Kinsale and Hinterland Energy Master Plan

November 2020

V 0.4

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Funding

This study was funded by the **Sustainable Energy Authority of Ireland** in the framework of its Sustainable Energy Community (SEC) programme.

Cover Photo of Kinsale: Éidín Griffen

Letter from the Chairperson | Our Energy Master Plan

It is with great pleasure that we present the Energy Master Plan for the district of Kinsale (P17 Eircode) to those living in the area. This plan was created between September 2019 and September 2020 by the Cork Energy Rating Company with Kinsale Community Energy Project (KCEP). Transition Town Kinsale (TTK) joined the SEAI Sustainable Energy Community (SEC) Network and set up KCEP in 2018. Transitioning to a low- and renewable-energy future is vital for future sustainability, our children's future and for reducing CO_2 emissions to prevent catastrophic climate breakdown.

Approximately €15 million a day[1] is spent on imported fossil fuel from countries with questionable human rights records, but Ireland is making progress on developing indigenous renewable-energy supplies and the Kinsale area can play its part. Imagine what this money could generate if it was spent locally. We could improve local housing, our health and education provision and regenerate our degraded ecosystems.

This is possible if we implement the recommendations in this report. We know what we must do and now is the time to make these changes in each of our households, our neighbourhoods, our communities and our district. We can reduce our energy demand through conscious actions in our households and how we travel, and through improving insulation and sealing our buildings to the highest standards. We can improve efficiency with low-energy lighting and heat pumps, and we can generate our own electricity with solar and wind power. We can plan to retrofit our homes to make them super energy efficient over time, while encouraging fully passive-housing construction. We can advocate for the decarbonisation of our transport and electricity grids.

Let us join the many other communities throughout Ireland transitioning to an energy-efficient and low-carbon future. This can be done with the help of grants from the Sustainable Energy Authority of Ireland (SEAI) or by having a conversation with our neighbours and bulk buying together. We hope this Energy Master Plan ignites a spark to transform the Kinsale area into a clean and self-sufficient energy community. Let us begin the transition today. Thank you.

Dónal Chambers

Chair – Kinsale Community Energy Project

September 2020

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[1] See: https://www.independent.ie/business/irish/fossil-fuels-imported-into-ireland-at-cost-of-57bn-a-year-34366389.html . Accessed – 29-08-2020

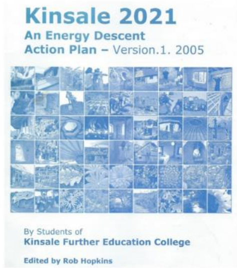
Our Energy Forum Timeline

Transition Town
KINSALE

Our Energy Forum Timeline

2005

Grant from
Kinsale Town Council
to newly fledged
Transition Town Kinsale
(TTK)



Energy- Our Vision
Kinsale is a carbon-
neutral town with
energy supplied by a
number of renewable
sources

2008
Energy Forum
Evenings

Community
Powerdown

2009

TTK
Open Space Event

2011

Launch of the
Anaerobic
Digestor
Feasibility Study

2011

Earth Hour Celebration

TTK joins the SEAI Sustainable Energy Community Network

2019

KCEP

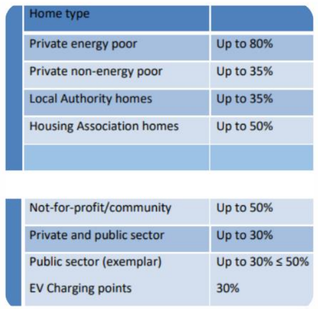
Public Meeting

2020

Working with The Cork Energy Rating Company to prepare the Energy Master Plan

2021

Better Energy Community Grant Application



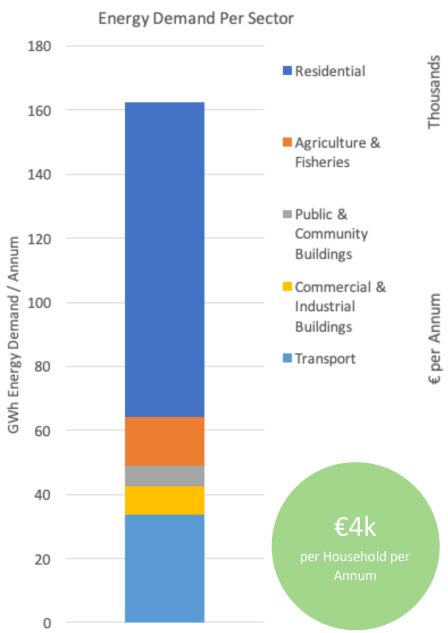
Home type	
Private energy poor	Up to 80%
Private non-energy poor	Up to 35%
Local Authority homes	Up to 35%
Housing Association homes	Up to 50%

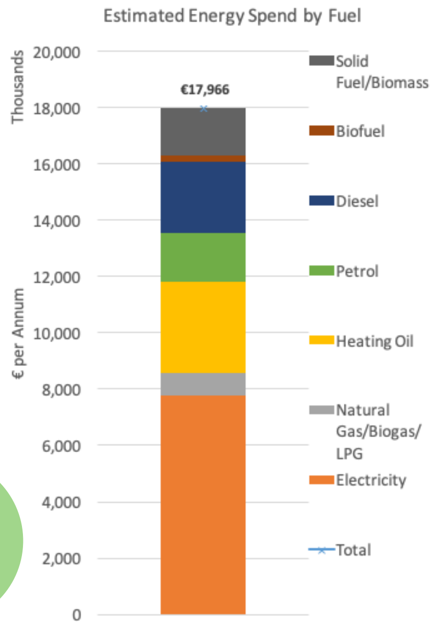
Not-for-profit/community	Up to 50%
Private and public sector	Up to 30%
Public sector (exemplar)	Up to 30% ≤ 50%
EV Charging points	30%

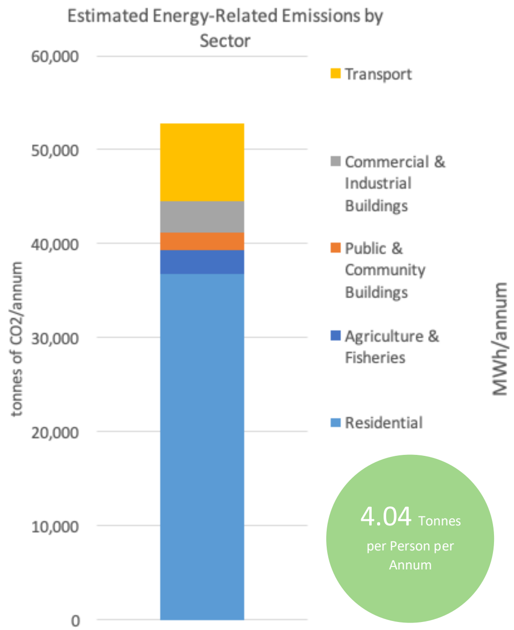
Summary: Energy Use in Kinsale

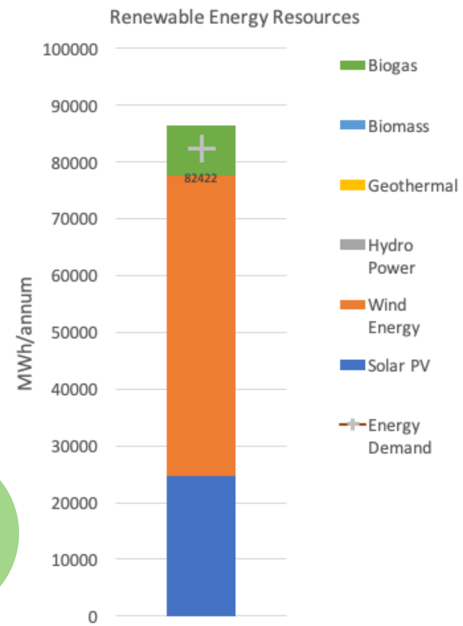
This Energy Master Plan aims to help the local community understand their current energy use, identify opportunities for energy efficiency and explore possible options for meeting demand using local renewables. This page presents some of the principal findings.

The master plan covers the P17 postcode area, home to **13,000** residents and **4,400** households. The main urban centre is Kinsale; however, there are a number of surrounding villages and a substantial amount of agricultural land.









Our modelling work indicates that within the study boundary we have defined, approximately 60% of energy demand relates to the domestic sector and about 20% relates to transport; these are therefore the most important areas for the community to focus on. There is significant potential for energy efficiency. A deep retrofit of housing could cut energy consumption by more than half, while in the transport sector a number of measures – including a switch to walking and cycling, higher public transport use and the adoption of EVs – could also half energy demand. There is ample potential to meet the remaining energy demand from renewable sources. The SEC group will engage the local community to develop projects in these priority areas as they implement their action plan.

Introduction

This Energy Master Plan (EMP) study has been commissioned by the Kinsale SEC (Sustainable Energy Communities) group in order to accelerate the transition to a more sustainable future for the local area and its population. By coming together as a community, the local residents have an important opportunity to tackle energy consumption and develop local energy generation in their area. While some of our options around energy are constrained by the infrastructure available (for example, public transport), there are other areas where simple changes can have a positive impact.

The Study and Report

Our analysis is based on a mix of desk research using publicly available data from the Central Statistics Office, SEAI and elsewhere, as well as field work, measuring properties and building-level modelling.

The Energy Master Plan presents an overall vision and direction of travel for the local area. Before establishing a direction of travel, it is vital to understand the starting point. The first portion of the EMP desk research therefore focuses on establishing a baseline level of energy consumption for the study area. The study area focuses on the P17 postcode district which encompasses the following electoral divisions.

Ballinspittle	Kilmonoge
Laherne	Kinure
Ballymackean	Ballyfeard
Kinsale Rural	Nohoval
Kinsale Urban	Farranbrien
Leighmoney	Ballyfoyle

Report Structure

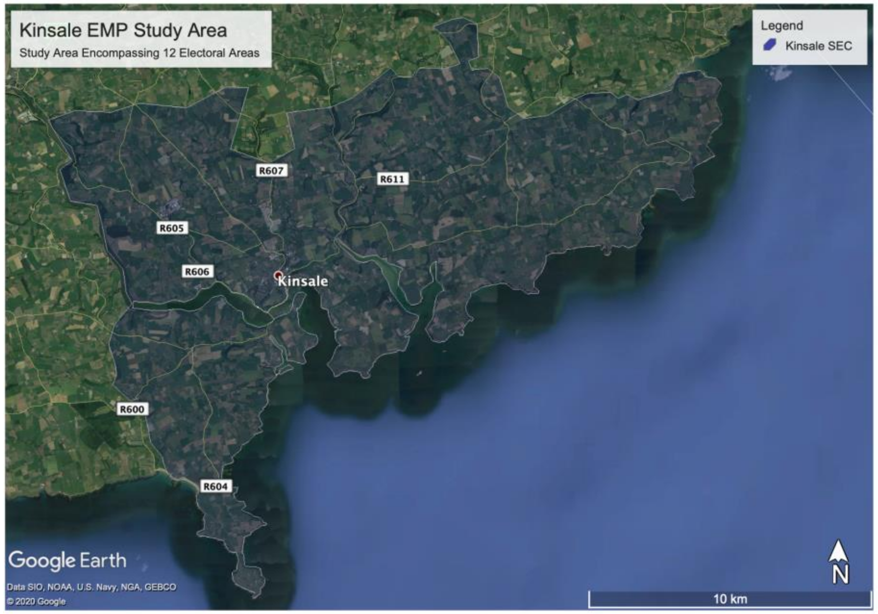
1 Baseline Energy Consumption

Energy-Efficiency Potential

2 Renewable Resources

3 Action Plan and Register of Opportunities

Study Area



Source: Google Earth

Land Area	Residents	Dwellings	Cars
17,900ha	12,997	4,405	6,800

Analytical Approach

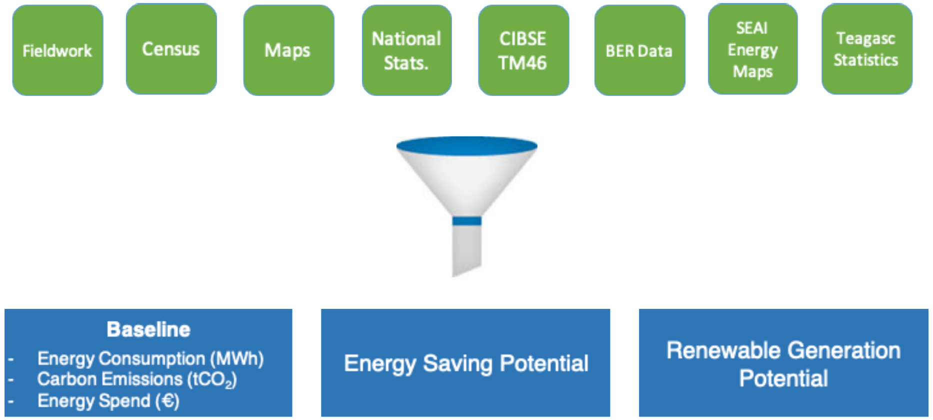
The analysis presented in this report is based on the collection of data and information from a range of sources. Our aim has been to make the analysis as reflective of the local area as possible by using the most granular statistical information available in a bottom-up modelling approach.

