



▶ Boherbue SEC
Energy Master Plan

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Introduction

This Energy Master Plan project has been funded by SEAI to assist in developing and refining short medium and long term plans for the Boherbue Sustainable Energy Community.

The data gathered and tools developed to review projects will help the community strive towards being an exemplar model in the transition to a low carbon village.

Energy consumption in Residential, Industrial, Agriculture, Public and Commercial sectors was reviewed.

Furthermore, census and statistical data was collected for the areas utilising published data from the Central Statistics Office, Teagasc, SEAI, amongst others.

The result is a snapshot of Boherbue's energy balance and potential opportunities for energy efficiency improvements and renewable energy implementation.

Legislation & Guidance

The National Energy Efficiency Action Plan (NEEAP), which presents the country's policy targets to energy efficiency [1] includes;

- Plan to deliver 20% energy efficiency by target date of 2020
- This represents €2.4 billion in energy cost and 7.7 million tonnes of carbon emissions reduction. To date, the country has achieved 12% of its national target.
- The Public Sector has been set an energy efficiency target of 33%.

The EU Energy Performance in Buildings Directive (EPBD) legislation Article 9 requires all new buildings to be “nearly zero energy” by end of 2020. Ireland has a target to achieve 70% energy efficiency in Residential buildings compared to 2005 standards, and 60% energy efficiency in Non-residential buildings compared to 2008 standards

Commercial sector target to reduce energy usage by 20%. In transportation, Ireland set an initial target of converting 10% of its passenger and light commercial vehicle stock to Electric Vehicles (EVs) by 2020.

National Renewable Energy Action Plan (NREAP) [2] includes;

- 40% electricity consumption from renewable energy sources (RES),
- 10% electric vehicles and
- 12% renewable heat by 2020

Climate Action Plan 2019

- > The Climate Action Plan 2019 is a central objective for the Irish Government, putting Ireland on a sustainable pathway to achieving a longer term vision for decarbonisation.
- > The Climate Action Plan recognises that Ireland must significantly increase its commitments to tackle climate disruption. The Plan sets out ambitious targets to be achieved by 2030 some of which are summarised to the right.



Electricity

70% Electricity generated from renewable sources by 2030



Phase-out Coal and Peat electricity generation



Homeowners to generate their own electricity and sell back to the grid under scheme for **micro-generation**



Transport

Increase the number of EVs by 2030 to circa



1 million



Build EV charging network to stay ahead of demand

Expand our network of cycle paths and 'Park and Ride' facilities, helping ease congestion

No diesel-only purchases

for public buses in our cities from 1 July 2019



Agriculture

Deliver GHG emissions reduction identified by Teagasc by creating new, sustainable opportunities for family farms



Buildings



500,000

existing homes to upgrade to 'B2' equivalent BER by 2030

600,000

heat pumps installed by 2030 (of which 400,000 will be in existing buildings)



New retrofitting delivery model, which will group retrofits together, leverage smart finance, and ensure easy pay-back methods



Waste and the Circular Economy



Reduce the percentage of municipal waste sent to landfill to **10%** by 2035

Reduce food waste by 50% by 2030



By 2030

Recycle 70% of packaging waste



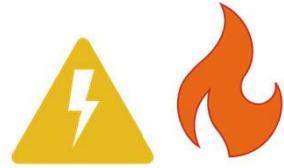
Recycle 55% of plastic packaging waste

Eliminate non-recyclable plastic and impose higher fees on the production of materials that are difficult to recycle



Boherbue Context

Review of Residential, Industrial, Commercial and Community life



Energy Baseline

Establish energy consumption, emissions and costs for each sector



Energy Assessments

Review of energy usage in a sample of buildings in the area



Register of Opportunities

Identify energy efficiency improvement and renewable energy implementation opportunities

March 2021

March 2021

April 2021

June 2021

Methodology

Boherbue Context

BUILDING_USE

- MIXED USE (104)
- COMMERCIAL (33)
- RESIDENTIAL (552)
- UNKNOWN (2)



Boherbue Context

VACANT

- NO (624)
- YES (67)



*Occupancy status based on Eircode/Geodirectory datasets

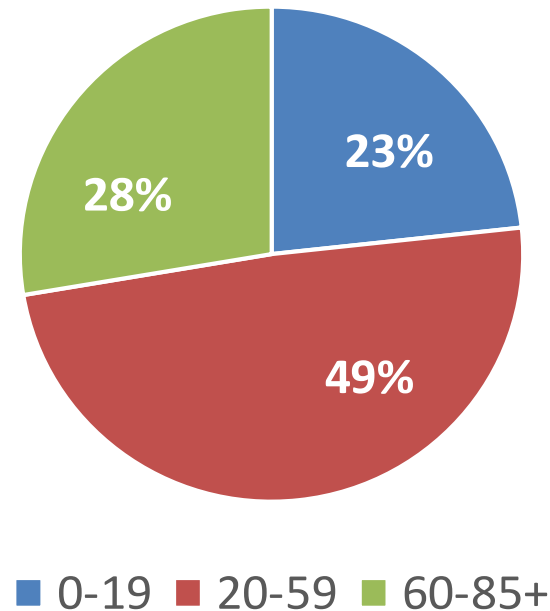
Boherbue Context

Background data on community life* was obtained from the Central Statistics Office for the Small Area Plans 047055001, 047055002, 047055003/047055004, 047130001, 047130002, 047291002, which covers the Boherbue catchment area.









