) ________

How much gas has your business consumed over the past 12 months? (kWh) ________

How much has your business spent on gas over the past 12 months (€, ex-VAT) ________

How much oil has your business consumed over the past 12 months? (litres) ________

How much has your business spent on oil in the past 12 months (€, ex-VAT) ________

How much Petrol/Diesel has your business consumed over the past 12 months? ________

How much has Petrol/Diesel cost your business over the past 12 months? (€, ex-VAT) ________

Has your business undertaken any energy upgrades in the past five years? □ Yes

□ No

Please describe the energy upgrade measures (e.g. lighting upgrade, heating upgrade, insulation or windows upgrade)

____

Do you plan any energy upgrades in the next three years? □ Yes

□ No

would you like to be considered for energy upgrades that emerge from the Ashbourne Energy Masterplan? □ Yes

□ No

If you answered yes to the previous question, or if you would simply like to be included on our e-mail distribution list, please enter your e-mail below.

____