The data sources include:

- Data from Census 2016 for the 12 electoral divisions that make up the local area, which provides statistical data on the local population, commuting patterns, housing, economy and land use from 2016
- Data extracted from the Building Energy Rating database for Co. Cork, which describes the built form and energy performance of the housing stock
- Primary data gathered on the ground in Kinsale, including surveys of a number of key community buildings and domestic houses
- Data on the potential for wind, hydro, geothermal energy and energy crops published from the SEAI's mapping tool & data on solar irradiance for Cork.
- Remote survey measurements taken from satellite imagery and Google Maps

The data and information collected have been processed using modelling tools and methodologies we have developed. More detailed descriptions are provided in the following sections as appropriate.

More detailed notes on particular elements of the methodology are provided in Appendix 1.



A Note on Units

Although we all use energy when we drive our cars or boil a kettle, energy itself is often hard to comprehend. Adding to this difficulty, the units used to describe energy use can be confusing.

Throughout this report we present energy use and energy production, regardless of the fuel used, in megawatt hours per annum (MWh/annum). As a point of reference, a typical home in Kinsale consumes approximately 20MWh per annum. We present carbon emissions in tonnes or kg of CO_2 emitted per annum. We present energy costs in € spent on energy per annum.

Local Energy Demand

This section presents a sector-by-sector breakdown of energy consumption in the local area within the study boundary described earlier, as well as estimates of the potential for energy efficiency.

The significant sectors are energy use in housing, followed by transport and finally the agricultural, commercial and public sectors. These are treated in order of size in the following sections.

Total energy expenditure in the study area has been estimated at €18 million per annum, of which €10 million is spent on heating and electricity in local homes and a further €4.5 million is spent on transport fuels as summarised in Figure 1.

Given current low levels of local renewable generation of energy, the area is heavily reliant on fossil fuels, particularly heating oil, petrol and diesel. Money spent on these fuels is leaving the local economy.

Annual CO_2 emissions related to energy use have been estimated at almost 52,500 tonnes per annum, 60% of which is produced by the residential sector and 20% by transport. With Ireland falling significantly short of its 2020 target to achieve a 20% emissions reduction[2] a concerted effort will be required to achieve 30% by 2030.

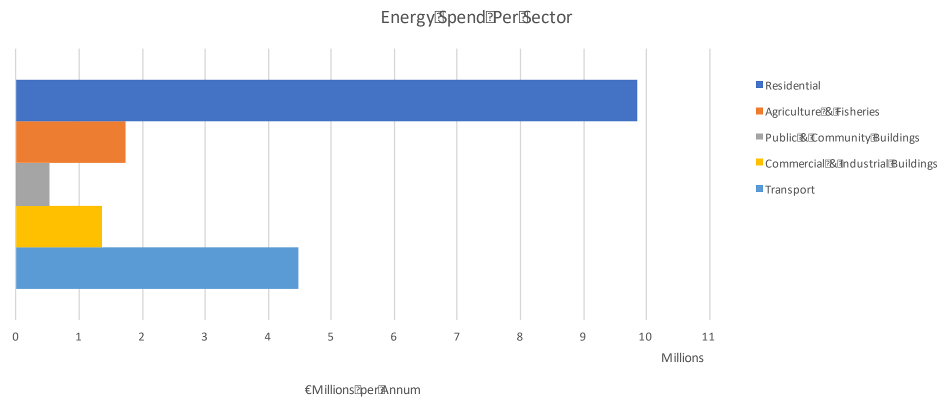


Figure 1: Energy Spend by Sector

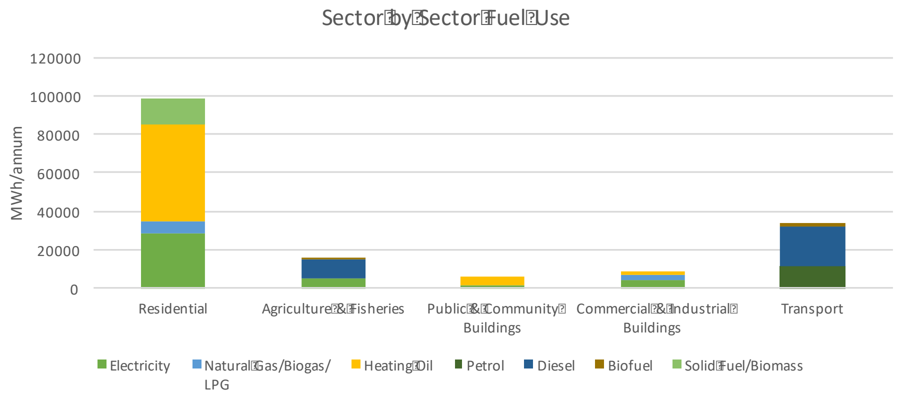


Figure 2: Sector-by-Sector Fuel Use

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[2] See: https://www.dccae.gov.ie/en-ie/climate-action/topics/eu-and-international-climate-action/2020-eu-targets/Pages/default.aspx

Energy in the Residential Sector

Energy demand in our homes is the result of our need for heat to keep warm and provide hot water, and electricity to provide lighting and power appliances. The size, shape and nature of the buildings themselves and the technologies used to provide heat, light and other household energy services have a significant influence on how this demand for energy services translates into the figures we see on our energy bills.

The Local Stock

The Central Statistics Office (CSO) provides basic statistics that describe the housing stock at the local electoral area level. A total of 4,405 dwellings are recorded as occupied in the census, while a further 434 are recorded as 'temporarily absent' or holiday homes. There are also a very large number of 'other vacant dwellings', 551 in total, 80% of which are in the Kinsale Urban and Rural Electoral Districts. It is likely these are 'ghost estates' which were still prevalent back at the time of the census in 2016. As our baseline is 2016, these homes are excluded from our analysis; however, if now occupied, their impact on 2020 energy demand will be significant. About 70% of households in the census are owner occupied, which is positive, as owner occupiers have a clearer incentive to reduce energy consumption.

The results presented in Figure 3 and Figure 4 compare the local stock to the rest of the country.

Compared to the national statistics, older homes built before 1919 and 'celtic tiger' era homes built between 2001 and 2010 dominate the local stock. Each of these presents its own challenges and opportunities in terms of energy performance.

Oil is by far the most common heating source, representing 60% of the total.

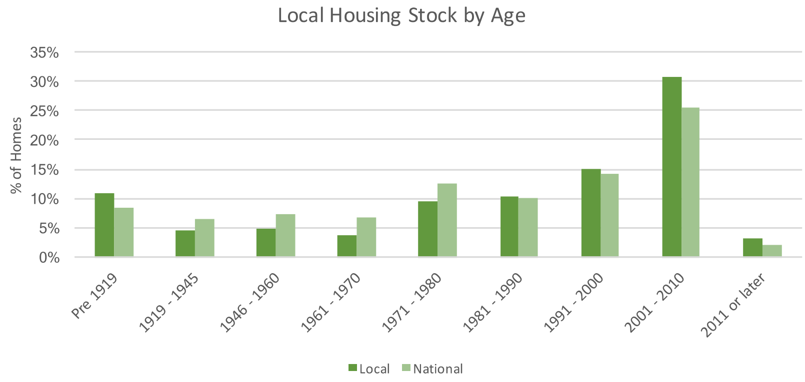

Figure 3: Local Housing Stock by Age (Source: CSO Census Statistics 2016)

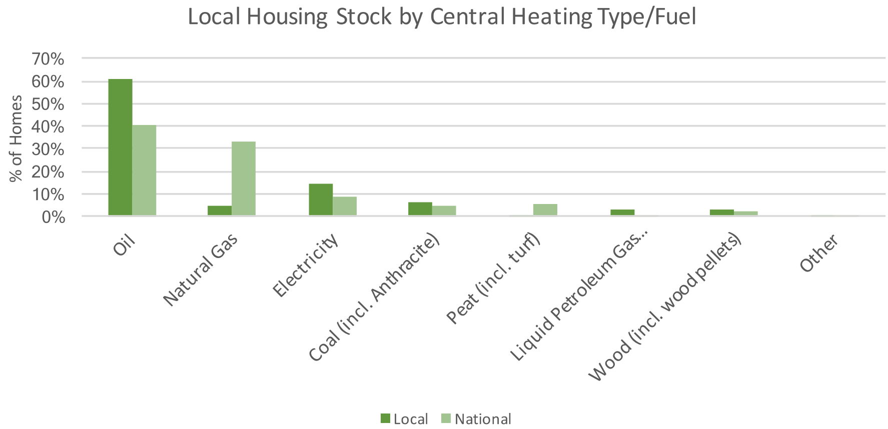

Figure 4: Local Housing Stock by Main Heating Fuel (Source: CSO Census Statistics 2016)

Baseline Energy Consumption

In order to model housing energy demand in the local area, we have extracted data for houses in Co. Cork from the BER Research Tool.[3] Using this data we have developed a series of typical dwelling archetypes based on age, dwelling type, construction type and central-heating fuel using the Retrokit Tool (www.retrokit.eu).

Retrokit simulates the energy consumption of each of these archetypes using the Irish Dwelling Energy Assessment Procedure (DEAP) model in order to estimate energy consumption for lighting, heating and hot water. In order to represent electricity consumption beyond lighting we apply a correction factor to the DEAP estimates.

The consumption of each of these archetypes is scaled to reflect the dwelling ages and heating fuels found in the CSO data.

The Impact of Holiday Homes

As highlighted by the census data, holiday homes represent almost 10% of the stock. In the absence of granular data on age, construction and so on, it is impossible to create a detailed bottom-up model. Instead we have factored in demand for a 40% occupancy rate, assuming this is primarily over the summertime (and therefore heating use is proportionally lower).

Retrokit estimates that the total annual energy spend in the residential sector for P17 is **€9.85 million**, with electricity representing a slightly higher proportion than heat demand as illustrated in Figure 6.

The residential sector is responsible for almost 37,000 tonnes of CO_2 emissions annually; 70% of emissions for the local area. Typical BER ratings range from E1 in the older portion of the stock to B2 in newer homes.