This data provides context on:

- ◆ Demographics
- ◆ Housing Stock
- ◆ Agriculture
- ◆ Employment
- ◆ Transport

Population Age Profile



Residential - Housing Stock

Single Occupancy		144	Persons
Double Occupancy		250	Persons
3 Person Family		255	Persons
4 Person Family		276	Persons
5 Person Family		195	Persons
6 Person Family		90	Persons
7 Person Family		42	Persons
8+ Person Family		0	Persons

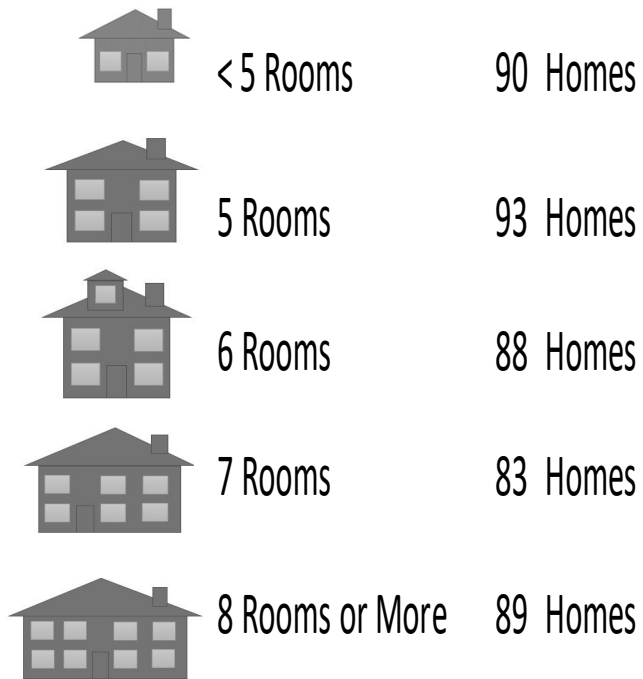
Occupancy status of permanent dwellings on Census night



Occupancy Distribution :

	Quantity	Percentage
Occupied	481	80.0%
Temporarily absent	8	1.3%
Unoccupied holiday homes	12	2.0%
Other vacant	100	16.6%
Total	601	100%

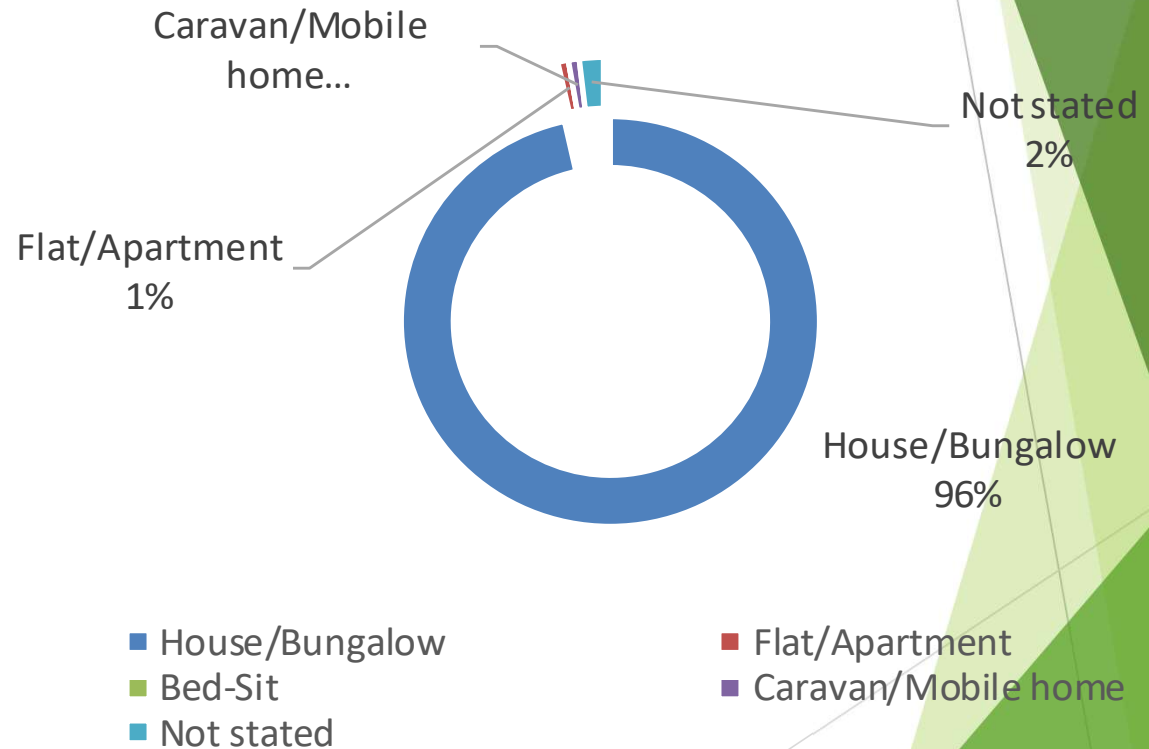
Residential - Housing Stock



*unknown number of rooms 7.5%

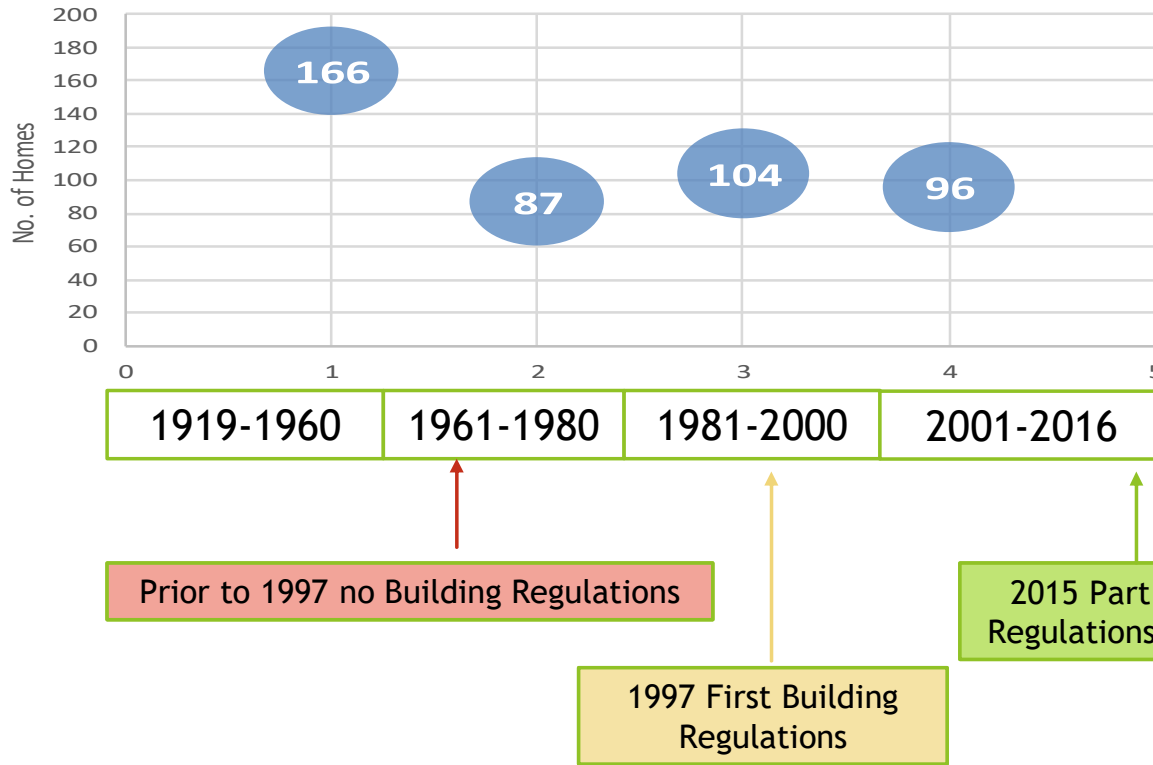
Dwelling Size Distribution:

Dwelling Type :



Residential - Housing Stock

Building Age

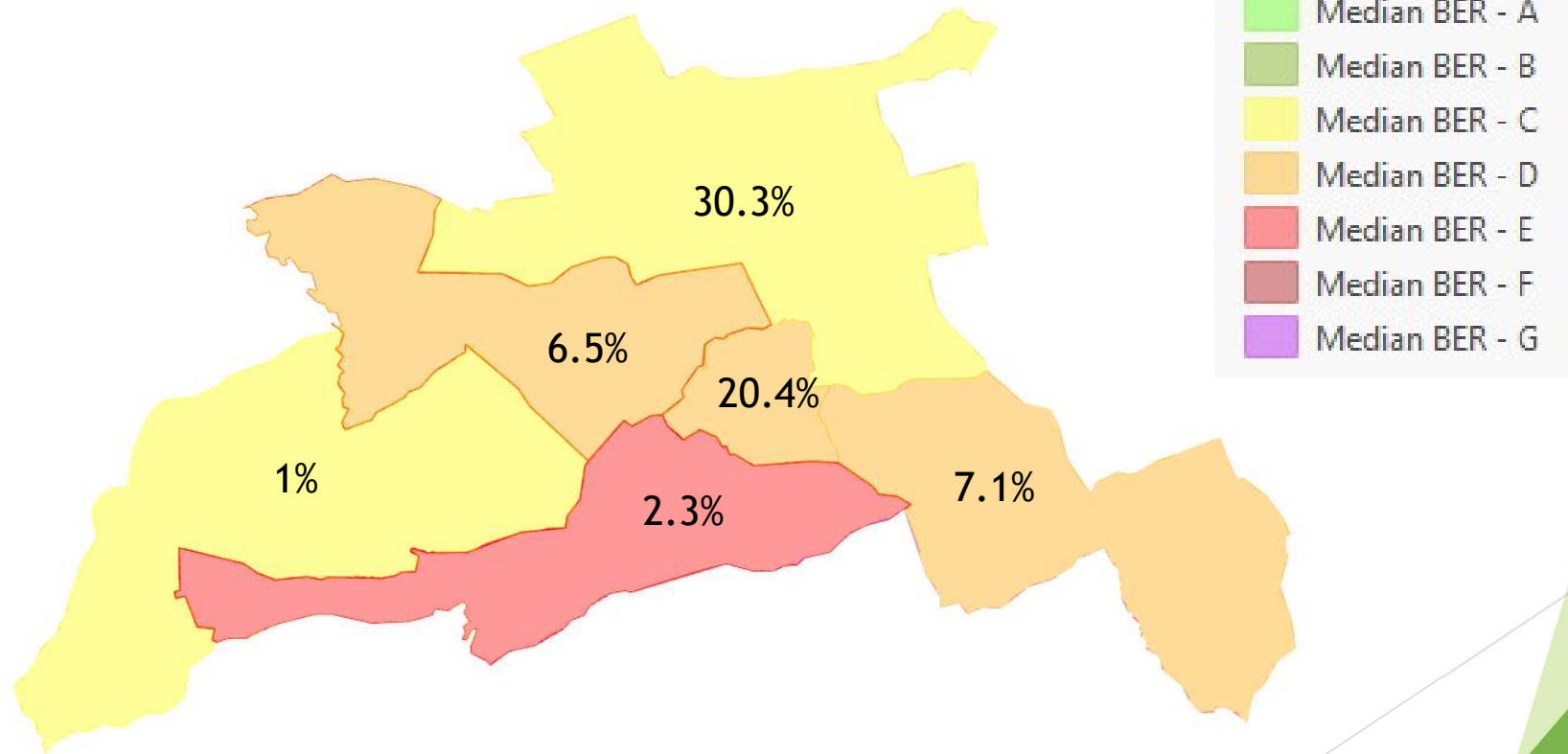


Relationship between Dwelling Age and Irish Building Regulations.