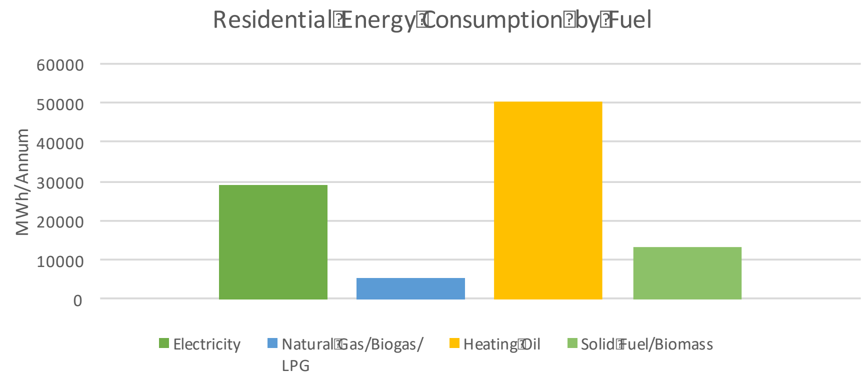

Figure 5: Residential Energy Consumption by Fuel Type

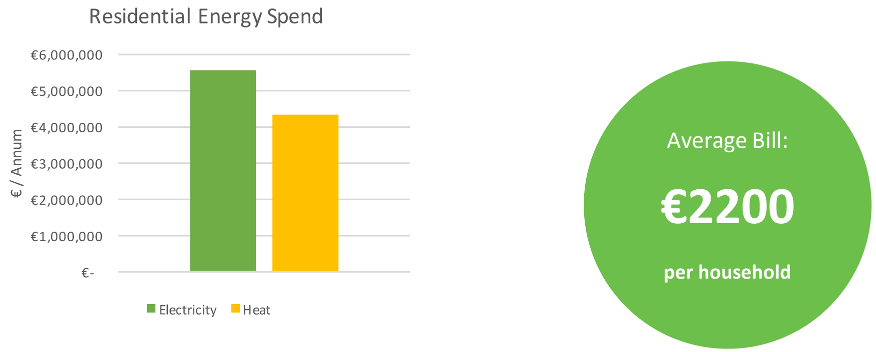

Figure 6: Residential Energy Spend in P17

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[3] See: https://ndber.seai.ie/BERResearchTool/Register/Register.aspx

Energy-Saving Potential

We have used Retrokit to assess the impact of two packages of retrofit measures on the local stock.

Retrokit estimates the cost of applying the various measures using the dimensions of the archetype and a database of cost data. These costs are exclusive of grant aid, which can vary depending on the funding scheme.

These retrofit measures are designed to be additive, i.e. a home that has received a medium retrofit can receive a deep retrofit later to achieve further energy savings without abortive work. The exception to this is triple glazing; however, this could be installed over the natural replacement cycle of the windows. Cost and carbon savings are calculated from a baseline of the current stock.

Note that the savings estimated from Retrokit do not include the potential for reducing demand for heating, hot water or appliances through energy conservation by the household.

This sort of activity has previously been encouraged by the Transition Town Kinsale group's initiatives such as the PowerDown Initiative in 2010.

The provision of solar photovoltaic (PV) on housing is considered separately as part of our assessment of renewable-energy potential.

Medium Retrofit	**Deep Retrofit**
This scenario focuses on improving the fabric performance of the stock and is aimed at delivering cost-effective energy savings.	This scenario focuses on further fabric improvements and switching heat supply from fossil fuels to renewable-energy sources.
Measures Providing energy-efficient LED lighting Replacement of single-glazed windows with double glazing Improving building airtightness and upgrading ventilation to Part F requirements Pumped insulation to cavity walls Insulating attics (min. 300mm mineral wool) Replacement of open fires with wood stoves Improved heating controls	*Measures* External-wall insulation to pumped cavity walls and solid walls Dry-lining sloped ceilings Replacing windows and doors with triple-glazed units Further improvements to fabric airtightness Installing mechanical heat recovery ventilation (MHRV) Installing air-to-water heat pumps for heat provision

Medium Retrofit

The medium-retrofit scenario reduces energy demand in the domestic sector by approximately 27%. Intuitively, these savings are largest in the oldest properties, which save on average a third; however, these homes have the highest capital requirement of €8,000 vs the average cost of €6,200 before grant aid. Grant aid of up to 30% could be available under the Better Energy Communities scheme.

Energy bill savings also average approximately 23% or €330 per household; this would equate to a simple payback of 19 years on average at current fuel costs, which could be reduced to 12 years with grant aid. Carbon savings in this scenario are approximately 22% or 8,200 tonnes per annum.

Deep Retrofit

The deep-retrofit scenario delivers energy savings of 68% and similar carbon savings. The average capital spend for this more intensive set of measures is €29,500; however, up to 50% grant aid may be available for deep retrofits.

Energy bills would be halved under this scenario, delivering an average bill saving of €690. Payback periods would be in excess of 40 years without grant aid in this case.

Wider Benefits

While the payback figures above may not look attractive, there are other benefits to improving the energy efficiency of your home. Better insulation and draught-proofing create much more comfortable living environments, while new glazing often delivers a great reduction in external noise. Finally, improving a home's BER rating can add to its value in the market.

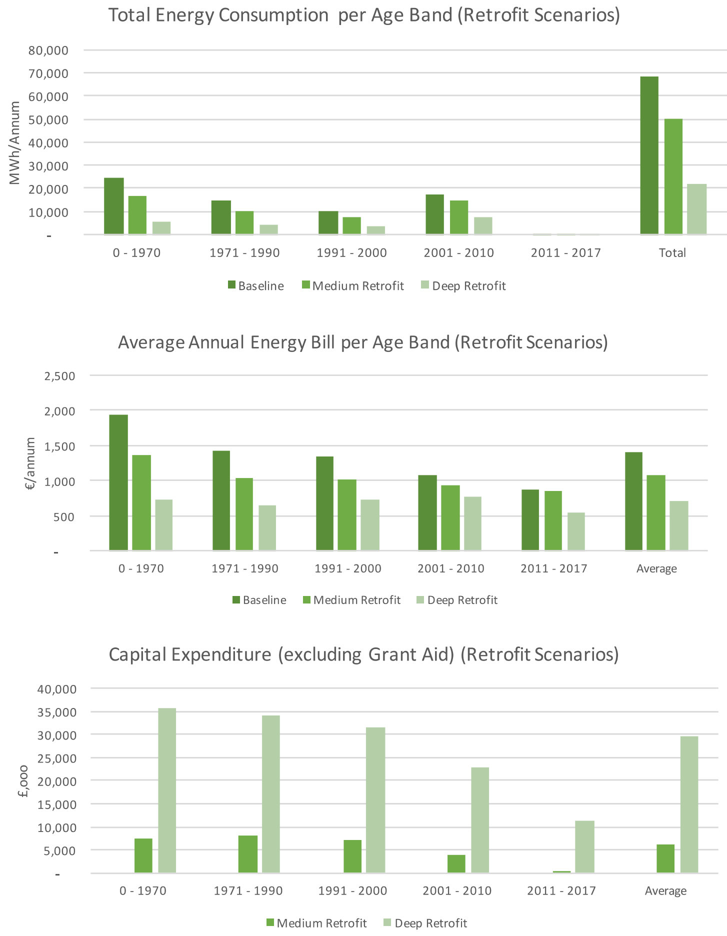


Figure 7: Retrofit Scenario Outcomes

Future Fuel Mix

The graph below shows the impact of the energy retrofit in terms of the fuel mix, showing firstly the impact of a reduction in energy use and finally a switch from fossil fuel to electrical heating. It is important to consider this switch of heating fuel in the context of the local renewable-energy resource as discussed later.

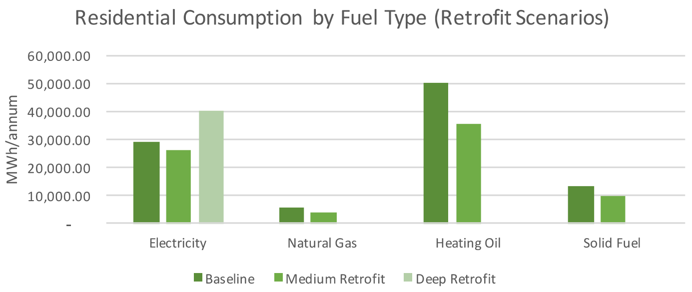


Figure 8: Retrofit Scenario Future Fuel Mixes

Priorities for Action

With regard to prioritising action in the residential sector, Figure 9 shows the return of investment in terms of euro of annual energy costs saved per euro invested in retrofit. This analysis shows that the best returns are seen in the oldest, worst-performing elements of the stock and also in newer dwellings, where simple, cost-effective measures such as draught-proofing are 'quick wins' in terms of energy saving.

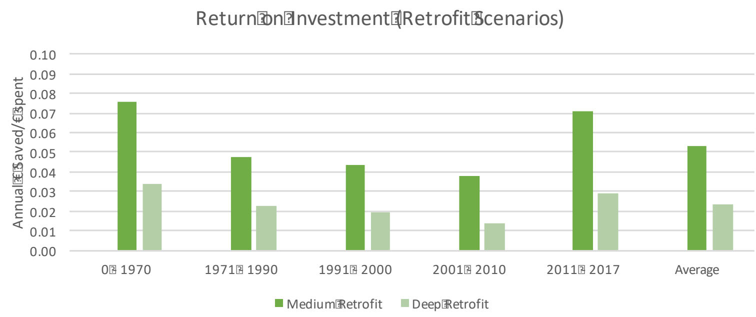


Figure 9: Retrofit Scenario ROI by Age

Figure 10 shows the age distribution of the housing stock in the Kinsale Urban, Kinsale Rural (which contains many of the newer housing estates) and the remainder of the study area.

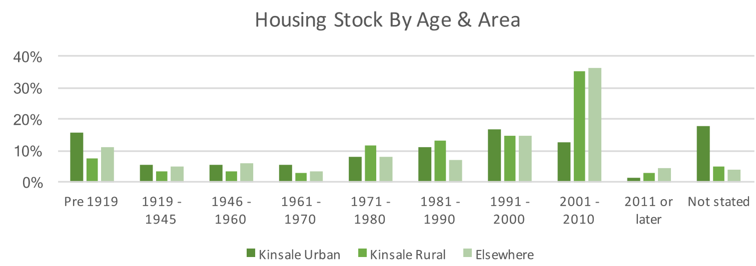


Figure 10: Housing Stock Age by Location

As discussed later as part of the action plan, the SEC has an opportunity to facilitate domestic retrofit action by:

1) Addressing the knowledge gap by facilitating peer-to-peer information sharing between those who are considering retrofitting their homes. This could be achieved by organising meetings or online forums for interested homeowners, where individuals can get non-biased advice, perhaps covering specific areas of retrofit.

   As part of the energy master plan work, a number of case studies have been developed that reflect 'typical' homes in the study area. These will be made available as a reference point and the SEC may consider expanding its library of case studies as others take part in retrofitting their homes.

2) Bringing individuals who are intending to retrofit their homes together, in order to facilitate a) group negotiation b) access to improved grant-aid ratios provided by the SEAI c) sharing the costs of engaging expertise/consultancy.

Financial Supports for Dwelling Retrofit

There are several financial incentives available to homeowners, including:

a) SEAI's Better Energy Homes programme provides grant aid for a range of energy-efficiency measures and is open to owners and landlords without means testing. For illustration purposes, our case study medium retrofit could attract close to €1,600 (16% of total investment) for the medium-retrofit package and €11,200 for a deep retrofit (30%).
   More info: https://www.seai.ie/grants/home-grants/better-energy-homes/
b) SEAI's Home Energy Grant scheme provides grants for a series of home improvements, including attic insulation, cavity-wall insulation, internal and external insulation, as well as heat pumps, heating controls and solar hot water, heating and electricity. Insulation grants range from €400 to €6,000 while €3,500 is available towards the cost of a heat pump.
   More info: https://www.seai.ie/grants/home-energy-grants/
c) SEAI's Better Energy Community programme offers significant funding for community-based projects, including for home-energy retrofits. For example, the case study projects would attract 35% BEC funding.

Local Retrofit Case Studies

The EMP team would like to express our gratitude to the local residents who made their homes available for energy audit. We have chosen the following case studies from the homes we visited which serve to illustrate the application of the 'medium' and 'deep' retrofit packages we have described above.

All case studies are available in a separate booklet.