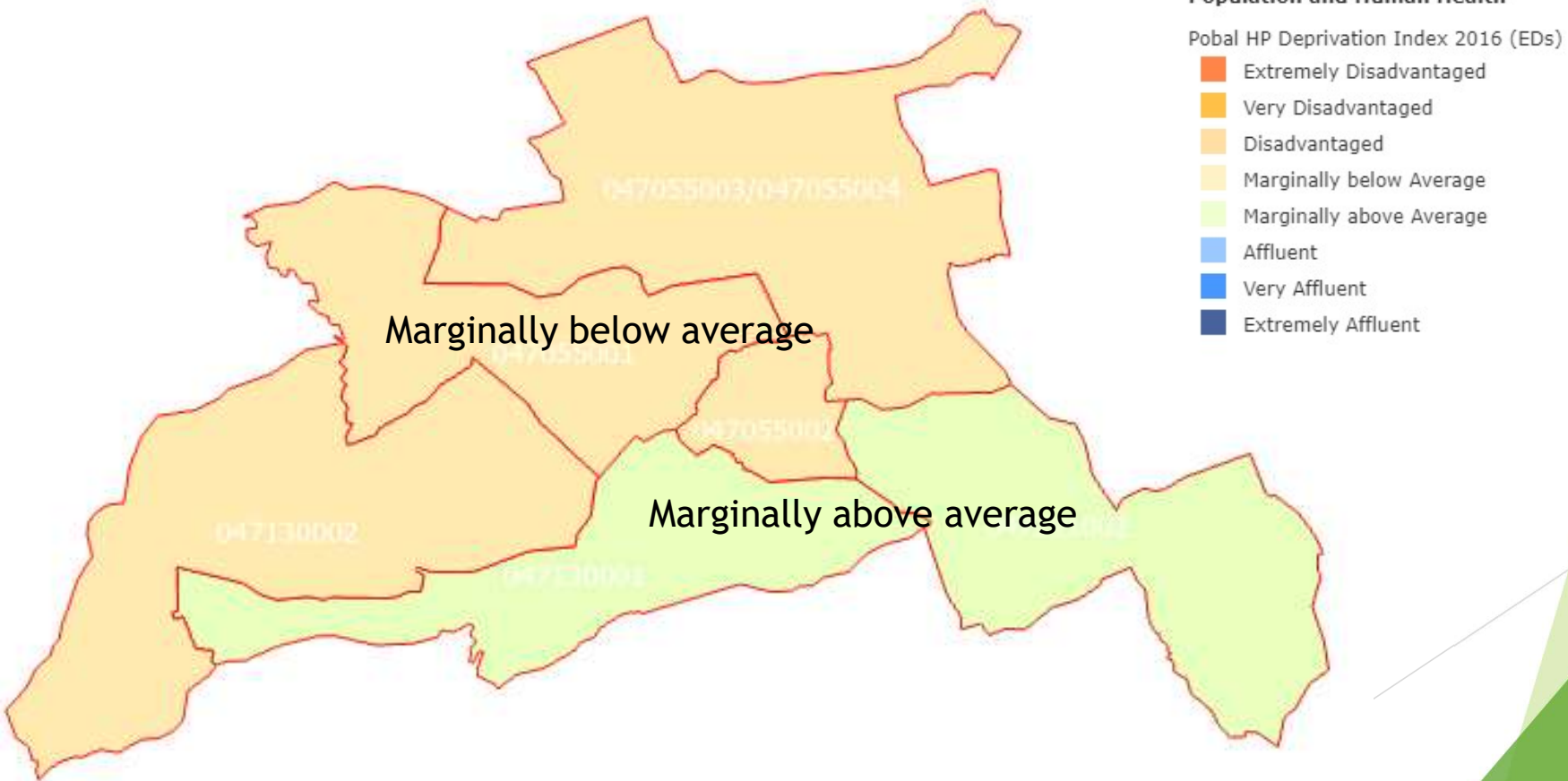
Residential - Housing Stock

AVAILABLE BER DATA FOR SURVEY AREA BASED ON SMALL AREA PLANS

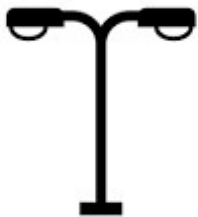
Percentage of Buildings with Building Energy Rating



Pobal Deprivation 2011 - Small Area Plans



Public Buildings and Utilities



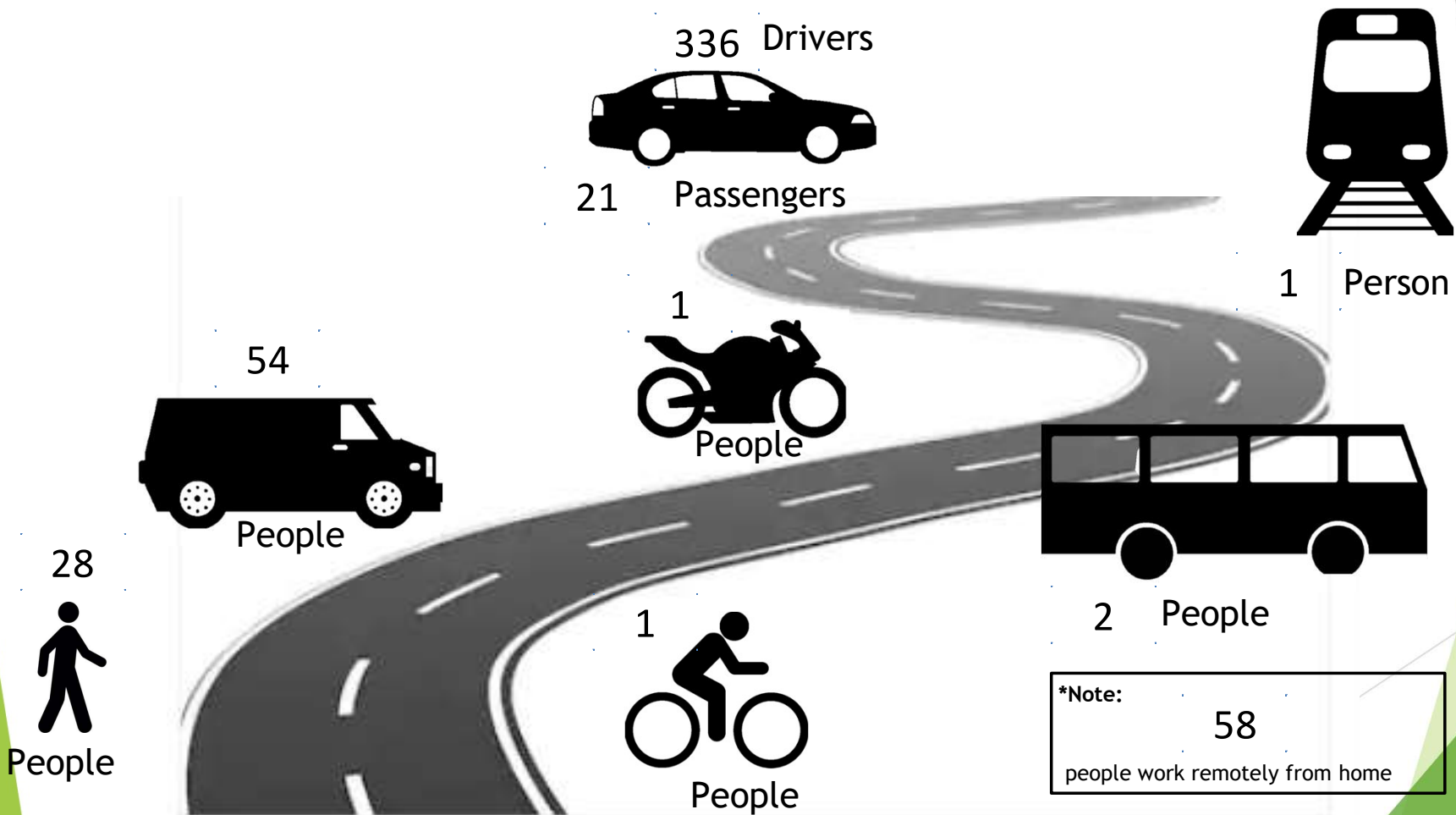
The main public buildings include:

- Boherbue National School
- Boherbue Comprehensive School
- Catholic Church of the Immaculate -Conception
- Boherbue GAA Club
- Boherbue Handball Club
- An Garda Siochana

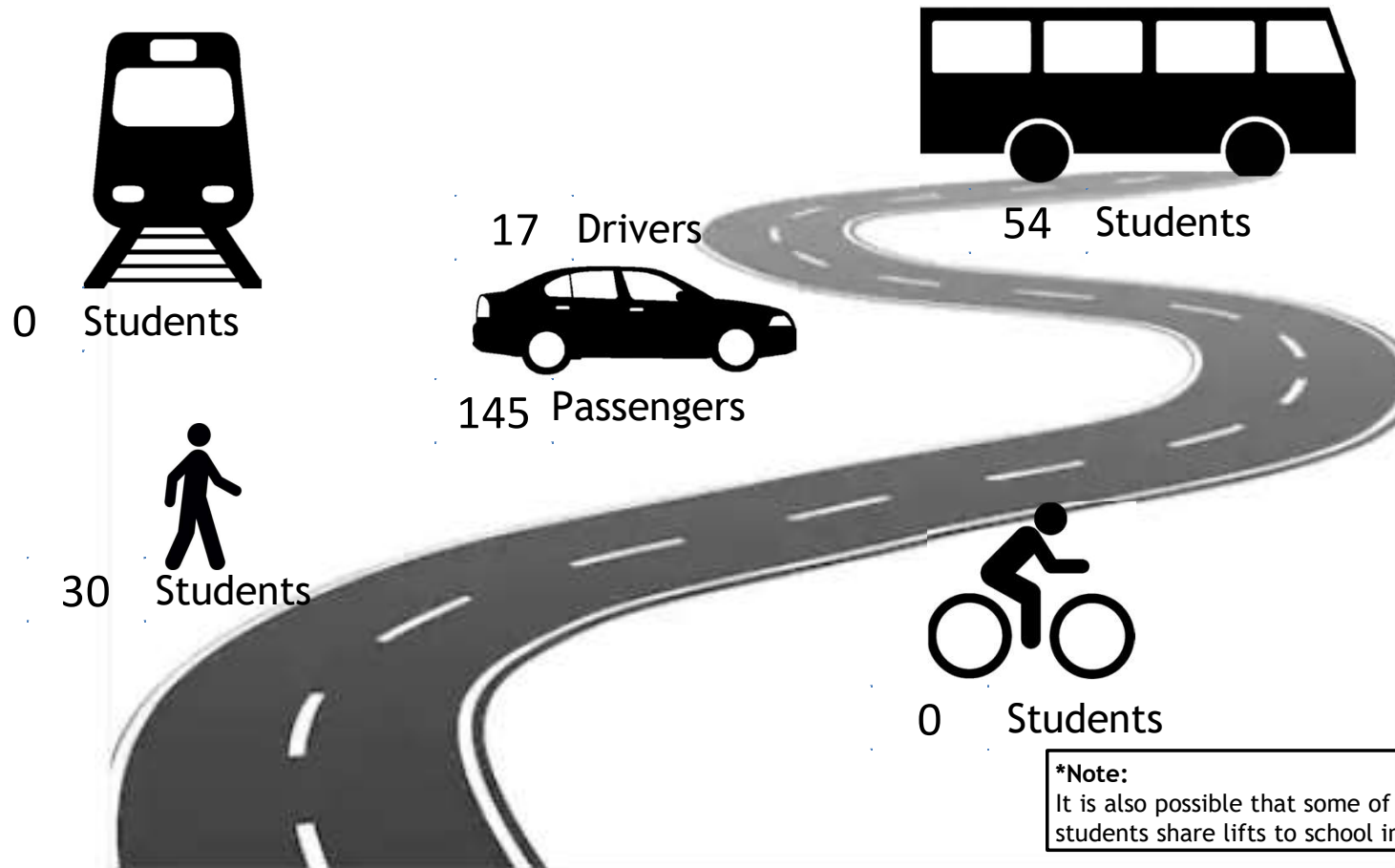
The main public utilities include:

- Public Lighting
- Group Water Scheme

Transportation- Means of Commute to Work



Transportation- Means of Commute to School



***Note:**
It is also possible that some of the students share lifts to school in cars.

BER REPORTS

Building No.	Building Size m2	Existing BER Rating	Measures No.	Possible BER Uplift
1	190	B2	6	A3
2	244	B1	6	A2
3	121	D1	8	A3
4	227	C1	8	A3
5	88	D1	5	A3

- 5 Properties to be surveyed in June 2021
- Example table of results above.
- Individual uplift reports for each of the properties surveyed

Percentage Energy Efficiency LqIB from Action

Measure	Percentage
1. Ventilation	15.00%
2. External Wall	15.00%
3. Windows/Doors	15.00%
4. Lighting	15.00%
5. Heating System	15.00%
6. Heating System	15.00%
7. Heating System	15.00%
8. Heating System	15.00%

Key Observations

1. OVERALL HOUSING STOCK

- 70% of housing built before 1990
- Heating heavily dominated by Oil & Solid Fuel.
- Potential suitability for retrofit or deep retrofit of homes.
- Low level of BER assessment of dwellings with the catchment area.
- High Level of Cavity Walls suitable for insulation.

Energy Baseline

The energy inputs and uses were analysed for the area, this included Total Primary Energy Requirement (TPER) and Total Final Consumption (TFC).

TPER is the measure of all of the energy consumed that accounts for the energy that is consumed and/or lost in transformation, transmission and distribution processes (e.g. electricity generation transmission and distribution).