Energy Audit Report

Building:	Generic house
Address:	Semi-detached 1990
Completed:	05/01/2020

CORK ENERGY RATING COMPANY
DOMESTIC & COMMERCIAL

Overview

1990's semi detached house with a small extension to rear of kitchen, typical of many estates in Kinsale town
- Cavity walls which were constructed with 40mm of EPS insulation in a 100mm cavity
- Pitched roof construction with 80mm of fibre insulation rolled out in attic space
- Floors are solid concrete
- All windows are double glazed, changed in 2003 and are in good condition
- Heating is supplied by 20 year old non condensing oil boiler to storage cylinder and radiators
- Heating controls consist of timer only
- Lighting is compact fluorescent or incandescent
- One open fire in living room

The Building




Baseline Energy Performance

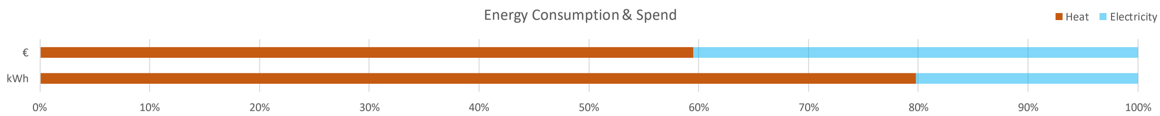
Energy Rating		
D1	Dwelling Type	Semi-Detached
	Year of Construction	2004
	Floor Area (m2)	91.93
	Volume (m2)	234
	HLI (W/K/m2)	3.12685422

DEAP

DEAP Estimates	Heating Fuel	Electricity
Energy Use (kWh/yr.)	14393	5905
Cost per unit (€/kWh)	€ 0.07	€ 0.18
Energy Cost (€/yr.)	964	1063
Total Cost (€/yr.)		2027

Bill Data

Energy Spend	Oil	Electricity
Energy Use (kWh/yr.)	18657	4722
Energy Cost (€/yr.)	**1250**	**850**
Total Cost (€/yr.)		**2100**



Your Energy Upgrade Options

Shallow Retrofit

Install heating controls
Draught proofing audit
Pump cavities with EPS bonded bead
Install attic insulation
Install new 120mm lagging jacket
Replace open fire with stove

Potential Impact

Energy Rating	Cost	Potential Grant	Energy Bill Saving	Payback
C1	€3,446	€1,600	€395	5
	€	€	€/yr	*years (with grant)*

Energy Spend	Oil	Electricity
Energy Use (kWh/yr.)	8128	5683
Cost per unit (€/kWh)	€ 0.07	€ 0.18
Energy Cost (€/yr.)	609	1023
Total Cost (€/yr.)		1632

Building Fabric

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
None	Pump cavities	1040	1375	€ 104.54	10

Ventilation

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
Draghtstripping	Draft stripping on attic hatch	400	37	€ 2.81	142
	Window service	0	0	€ -	-

Hot Water

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
none	120mm lagging jacket	40	0	€ -	-

Heating System

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
Upgrade controlls	upgrade heating controls to Time and temp. zone	1200	6265	€ 476.36	3
		0	0	€ -	3

Lighting

Measure	Description	Capital Cost (€)	Electrical Savings (kWh/yr)	Saving (€)	Payback (years)
None	New LED bulbs	150	0	€ 32.94	5

Deep Retrofit

Full airtightness audit including air permeability testing
Replace front door
Improve draught stripping /window service
Airtightness upgrade to achieve 4m3
Install demand control ventilation
Install new radiators
Air source heat pumps
1.8kWp PV

Potential Impact

Energy Rating	Cost	Potential Grant	Energy Bill Saving	Payback
A2	€21,306	€7,457	€2,015	7
	€	€	€/yr	*years (with grant)*

Energy Spend	Elec. blended rate	Electricity
Energy Use (kWh/yr.)	8141	4100
Cost per unit (€/kWh)	€ 0.14	€ 0.18
Energy Cost (€/yr.)	1058	557
Total Cost (€/yr.)		1616

Building Fabric

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
Front door	Upgrade front door U =1.2 Wm3	2000	208	€ 28.33	71
	0	0	0	€ -	-

Ventilation

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
Airtightness including 2 X tests	Airtightness mitigation throughout to achieve max 5m3	4500	321	€ 43.70	103
Forced Ventilation system	DCV or similar	0	0	€ -	-

Hot Water

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
Storage and pipework insulation	Integral to new heating system	2000	730	€ 99.28	20
New Radiators		0	0	€ -	-

Heating System

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
New Heating system including Rads	Air source heat pump	0	-13	-€ 1.77	0
		7000	8496	€ 1,155.45	6

Lighting

Measure	Description	Capital Cost (€)	Electrical Savings (kWh/yr)	Saving (€)	Payback (years)
Install LED lighting	#REF!	150	183	€ 32.94	5

Renewables

Measure	Description	Capital Cost (€)	Electrical Savings (kWh/yr)	Saving (€)	Payback (years)
Micro generation	Description	4000	1800	€ 324.00	12

NOTES:

Only very simple figures supplied by homeowner actual bill were not seen. The figures given however are broadly in line with assumed consumption by DEAP and average usage.

Ventilation solution to be designed in line with SR50 & Part F regulations. Heat saving estimates are based on improved controls of air flow due to humidity/CO2 responsive vents.

Energy Audit Report

Building: Generic Detached Bungalow
Address:
Completed: 05/04/2020

CORK ENERGY RATING COMPANY
DOMESTIC & COMMERCIAL

Overview

Bungalow style dwelling is can be found throught the area
The main construction methods are as follows :
Cavity block outer and inner leaf, received pumped fibre insulation in the 1990`s,
Pitched roof construction with 50-100mm of fibre insulation which has been compressed with storage and traffic in attic area,
All windows are double glazed and are in fairly good condition but with possible air leakage, front bay windows are older and are causing more issues,
Heating is supplied by a non-condensing oil fired boiler located outside to a 150 l buffer tank to radiators,
Heating controls consist a a timer only,
Lighting is a mixture of CFL and incandescent bulbs.

The Building

Baseline Energy Performance

Energy Rating		
D2	**Dwelling Type**	detached
	Year of Construction	1960
	Floor Area (m2)	123
	Volume (m2)	317
	HLI (W/K/m2)	3.34

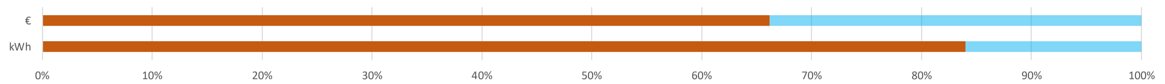
DEAP

DEAP Estimates	**Heating Fuel**	**Electricity**
Energy Use (kWh/yr.)	26905	5362
Cost per unit (€/kWh)	€ 0.07	€ 0.18
Energy Cost (€/yr.)	1803	965
Total Cost (€/yr.)		2768

Bill Data

Energy Spend	**Oil**	**Electricity**
Energy Use (kWh/yr.)	26866	5111
Energy Cost (€/yr.)	**1800**	**920**
Total Cost (€/yr.)		**2720**

Energy Consumption & Spend



Your Energy Upgrade Options

Shallow Retrofit

Upgrade attic insulation to 300mm fibre rolled ,
Upgrade heating controls to provide time and tempeture zoning control,
Draft proofing audit.
- doors
-Window service
- Draft proof attic hatches
- Permanently block open flue
Change all light fitting to low energy units.

Potential Impact

Energy Rating	Cost	Potential Grant	Energy Bill Saving	Payback
C2	€4,124	€350	€625	6
	€	€	€/yr.	*years (with grant)*

Energy Spend	**Oil**	**Electricity**
Energy Use (kWh/yr.)	19034	4820
Cost per unit (€/kWh)	€ 0.07	€ 0.18
Energy Cost (€/yr.)	1275	868
Total Cost (€/yr.)		2143

Building Fabric

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
Attic insulation	upgrade insulation in horizontal roofs to 300mm	1344	1350	€ 106.40	13

Ventilation

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
Draghtstripping	draft striping, attic hatch doors	950	833	€ 65.68	14
	Window service , block up open flue	0	0	€ -	-

Hot Water

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
None		0	0	€ -	-

Heating System

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
Heating controlls	upgrade to include T & T zone controll.	0	7066	€ 556.97	3

Lighting

Measure	Description	Capital Cost (€)	Electrical Savings (kWh/yr.)	Saving (€)	Payback (years)
Install low energy lighting	23 low enrgy bulbs	230	0	€ 90.36	3

Note : some saving gained in one section may show up in other sections. It can be difficult to isolate savings and to show in separate sections.

Deep Retrofit

Install Horizontal attic insulation up to 300mm attic and crawl spaces.
Install External wall insualion 150mmEPS
Replace fron bay window section
Full airtightness audit including air permeability testing,
Airtightness upgrade to achieve 4m3,
Install Demand Control ventilation,
Install air source heat pump with Rads as necessary,
Replace Electric showers with mains units,
1.8kWp PV.

Potential Impact

Energy Rating	Cost	Potential Grant	Energy Bill Saving	Payback
A2	€41,954	€14,684	€1,928	14
	€	€	€/yr.	*years (with grant)*

Energy Spend	Elec. Blended Rate	Electricity
Energy Use (kWh/yr.)	2726	2698
Cost per unit (€/kWh)	€ 0.18	€ 0.18
Energy Cost (€/yr.)	354	486
Total Cost (€/yr.)		840

Building Fabric

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
			0	€ -	-
Windows	ReplaceBay window section	5400	984	€ 133.87	40
		0	0	€ -	-
Roof	horizontal ceiling	1344	1350	€ 183.59	7
		0	0	€ -	-
Wall insulation	Install EWI	12480	3250	€ 441.97	28

Ventilation

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
Air-tightness including 2 X tests	airtightness mitigation throughout to achieve max 4m3/m2	6000	1042	€ 141.66	42
Forced Ventilation system	DCV or similar	0	0	€ -	-

Hot Water

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
Storage and pipework insulation	new tank insulate pipework etc	5500	4721	€ 642.06	6
	replace electric shower with vented from tank	0	0	€ -	-

Heating System

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
	Install Heat pump 8 kw	8000	14630	€ 1,989.68	4
Air Source heat pump		0	0	€ -	-

Lighting

Measure	Description	Capital Cost (€)	Electrical Savings (kWh/yr.)	Saving (€)	Payback (years)
Install low energy lighting	low energy light bulbs	230	502	€ 90.36	3

Renewables

Measure	Description	Capital Cost (€)	Electrical Savings (kWh/yr.)	Saving (€)	Payback (years)
Micro generation	Install 1.8 kWp of PV	4500	1800	€ 324.00	14

NOTES: Payback period is long due to the cost of external wall insulation (EWI) versus the payback period. Grants are not generally accepted unless a significantly low HLI (heat loss indicator)is achieved. This required HLI is still not achieved after EWI and may require full window replacement. This would need to be explored further if project were to be recommended to apply for deep retrofit grants. Exceptions are not uncommon when it comes to difficult detached bungalow scenarios such as this one.
Only very simple figures supplied by homeowner actual bill were not seen. The figures given however are broadly in line with assumed consumption by DEAP and average usage.
PV refers to Photovoltaics , panels that generate electricity roof mounted
Night saver energy rates are not used here.

Ventilation solution to be designed in line with SR50 & Part F regulations. Heat saving estimates are based on improved controls of air flow due to humidity/CO2 responsive vents.

Energy Audit Report

Building: Generic cottage
Address: Kinsale EMP
Completed: 05/03/2020

CORK ENERGY RATING COMPANY
DOMESTIC & COMMERCIAL

Overview

This is a single story detached cottage dwelling
The main construction methods are as follows;
- Stone wall construction with some drylining
- Extensions added over the years
- Pitched roof construction on both, no insulation
- Two sections of horizontal ceilings, access to one section with very little insulation laid horizontally, no access to the second
- All windows are single glazed apart from a small section on rear double doors
- Front door is in bad condition with excessive air ingress
- Heating is supplied by non-condensing combi boiler
- Secondary heating from stove in living room
- Heating controls consist of a timer to a single zone piping network with a room thermostat
- One electric shower and one mains shower with two baths
- Lighting provided by tungsten or incandescent bulbs

The Building




Baseline Energy Performance

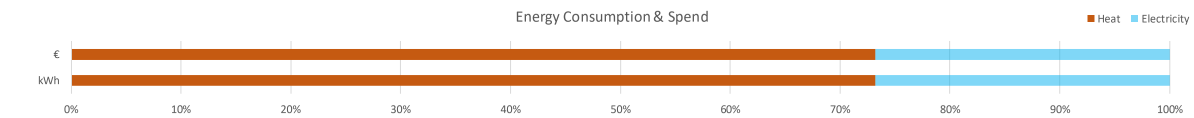
Energy Rating		
E2	Dwelling Type	Detached
	Year of Construction	1896
	Floor Area (m2)	123
	Volume (m2)	357
	HLI (W/K/m2)	4.35

DEAP

DEAP Estimates	Heating Fuel	Electricity
Energy Use (kWh/yr.)	33590	6405
Cost per unit (€/kWh)	€ 0.08	€ 0.18
Energy Cost (€/yr.)	2519	1153
Total Cost (€/yr.)		3672

Bill Data

Energy Spend	LPG	Electricity
Energy Use (kWh/yr.)	14444	5278
Energy Cost (€/yr.)	**2600**	**950**
Total Cost (€/yr.)		**3550**



Your Energy Upgrade Options

Shallow Retrofit

Inject insulation to cavities EPS bonded bead (extensions)
Install attic insulation where possible 300mm (spare room)
Install TRVs to all radiators (explore zoning)
Draft proofing audit
-Attic hatch
-Window service
Replace front and rear doors (double)
Change all light fittings to low energy units

Potential Impact

Energy Rating	Cost	Potential Grant	Energy Bill Saving	Payback
D2	€7,258	€1,000	€386	16
	€	€	€/yr.	*years (with grant)*

Energy Spend	LPG	Electricity
Energy Use (kWh/yr.)	31533	5119
Cost per unit (€/kWh)	€ 0.08	€ 0.18
Energy Cost (€/yr.)	2365	921
Total Cost (€/yr.)		3286

Building Fabric

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
None	Replace front and rear door	4000	417	€ 31.25	128

Ventilation

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
Draghtstripping	Draft stripping	400	5	€ 0.35	1138

Hot Water

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
none	None	0	0	€ -	-

Heating System

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
Heating controls	Install TRVs on all rads	800	1808	€ 135.60	6

Lighting

Measure	Description	Capital Cost (€)	Electrical Savings (kWh/yr.)	Saving (€)	Payback (years)
Install low energy lighting	0	250	250	€ 51.48	5

Deep Retrofit

Inject insulation to cavities EPS bonded bead
Install internal insulation to stone walls to achieve U Value of 0.27 W/m2k
Install horizontal attic insulation where possible - 300mm
Install further insulation at rafter to achieve 0.2W/m2k
Replace all single glazing
Replace all doors
Full airtightness audit including air permeability testing
Airtightness upgrade to achieve 4m3
Install demand control ventilation
Install air source heat pump
Replace electric showers with mains units
1.8kWp PV

Potential Impact

Energy Rating	Cost	Potential Grant	Energy Bill Saving	Payback
A2	€53,429	€18,700	€2,673	13
	€	€	€/yr.	years (with grant)

Energy Spend		Elec. Blended Rate	Electricity
Energy Use (kWh/yr.)		3119	3301
Cost per unit (€/kWh)	€	0.18	€ 0.18
Energy Cost (€/yr.)		405	594
Total Cost (€/yr.)			1000

Building Fabric

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
			3375	€ 458.97	9
Doors	Replace front/rear doors	5000	521	€ 31.25	160
Walls	Inject cavities	1264	1440	€ 195.84	6
Roof	Horizontal ceiling	455	3591	€ 488.36	1
	Rafters	11790	3752	€ 510.32	23
Windows	Replace all single glazed windows	9350	2036	€ 276.94	34

Ventilation

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
Airtightness including 2 X tests	Airtightness mitigation throughout to achieve max 5m3/m2	5500	280	€ 38.11	144
Forced ventilation system	DCV or similar	0	0	€ -	-

Hot Water

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
Storage and pipework insulation	New tank insulate pipework etc	5500	2252	€ 306.27	15
	Radiators as required	0	0	€ -	-

Heating System

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
Air Source heat pump	install Heat pump 8.5 kw	7000	25057	€ 3,407.75	2
Air Source heat pump	0	0	0	€ -	-

Lighting

Measure	Description	Capital Cost (€)	Electrical Savings (kWh/yr.)	Saving (€)	Payback (years)
Install low energy lighting	Low energy light bulbs	250	323	€ 58.14	4

Renewables

Measure	Description	Capital Cost (€)	Electrical Savings (kWh/yr.)	Saving (€)	Payback (years)
Micro generation	Description	4000	1800	€ 324.00	12

NOTES:

PV refers to Photovoltaics , panels that generate electricity roof mounted
Standard peek energy rates are used here , night saver will reduce energy bills.

Ventilation solution to be designed in line with SR50 & Part F regulations. Heat saving estimates are based on improved controls of air flow due to humidity/CO2 responsive vents.

Energy Audit Report

Building: Generic
Address: Generic mid terrace 1900s

CORK ENERGY RATING COMPANY
DOMESTIC & COMMERCIAL

Overview

Two story mid terrace building constructed in the early 19th century, style of house is particularly common in the town of Kinsale
The main construction methods are as follows;
- Solid stone or brick walls
- Pitched roof construction with 80mm of fibre insulation rolled out in attic space
- All windows are single glazed and in poor condition
- Heating is supplied by electric storage heaters
- Hot water from electric immersion
- Heating controls consist of manual charge control on storage and appliance timers on convectors
- One stove located in living room
- Lighting is a mix of incandescent and compact fluorescents

The Building

Baseline Energy Performance

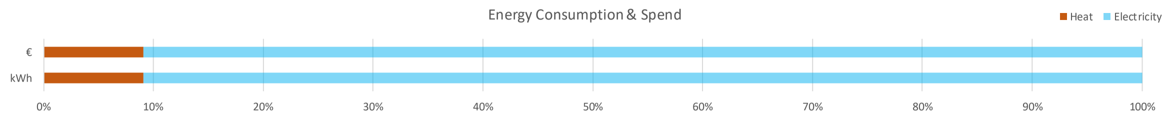
Energy Rating		
E2	**Dwelling Type**	Mid-terrace
	Year of Construction	1997
	Floor Area (m2)	123
	Volume (m2)	253
	HLI (W/K/m2)	4.35

DEAP

DEAP Estimates	Heating Fuel	Electricity
Energy Use (kWh/yr.)	17148	4900
Cost per unit (€/kWh)	€ 0.18	€ 0.18
Energy Cost (€/yr.)	3087	882
Total Cost (€/yr.)		3969

Bill Data

Energy Spend	Elec. day rate	Electricity
Energy Use (kWh/yr.)	1667	16667
Energy Cost (€/yr.)	**300**	**3000**
Total Cost (€/yr.)		**3300**



Your Energy Upgrade Options

Shallow Retrofit

Internally insulate with breathable insulation material
Install attic insulation where possible - 300mm
Draft proofing audit
Doors
Floors
Window service
Change all light fittings to low energy units

Potential Impact

Energy Rating	Cost	Potential Grant	Energy Bill Saving	Payback
D1	€8,376	€2,000	€1,234	5
	€	€	€/yr.	*years (with grant)*

Energy Spend	Elec. night rate	Electricity
Energy Use (kWh/yr.)	10993	4200
Cost per unit (€/kWh)	€ 0.18	€ 0.18
Energy Cost (€/yr.)	1979	756
Total Cost (€/yr.)		2735

Building Fabric

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
None		0	0	€ -	-

Ventilation

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
Draghtstripping	Draft stripping	1200	290	€ 20.27	59

Hot Water

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
none		600	0	€ -	-

Heating System

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)

Lighting

Measure	Description	Capital Cost (€)	Electrical Savings (kWh/yr.)	Saving (€)	Payback (years)
Install low energy lighting	0	250	0	€ 126.00	2

Deep Retrofit

Internally insulate with breathable insulation material
Install attic insulation where possible - 300mm
Replace front door
Remove floor boards, place insulation and air tightness membrane and replace boards
Full airtightness audit including air permeability testing
Airtightness upgrade to achieve 4m3
Install demand control ventilation
Install air source heat pump with rads
Replace electric showers with mains units
1.8kWp PV

Potential Impact

Energy Rating	Cost	Potential Grant	Energy Bill Saving	Payback
A3	€54,576	€19,102	€3,100	11
	€	€	€/yr.	*years (with grant)*

Energy Spend	Elec. blended rate	Electricity
Energy Use (kWh/yr.)	1480	3757
Cost per unit (€/kWh)	€ 0.18	€ 0.18
Energy Cost (€/yr.)	192	676
Total Cost (€/yr.)		869

Building Fabric

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
			0	€ -	-
Floors	Remove floor boards and insulate floors	7350	1978	€ 268.97	27
Wall insulation	Internally insulate front and rear wall	5640	4528	€ 615.86	9
Wall insulation	Internally insulate front and rear wall	2000	292	€ 39.66	50
Doors	Replace doors	686	1199	€ 163.12	4
Attic insulation	Upgrade insulation in horizontal roofs to 300mm	7150	2979	€ 405.14	18

Ventilation

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
Air-tightness including 2 X tests	Airtightness mitigation throughout to achieve max 4m3/m2	6500	1852	€ 251.87	26
Forced Ventilation system	DCV or similar	0	0	€ -	-

Hot Water

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
Storage and pipework insulation	New tank insulate pipework etc	5500	3083	€ 419.29	11
Solar thermal	Full service	0	0	€ -	-

Heating System

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
	Install heat pump 5 kw	16000	8613	€ 1,171.37	14
Air Source heat pump		0	0	€ -	-

Lighting

Measure	Description	Capital Cost (€)	Electrical Savings (kWh/yr.)	Saving (€)	Payback (years)
Install low energy lighting	Low energy light bulbs	250	393	€ 70.74	4

Renewables

Measure	Description	Capital Cost (€)	Electrical Savings (kWh/yr.)	Saving (€)	Payback (years)
Micro generation	Description	4500	1200	€ 216.00	21

NOTES:

Only very simple figures supplied by homeowner actual bill were not seen. The figures given however are broadly in line with assumed consumption by DEAP and average usage.
PV refers to Photovoltaics , panels that generate electricity roof mounted
Night saver energy rates are used here.

Ventilation solution to be designed in line with SR50 & Part F regulations. Heat saving estimates are based on improved controls of air flow due to humidity/CO2 responsive vents.

Energy Audit Report

Building: Generic
Address: larger detached property 1980
Completed: 05/04/2020

Overview

This two story detached dwelling is typical of many larger properties constructed between 1980-1990 in the area
The main construction methods are as follows;
- Cavity block outer and inner leaf
- Pitched roof construction with 100mm of fibre insulation rolled out in attic space
- Sloping ceilings with no insulation
- All windows are double glazed and in fairly good condition but with possible air leakage
- Heating is supplied by an oil fired boiler located outside to a 300l buffer tank to radiators
- Heating controls allowing time and temperature control
- Two open fires present
- Lighting is predominantly provided by tungsten bulbs

The Building

Baseline Energy Performance

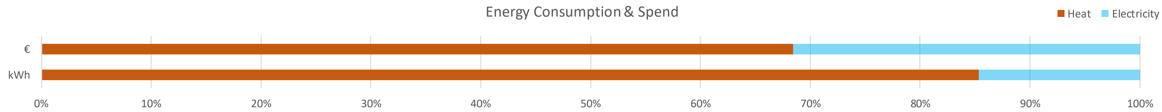
Energy Rating		
D1	Dwelling Type	detached
	Year of Construction	1985
	Floor Area (m2)	220.65
	Volume (m2)	577.4
	HLI (W/K/m2)	2.27

DEAP

DEAP Estimates	Heating Fuel	Electricity
Energy Use (kWh/yr.)	45370	5049
Cost per unit (€/kWh)	€ 0.07	€ 0.18
Energy Cost (€/yr.)	3040	909
Total Cost (€/yr.)		3949

Bill Data

Energy Spend	Oil	Electricity
Energy Use (kWh/yr.)	38806	6667
Energy Cost (€/yr.)	**2600**	**1200**
Total Cost (€/yr.)		**3800**



Your Energy Upgrade Options

Shallow Retrofit

Upgrade attic insulation where possible to 300mm
Replace sloping ceiling with insulation system
Inject cavities with EPS bonded bead
Heating controls upgrade
Draft proofing audit
Doors
Window service
Draft proof attic hatches
Replace open fires with wood burner and permanently block up one chimney
Change all light fittings to low energy units

Potential Impact

Energy Rating	Cost	Potential Grant	Energy Bill Saving	Payback
B3	€14,126	€1,400	€1,567	8
	€	€	€/yr.	years (with grant)

Energy Spend	Oil	Electricity
Energy Use (kWh/yr.)	23211	4591
Cost per unit (€/kWh)	€ 0.07	€ 0.18
Energy Cost (€/yr.)	1555	826
Total Cost (€/yr.)		2382

Building Fabric

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
Door	Replace Front door	2000	260	€ 20.53	244
Wall insulation	Inject cavitied with 50mm+ EPS bonded bead	3136	3850	€ 303.45	10
Attic insulation	Upgrade insulation in horizontal roofs to 300mm	1330	1336	€ 105.30	13
	Sloping ceilings	2610	604	€ 47.62	55

Ventilation

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
Draghtstripping	Draft stripping, attic hatch doors	500	365	€ 28.74	17

Hot Water

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
None		0	0	€ -	-

Heating System

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
Heating controls	install thermostats and 7 day programmer	1200	16799	€ 1,324.16	1

Lighting

Measure	Description	Capital Cost (€)	Electrical Savings (kWh/yr.)	Saving (€)	Payback (years)
Install low energy lighting	15 no low enrgy bulbs	350	0	€ 82.44	4

Note : some saving gained in one section may show up in other sections. It can be difficult to isolate savings and to show in separate sections.