TFC is the energy at point of use (the quantity of electricity directly used by the consumer)

For purposes of this document, TPER conversion, TFC emissions and TFC cost were based on SEAI conversion publications[10, 11].

Boherbue

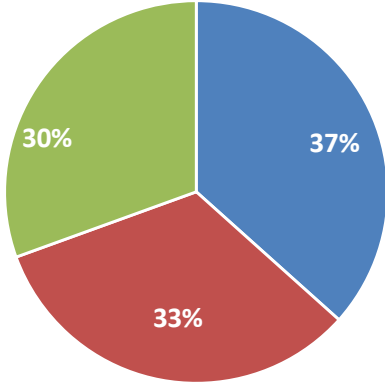
	Boherbue SEC				
	Total Primary Energy Requirement Usage (MWh)	Total Final Consumption (TFC) Usage (MWh)	Total Final Consumption (TFC) Emissions (tCO ₂)	Total Final Consumption (TFC) Cost (€)	
Transportation	2,709	5,730	1,478	€	693,295
Thermal Fuel	4,826	6,548	1,710	€	620,883
Imported Electricity	3,947	2,577	1,244	€	577,838
Total	11,482	14,854	4,432	€	1,892,016

This table provides a summary of the TPER and TFC for the 3 main energy uses in Boherbue in 2021.

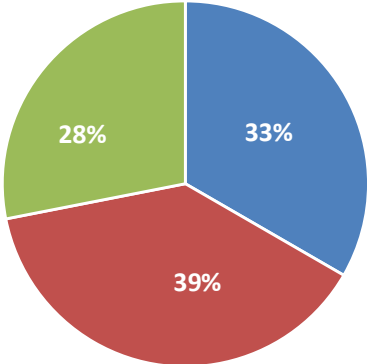
Energy Baseline

Boherbue

Total Final Energy Cost (€)



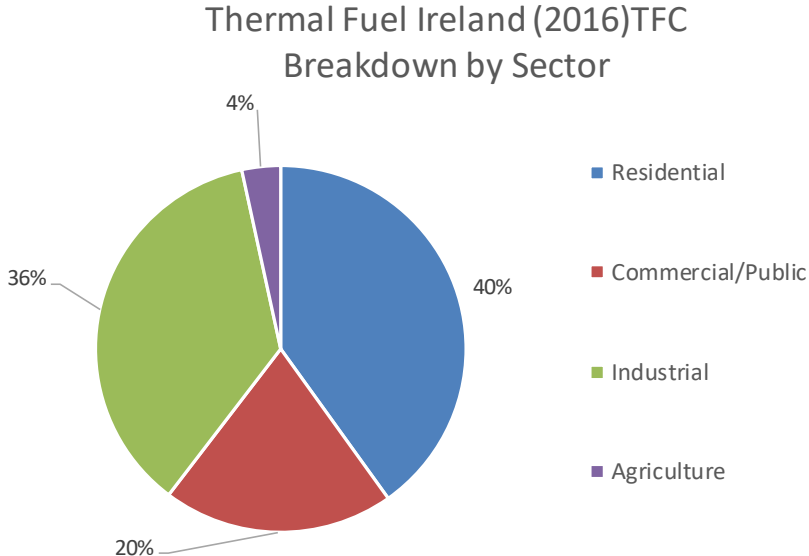
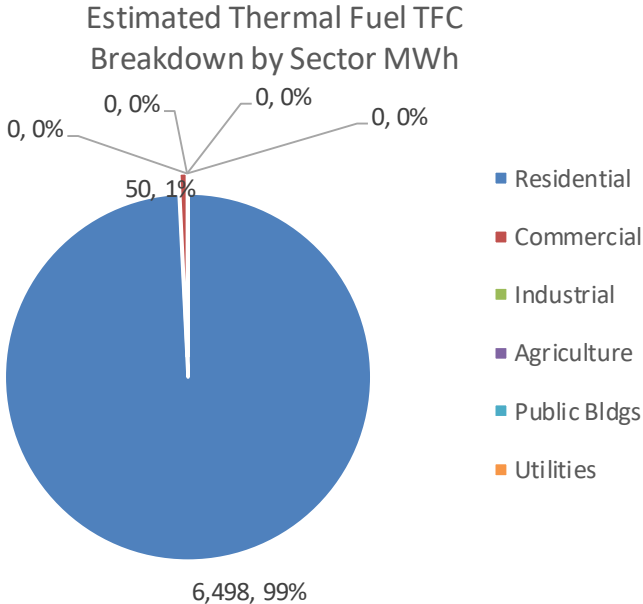
Total Final Energy Emissions (tCO2e)



Figures detail the Total Primary Energy Consumption, Emissions and Cost breakdown by Fuel.

Energy Baseline

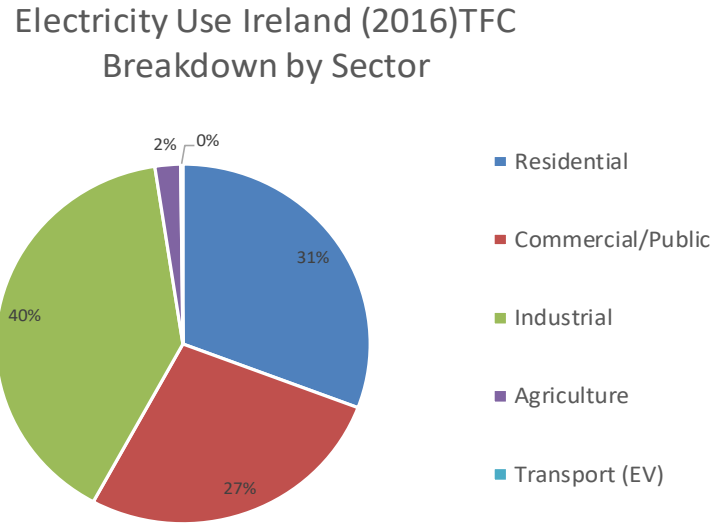
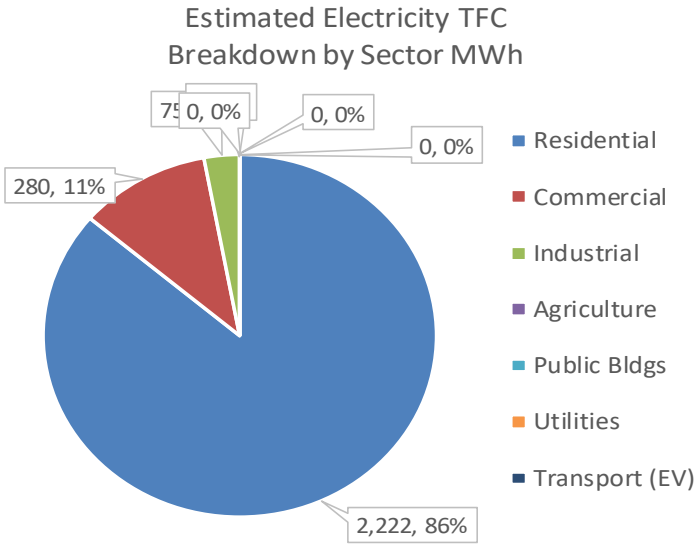
Boherbue



The Residential Sector consumes the vast majority of the Thermal Fuel. Due to the low level of industry and the type of agricultural practices this is to be expected.

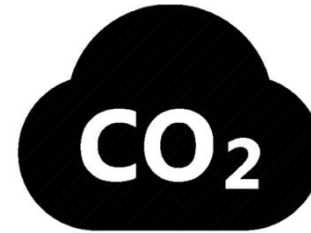
Energy Baseline

Boherbue



The Residential Sector and Agricultural Sector consume the vast majority of electrical energy. Due to the low level of industry and public infrastructure this is to be expected.

Energy Baseline



147 Cars

2 Mini Bus

0 Electric Cars

219,428
Litres of Fuel

2,631,680
kWh TFC

679
Tonnes

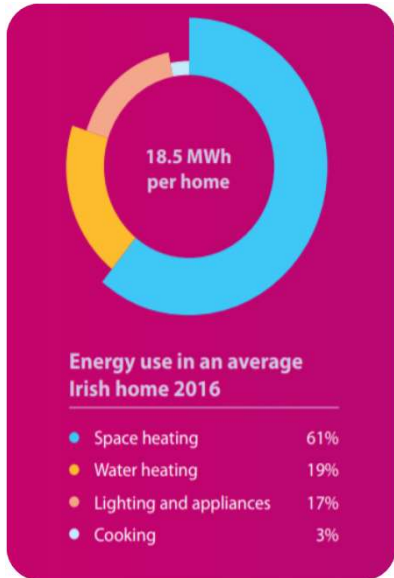
€ 318,433
Annual Fuel Spend

Residential transport energy TFC represents 39% of the overall energy usage of the Boherbue study area.

*Note: CSO data does not provide distinction between diesel and petrol vehicles. Average conversion, emission factors and cost were used for petrol/diesel.

Energy Baseline- Residential Transport

Residential Sector



SEAI published the national annual energy consumption of a residential property in 2016.

In conjunction with CSO data, an estimate for the Boherbue Study Area Thermal and Electric TFC energy consumption was calculated.

Boherbue's Residential Sector consumed 59% of the study areas Total Energy or 8,720 MWh.

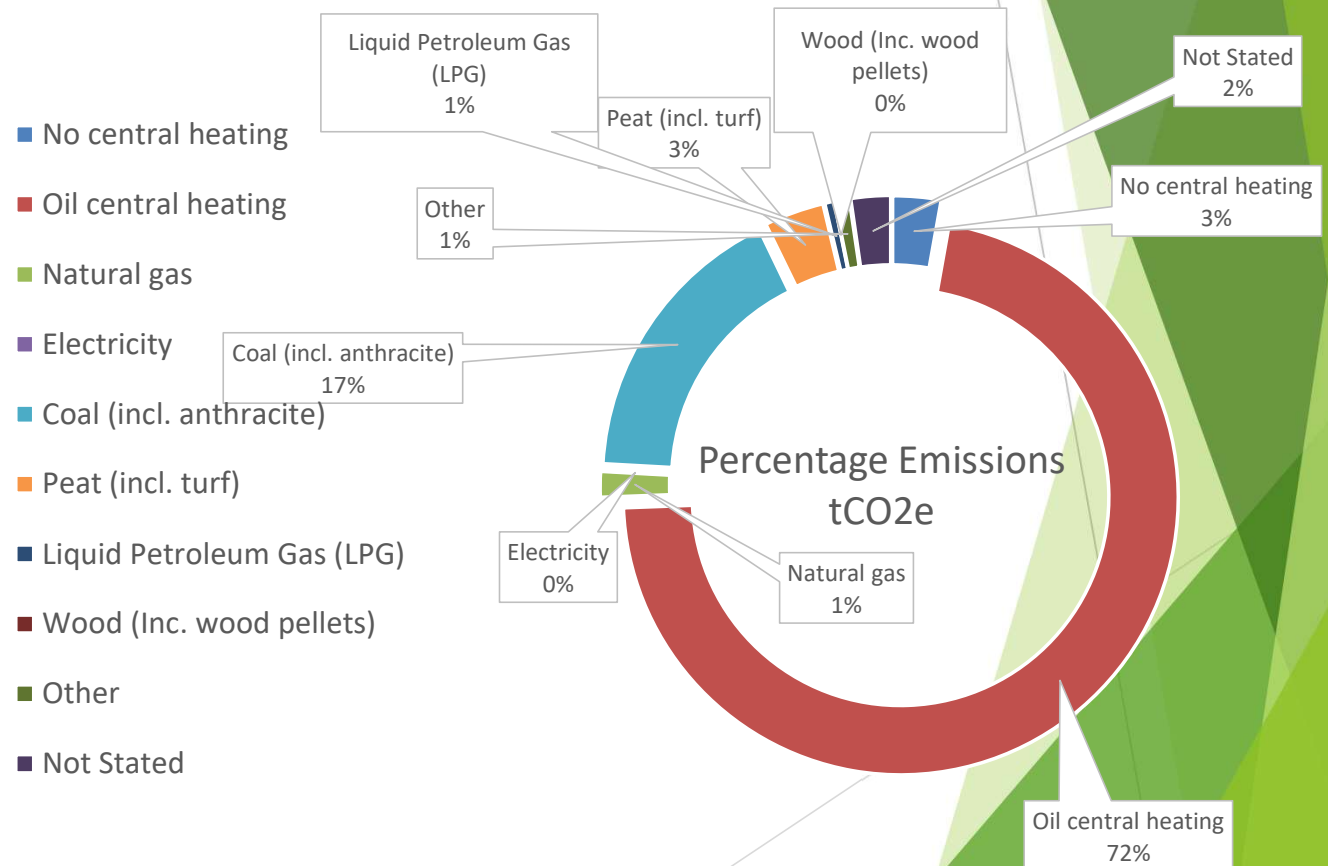
This accounted for 2,777 tCO₂e and € 1,003,753 in energy spend.