Deep Retrofit

Install horizontal attic insulation up to 300mm attic and crawl spaces
Install insulation between rafter and thermal liner to sloping ceilings
Inject cavities with EPS bonded bead
Full airtightness audit including air permeability testing
Airtightness upgrade to achieve 4m3
Install demand control ventilation
Install air source heat pump with rads as necessary
Replace electric showers with mains units
1.8kWp PV

Potential Impact

Energy Rating	Cost	Potential Grant	Energy Bill Saving	Payback
A2	€34,116	€11,941	€2,944	8
	€	€	€/yr.	*years (with grant)*

Energy Spend	Elec. Blended Rate	Electricity
Energy Use (kWh/yr.)	3726	2888
Cost per unit (€/kWh)	€ 0.18	€ 0.18
Energy Cost (€/yr.)	484	520
Total Cost (€/yr.)		1004

Building Fabric

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
			0	€ -	-
Door	Replace front door	4000	219	€ 29.75	134
		0	0	€ -	-
Roof	Horizontal ceiling	1330	1336	€ 181.68	7
	Sloping ceilings	2250	521	€ 70.83	32
Wall insulation	Inject cavitied with 50mm+ EPS bonded bead	3136	3850	€ 523.57	6

Ventilation

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
Air-tightness including 2 X tests	Airtightness mitigation throughout to achieve max 4m3/m2	6500	1129	€ 153.49	42
Forced Ventilation system	DCV or similar	0	0	€ -	-

Hot Water

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
Storage and pipework insulation	New tank insulate pipework etc	5500	5829	€ 792.74	5
		0	0	€ -	-

Heating System

Measure	Description	Capital Cost (€)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)
	Install Heat pump 8 kw	8000	16796	€ 2,284.26	4
Air Source heat pump		0	0	€ -	-

Lighting

Measure	Description	Capital Cost (€)	Electrical Savings (kWh/yr.)	Saving (€)	Payback (years)
Install low energy lighting	Low energy light bulbs	400	458	€ 82.44	5

Renewables

Measure	Description	Capital Cost (€)	Electrical Savings (kWh/yr.)	Saving (€)	Payback (years)
Micro generation	Description	4500	1800	€ 324.00	14

NOTES:

PV refers to Photovoltaics , panels that generate electricity roof mounted
Night saver energy rates are not used here.

Ventilation solution to be designed in line with SR50 & Part F regulations. Heat saving estimates are based on improved controls of air flow due to humidity/CO2 responsive vents.

Energy in Transport

Transport to work or school and for leisure is the second-highest energy consumer in the local area.

Local Transport

The census poses a number of transport-related questions covering, for example, how people get to work, how long they have to travel for and how many cars each household owns. This data provides a basis to model transport energy consumption in the local area. This information is presented in Figure 11 and Figure 12.

In addition, a transport survey which gathered data from 117 respondents on their vehicle ownership and commuting patterns was carried out as part of the study fieldwork.

The census data shows that a very large proportion, almost 70%, of commutes are by car or van, while low-carbon options such as walking and public transport account for about 15%. Nationally, a similar number of commutes are by car or van and just over 20% by walking, cycling or public transport.

The local transport survey is slightly skewed towards individuals who drive their car to work compared to the census data; however, the combined totals for car drivers and passengers are similar at about 60% of commutes across the survey and the census.

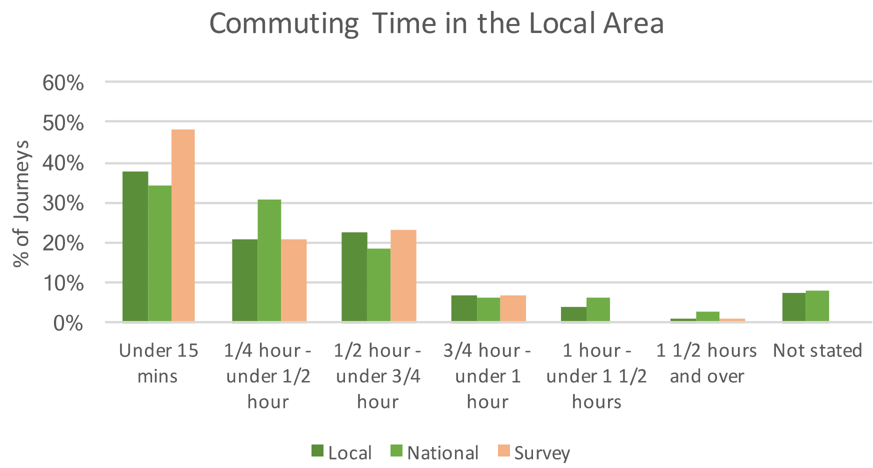


Figure 11: Commute Length (Source: CSO SapMap)

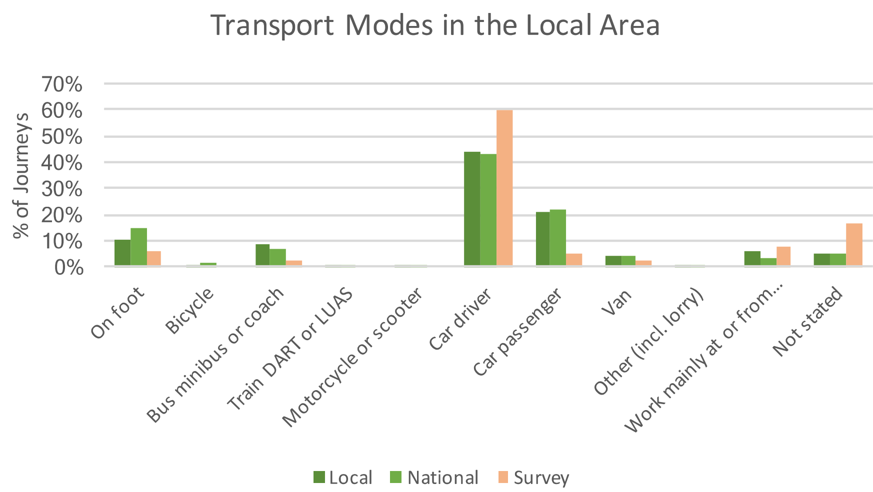


Figure 12: Mode of Transport (Source: CSO SapMap)

SEC Survey Results: Private Cars

In terms of vehicle ownership, over 90% of respondents had at least one car, which is in line with the census data.

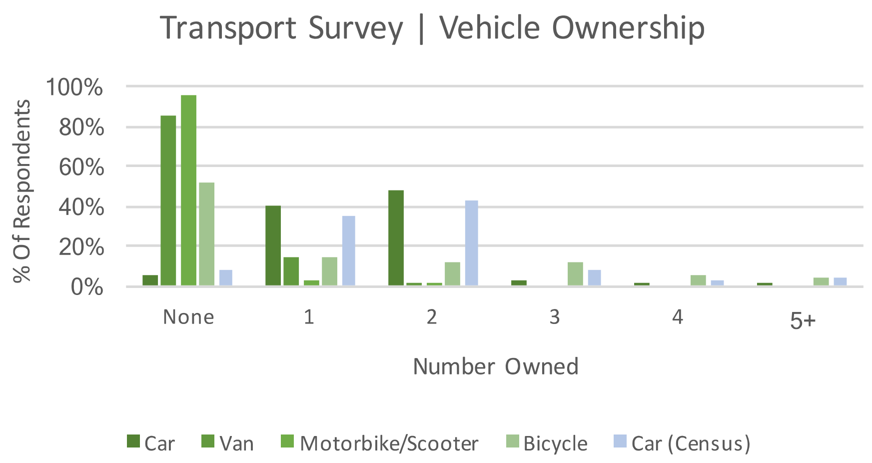


Figure 13: Vehicle Ownership (Source: SEC Survey)

There is quite a range of ages among the sample, with a large proportion, over 50%, of respondents having vehicles over a decade old. This has obvious consequences for the efficiency of the vehicle stock.

We now turn to means of addressing transport emissions. A large proportion of our respondents, almost 90%, own or would consider switching to an electric vehicle (EV). However, the 10% ownership rate does indicate that the survey sample may be somewhat skewed towards early adopters, as new EV sales account for 3% sales to date this year[4].

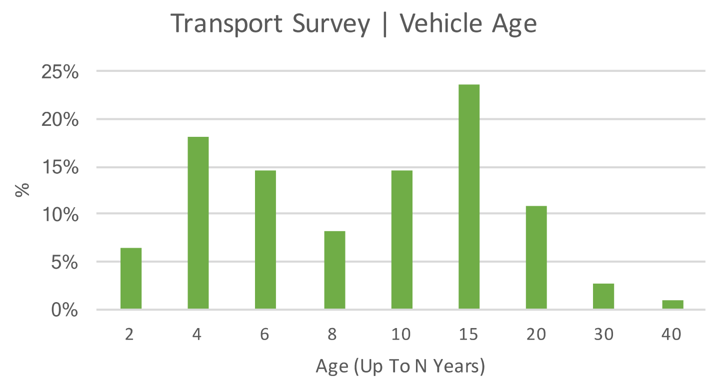


Figure 14: Vehicle Age Distribution (Source: SEC Survey)

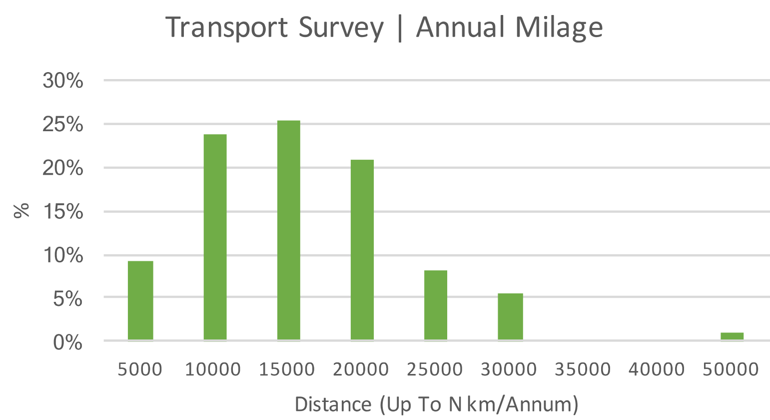


Figure 15: Annual Mileage (Source: SEC Survey)

[4] See: https://www.irishevowners.ie/irish-bev-sales-march-2020/

SEC Survey Results: Public Transport

Kinsale is relatively well served by bus links provided by Bus Eireann (an hourly service to Kent Rail station via Cork Airport) and the Local Link service (Kinsale–Clonakilty, Bandon–Kinsale and the Charlesfort Shuttle service).

The survey explored attitudes to public transport, asking: *What would make you consider using public transport rather than your car?* The top three responses to this question were: more local services, more frequent services and lower fares.

Given there are already a number of local services and a frequent service to Cork, it seems unlikely that additional capacity would be developed without increases in ridership. A key barrier to uptake is the price of public transport, which should take into account the inconvenience of longer journey times and the need to travel at either end of the route. This is an area where the SEC could contribute to a lobbying effort and work with the community to further progress the survey work begun as part of this study and identify specific improvements to the bus services that would drive uptake.