Residential Sector - Thermal Consumption

Heating Type	NO. OF UNITS	Fuel	% of Total Thermal Energy	Thermal TFC (kWh)	Emissions tCO2e
Sum of No central heating	5	oil	2%	69,425	18.3
Sum of Oil	112	Oil	55%	1,555,120	410.4
Sum of Natural gas	1	Natural Gas	0%	13,885	2.8
Sum of Electricity	2	Electricity	1%	-	0.0
Sum of Coal (incl. anthracite)	7	Coal	3%	97,195	33.1
Sum of Peat (incl. turf)	58	Peat	28%	805,330	286.6
Sum of Liquid Petroleum Gas (LPG)	3	LPG	1%	41,655	9.6
Sum of Wood (Inc. wood pellets)	11	Wood Pellets	5%	152,735	0.0
Sum of Other	1	Other	0%	13,885	3.6
Not Stated	4	Other	2%	55,540	14.3
Totals	204			2804770	778.7

Residential Sector - Thermal Fuel Emissions

Heating Type	Emissions tCO2e
No central heating	18.3
Oil central heating	410.4
Natural gas	2.8
Electricity	0.0
Coal (incl. anthracite)	33.1
Peat (incl. turf)	286.6
Liquid Petroleum Gas (LPG)	9.6
Wood (Inc. wood pellets)	0.0
Other	3.6
Not Stated	14.3



Register of Opportunities

The Register of Opportunities (RoO) is a live document used to identify, evaluate and plan your energy projects. The SEC owns this document and is responsible for using, editing and improving the content in order to match its ambitions. The RoO is presented in an excel workbook because some parts contain formulas to calculate financial and energy savings.

RoO Timing and Funding Opportunities

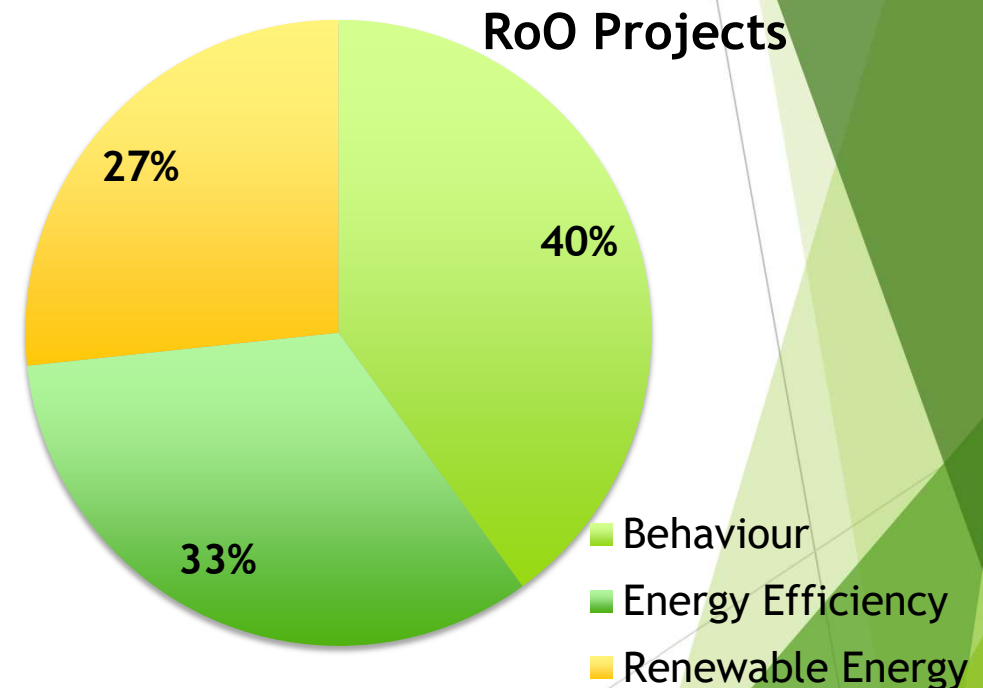
- The Register of Opportunities details a number of different projects under 3 main categories:

- Behavior
- Energy Efficiency
- Renewable Energy

The Register of Opportunities also breaks projects down into 3 main timescales for projects:

- Short Term
- Medium Term
- Long Term

Each of the projects is detailed within the RoO spreadsheet which is a live document.



RoO Projects - Renewable Energy

Where a 20% reduction in electricity consumption could be achieved there would remain a residual demand in the area, estimated at 3157 MWh TFC or € 462,270 per annum. The development of a community owned electricity generation project could in principle meet this demand. A detailed set of calculations on the generator size and the arrangements to use the energy locally would need to be carried out under a scoping study.

Initial calculations indicate that approximately 1.2 MW wind turbine or 3 MW of solar PV correctly sited and installed could generate sufficient electricity to meet this demand. A battery or other storage solution may also form part of such an initiative.

	Boherbue SEC			
	Total Primary Energy Requirement Usage (MWh)	Total Final Consumption (TFC) Usage (MWh)	Total Final Consumption (TFC) Emissions (tCO ₂)	Total Final Consumption (TFC) Cost (€)
	Imported Electricity	3,947	2,577	1,244
20% Reduction	3157	2061	995	€ 462,270



Bibliography

[1] CSO, "2016 Census- Small Area Data," Central Statistics Office 2017.

[2] DCENR, "National Energy Efficiency Action Plan," Department of Communications Energy and Natural Resources 2014,
Available: https://www.dccae.gov.ie/documents/NEEAP_4.pdf.

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[6] CSO, "2011 Census - Agriculture." Central Statistics Office 2012