For example:

- Are there specific connections that could be delivered beyond the current 'cheek to cheek' service to Kent Station?
- Could the smaller-capacity Local Link service become more reactive to demand by using technology to effectively allow passengers to book seats and by providing greater flexibility in the schedule and route?
- Is there the potential for transport links to contribute to a sustainable tourism by offering, for example, direct connections to Kinsale from the ferry?

Source: Cork County Council (www.corkcoco.ie)

Baseline Energy Consumption

Our transport consumption model draws primarily from the transport mode and commute-length data available for the local area in Census 2016.

Our modelling converts commute length from time to kilometres assuming an average speed of 60km per hour which allows the 'total distance commuted' for the community to be established.

Based on the CSO data, we assume 70% of all journeys are made by car. The result is doubled to account for non-commuting car use in order to bring our annual mileage estimates into line with national statistics. The final estimate indicates that the annual distance travelled per car per annum (16,400km) is slightly lower than the national average (18,000km, as presented by the CSO's Transport Omnibus, 2016).

Estimates for kilometres travelled by public service vehicles (taxis and buses) in the area have been calculated by scaling Transport Omnibus data for Cork county on a per-capita basis.

The modelling indicates that energy use for personal transport accounts for 20% of total energy demand for the area and the total transport fuel spend is just over €4.5 million per annum. Transport therefore should be an important area of focus for the local community.

Note: no electricity use by EVs is included in the model. This is likely to have been negligible in the baseline year, 2016, which was early in the EV adoption cycle. Less than 1% of the transport survey respondents had an EV older than 2016.

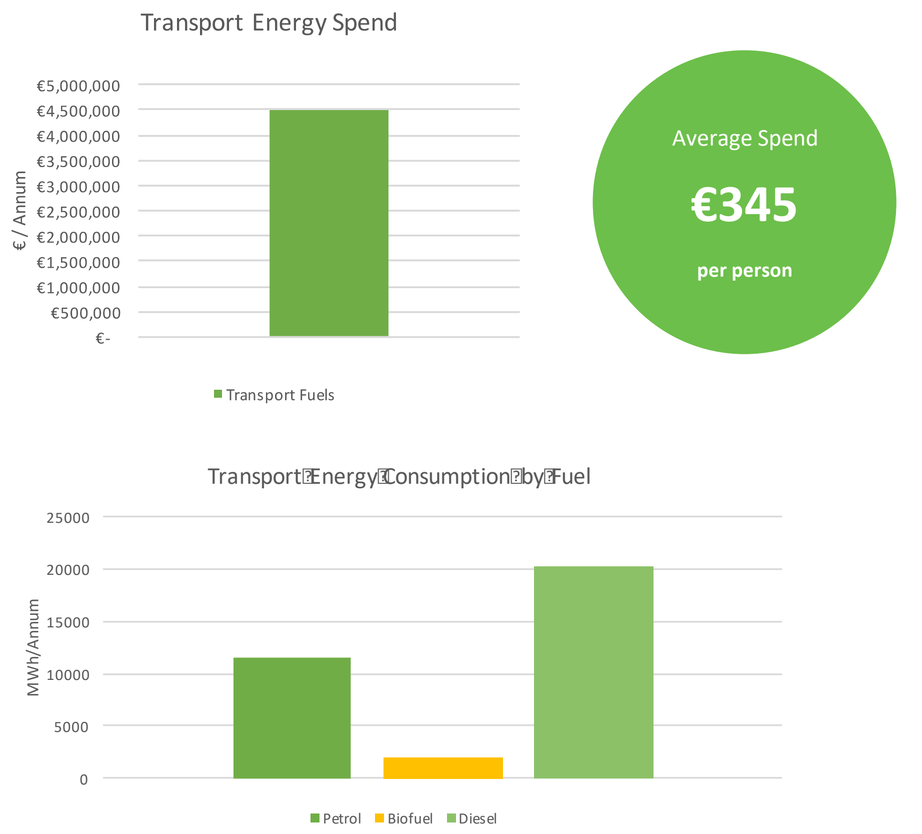


Figure 16: Transport Spend and Fuel Use in P17

Energy-Saving Potential

In many respects energy use for transport is the ‘elephant in the room’. It represents a large proportion of the total energy use at national level, just as in this local area, but is often ignored in energy planning because it is perceived as a problem too difficult to tackle. Through community action and the development of appropriate supports and infrastructure it is possible to address this issue. The following measures are examples of the sort of actions that could make a significant impact on transport energy demand in Kinsale.

Encouraging Walking and Cycling

Kinsale is close to the national average when it comes to the proportion of residents commuting by foot or bicycle (see graph census data in Figure 12); however, there are also good levels of bus use.

Almost 40% of commutes in the local area are less than 15 minutes in duration and, alongside local travel for leisure, represent an opportunity to walk or cycle. If this behaviour change was adopted and half of these short journeys were made by walking or cycling, local carbon emissions could be cut by over 450 tonnes, and over €235,000 would be saved on petrol and diesel collectively.

In addition to promoting the benefits of walking and cycling, the SEC can play a direct role in continuing to lobby for cycling facilities within the town, such as cycle lanes between residential and central commercial areas; the provision of adequate footpaths around schools; and developing safe walking and cycling routes over longer distances between the smaller towns and villages in the P17 area. A community effort to map these routes may also benefit the local tourism product.

In addition, the SEC may be able to facilitate the establishment of provisions for children such as walking or cycling ‘buses’. For instance, there is anecdotal evidence of very low numbers of students cycling to the local community school; encouraging cycling at a young age has the potential to contribute to long-term environmental goals, as well as delivering health benefits.

Switching to Electric Vehicles

Manufacturers of electric vehicles (EVs) now claim ranges above 270km and approaching 385km for the most popular models. Almost all commutes made in Kinsale are less than 1.5 hours in duration, well within this range.

EVs consume less energy than internal combustion engines per km travelled, ~0.2kWh/km vs ~0.5kWh/km.[5] Taking this into account we have estimated the potential energy savings delivered by using EVs to complete these journeys, as well as the consequent cost and carbon reductions.

Switching to EVs could reduce total transport demand in the area by 40%, deliver a 30% reduction in CO_2 and cut costs by almost €1,400,000 per year. The Government is already providing sizable grant incentives to make EVs more affordable; however, EVs are still at the early stage of the adoption cycle.

Further to this, there is the potential to supply a large fleet of EVs with locally generated renewable energy which would boost the carbon-saving impacts of electrifying transport and increase the region’s energy autonomy. Paths to increasing renewable supply are discussed later in the report.

As a community group, there are a number of actions the SEC could take to promote EVs in the local community. For example, connecting early adopters to those who are considering making the switch to an EV and facilitating

[5] See: http://www.eprg.group.cam.ac.uk/wp-content/uploads/2013/01/EEJan13_EconomicsEVs.pdf

information sharing; lobbying for the provision of more on-street charging facilities, particularly in Kinsale town centre where potential EV owners live in apartment buildings or houses with no off-street parking.

Car Sharing

A sizable portion of the local population complete commutes of ½ to ¾ of an hour, most likely to centres of employment in and around Cork City. There may be useful opportunities for car sharing; however, only 30% of the respondents to the local survey indicated a willingness to car share and the current situation with COVID-19 means car sharing is not currently feasible.

Car sharing has obvious energy-saving and economic benefits, reducing the cost of commuting by half or more. While apps such as *Carpool Ireland* are available, the SEC could play an important role in facilitating car sharing by gathering information on residents' commutes and helping to identify potential car sharers. Where there are larger employment centres – for example, Eli Lilly – there may be potential to run local bus services specifically for commuters.

Home Working

The trend towards home working has been accelerated greatly by recent events and it is unlikely that old ways of working will fully return.

The impacts of home working are difficult to evaluate, as generally energy use in commercial premises may be replaced by energy use in the home. In terms of transport demand, it is also difficult to predict what the final outcome might be but, by way of example, a halving of energy demand for commuting would lead to a saving of 14,000MWh or approximately 8% of the energy use within the study boundary. MaREI have recently released a detailed study of the impacts of the change in working patterns due to the pandemic[6].

The SEC may have a role to play here in lobbying for infrastructure to support home working, such as access to reliable broadband.

Financial Supports

The purchase of new electrical vehicles can attract the following financial incentives:

a) SEAI offers grants available for a range of eligible private and commercial electric vehicles. The level of grant depends on the purchase cost but is €5,000 for a private electrical car of €20,000 or more, and €3,800 for a commercial vehicle of €18,000 or more.
b) Electrical vehicles also receive VRT relief separately to SEAI grant support, as well as reduced motor tax of €120.
c) SEAI also provide a grant up to the value of €600 towards the purchase and installation of a home charger unit.
d) For company electrical cars, the Revenue also allows for Benefit in Kind exemption.

For more information on EV models specifications, please see

https://www.seai.ie/sustainable-solutions/electric-vehicles/

[6] See: https://www.marei.ie/marei-covid-19-analysis/

Energy in Agriculture and Fisheries

Energy use on farms is driven by requirements for pumping and cooling in milking parlours, lighting on farmyards and transport fuels for tractors and machinery.

The CSO provides local electoral area data on the total area of land farmed by crop type, the total number of farm animals and the number of farms in the local area. This data is from the 2010 Agricultural Census, therefore we made some adjustments to reflect the recent growth in the dairy industry, where national herd numbers increased by almost 30% between 2010 and 2016, the results are illustrated in Figure 17.

This analysis does not address non-energy, livestock-generated emissions, which, according to several recent analyses, are significant.

Fisheries energy consumption is dominated by the diesel consumption of trawlers. According to CSO statistics, approximately 1,600 tonnes of fish were landed in Kinsale in 2016.

Using energy intensity data derived from the UN Food and Agriculture Organisation, we have estimated the diesel consumption and resultant fuel spend and CO_2 emissions.

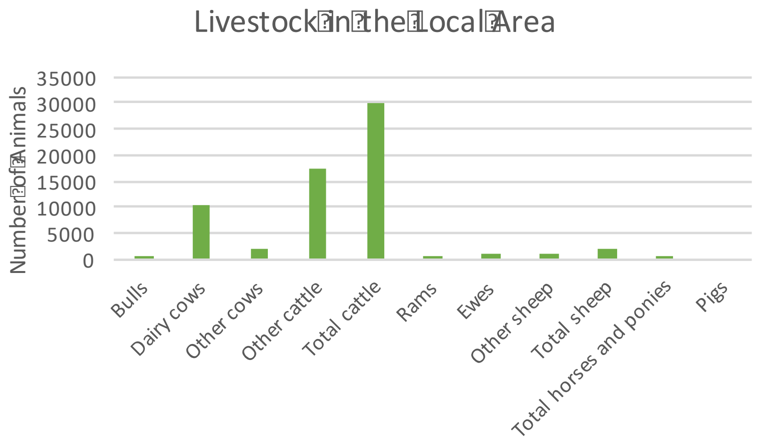


Figure 17: Livestock in the Local Area (Source: Adapted from CSO Agricultural Census)

Baseline Energy Consumption

Using the CSO data, we have derived estimates of electricity and diesel consumption on local farms as follows:

- We have scaled the total diesel consumption in the agriculture sector in Ireland as presented in SEAI's national energy balance by Kinsale's share of the total farmed area in Ireland (circa 16,800ha, 0.35%).
- We have multiplied the number of dairy-farm animals in the local area by low, average and high estimates of energy consumption per animal on dairy farms in the UK (Collings, 2011) and adjusted these to represent conditions in Ireland.
- In order to estimate electricity consumption on beef farms, we have removed the dairy-specific elements of Collings' figures, leaving lighting and 'other' consumption, and multiplied this by the total number of beef cattle in the local area.
- For fisheries we have multiplied the 2016 fish landings by an energy-efficiency factor of 205 litres of diesel per tonne derived from figures presented by the UN FAO (2015).

Our analysis indicates that the agriculture and fisheries sectors represent circa 10% of total energy demand in the local area. The total energy spend on farms is almost €1,750,000 per year, or €4,200 per year per farm.

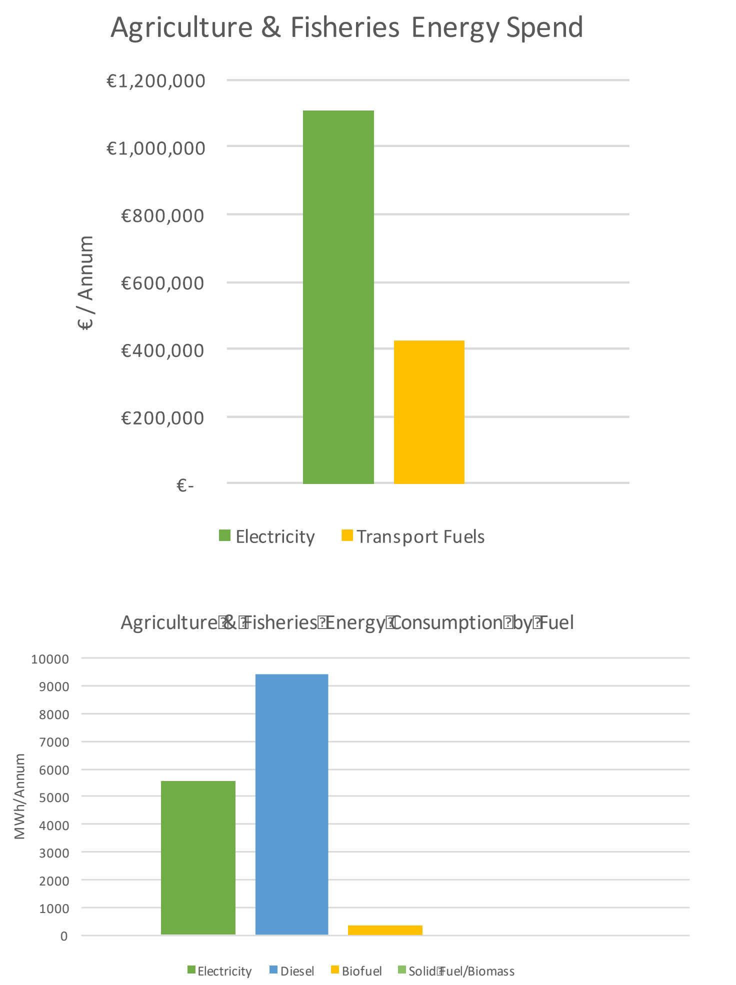


Figure 18: Energy Consumption and Energy Costs in the Agri & Fisheries Sector in P17

Potential Energy Demand Reduction

Our analysis has shown electricity consumption on dairy farms represents almost 40% of end use within the agricultural and fisheries sector in Kinsale. Teagasc and the SEAI (2017) have conducted several research projects on energy efficiency in the dairy sector which highlight the potential for pumps with variable speed drives, more efficient milk-cooling practices and better control of water heaters, for example.[7]

Some improvements can be generated through more energy-conscious practices in the day-to-day operation of the farm. In general, the economics of replacement equipment such as chillers and pumps[8] are only favourable when the equipment being replaced is at the end of its lifecycle and therefore improving efficiency is a long-term project.

Evidence from the UK[9] has shown energy consumption as low as 200kWh/annum per dairy cow being achieved on the best performing farms and we have based our estimate of the potential energy saving on this data. If achieved, this would deliver a 20% reduction in total agricultural electricity use which equates to a cost saving of over €500,000/annum or 1,000 tonnes CO_2/annum in the local area.

Renewable-energy opportunities on farms are discussed later in this report, but it is worth highlighting that many farms could produce their wood fuel from their own forestry and/or mature hedgerows. Burning this wood fuel in efficient wood stoves and wood boilers can generate significant savings in home heating.

Financial Supports

The following financial incentives are available for energy-efficiency projects on farms:

a) The Energy Efficiency in Dairying is a scheme run annually by Teagasc and SEAI, which offers 40–50% support for investment in vacuum pumps and variable speed drives on milk pumps.
For more information:
https://www.teagasc.ie/publications/2019/energy-efficiency-in-dairying.php

b) Accelerated Capital Allowances are available to companies and other trading structures who invest in an energy-efficient plant. This measure allows the purchaser to write off 100% of the purchase value of qualifying energy-efficient equipment against profits in the year of purchase.
For further information: https://www.seai.ie/energy-in-business/accelerated-capital-allowance/

c) SEAI's grants for home energy-efficiency measures are discussed in the section on residential energy demand.

d) SEAI's Better Energy Community programme also offers grant aiding for projects including agricultural enterprises.

[7] See: https://www.teagasc.ie/media/website/publications/2017/Energy-Efficiency-in-Dairy-Sector-Pilot-2017.pdf

[8] See: http://energyinagriculture.ie/wp-content/uploads/2017/05/Energy-Efficiency-and-Renewable-Options-for-Dairy-Farms-Michael-Breen.pdf

[9] See: https://www.teagasc.ie/media/website/rural-economy/farm-management/ElectricityConsumptiononDairyFarms.pdf

Energy in Public and Community Buildings

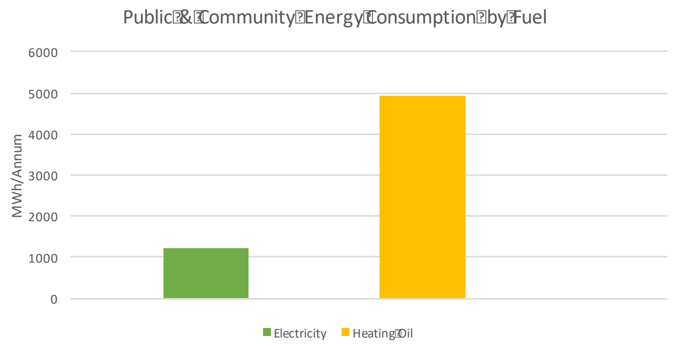
Our fieldwork identified a number of public and community buildings in the study area, including:

- Kinsale Community School
- Kinsale Municipal Hall and Temperance Hall
- Nine primary schools
- Local churches
- Kinsale Community Hospital and Primary Care Centre
- Local GAA, Rugby and Soccer clubs
- The Sáile Centre
- Kinsale Yacht Club
- Kinsale Tourist Office, County Council Offices and Fire Station
- Tracton Community Centre
- Belgooly Parish Hall
- Red Cross and RNLI centres

Baseline Energy Consumption

In order to evaluate energy use in these types of buildings, the floor areas of a number of public and community buildings in the locality have been audited. The size of others has been estimated using satellite imagery. These floor areas have been combined with standard values for a range of building types developed by the Chartered Institute of Building Services Engineers (CIBSE) and published in their 'TM46' guidelines in order to estimate energy consumption in this sector.

Public and community buildings represent ~4% of the total energy use and CO_2 emissions within the study area. We estimate the combined annual energy bill is close to €520,000 per annum.



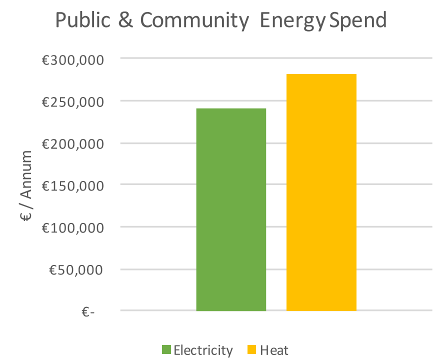


Figure 19: Energy Consumption and Energy Costs in Public and Community Buildings

A number of specific opportunities for energy saving have been explored and these are described later in the case-study section.

Where detailed assessments have not been carried out, we have estimated that there is potential for 20% savings in electricity use and 30% savings in heat demand.

Financial Supports

The following financial incentives are available for energy-efficiency and renewable-energy projects in the public and community sectors:

a) SEAI's Better Energy Community programme has funded a large number of projects in both the public sector, including local authorities and national institutions' buildings and facilities, and the community sector. See Financial Supports and Incentives below for details.

b) SEAI's Public Sector programme also offers comprehensive support and engagement to guide public bodies in reaching their energy-saving targets.
More information: https://www.seai.ie/energy-in-business/public-sector/public-sector-energy-programme/

Although community buildings only represent a small proportion of local energy demand, undertaking projects in this sector can have a positive effect on awareness and the development of knowledge and capacity in the local area.

Figure 20: Kinsale College Amphitheatre, one of the only publicly owned green buildings in Ireland

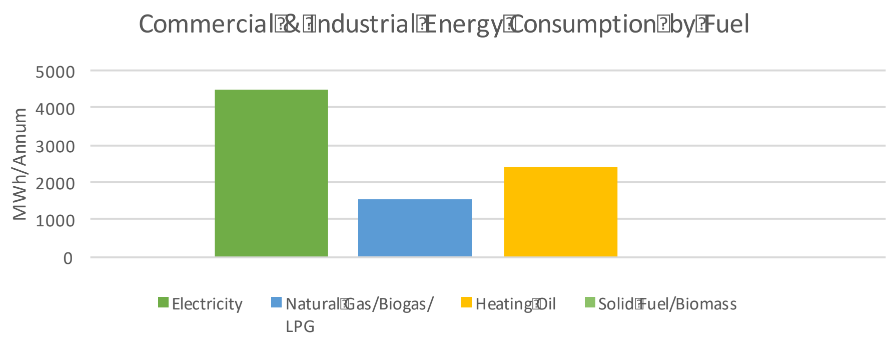
Energy in the Commercial and Industrial Sectors

Our analysis of the commercial sector follows a methodology developed by Element Energy in a study of commercial demand for the SEAI[10]. Their approach grouped commercial properties into five categories – office, retail, hotel, restaurant/public house and warehouse/light industry. While companies such as Graepel are included in our light industry category, consumption by the buildings and processes at Eli Lilly is outside the scope of this EMP. Eli Lilly are subject to the Emissions Trading Scheme, part of SEAI's Large Industry Energy Network, and have dedicated energy management teams.

Utilising data kindly provided by the SEC and other business registries, we have constructed a register of circa 500 businesses in the study area. Business types from this register are multiplied by archetype average demand for electricity, gas and oil in order to develop the consumption estimates shown in Figure 21.

Baseline Energy Consumption

Commercial and industrial buildings represent 5.5% of the total energy use and CO_2 emissions within the study area. We estimate the combined annual energy bill is close to €1.4 million.



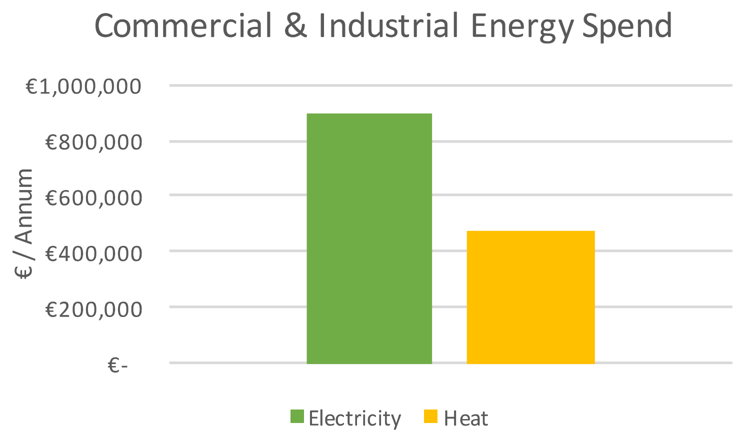


Figure 21: Energy Consumption and Energy Costs in the Commercial and Industrial Sector

[10] See: www.seai.ie/publications/Extensive-Survey-of-Commercial-Buildings-Stock-in-the-Republic-of-Ireland.pdf

Energy-Efficiency Potential

A number of energy audits including the Cozy Café and a local B&B have been carried out as part of the fieldwork for the study and these are presented as case studies in the next section.

We have estimated the energy-saving potential to be 20% of baseline electricity use and 30% on heating fuels and this reflects the likely impact of simple measures to improve energy management; for example, address electricity use by replacing inefficient lighting and taking basic thermal-efficiency measures such as replacing boilers.

Engaging with these local businesses and capturing this potential could therefore allow the SEC to make an important impact on local energy flows, while delivering benefits for local business. The SEC should use their existing contact with the Chamber of Tourism and Business and, ideally, get a number of local business involved in a community energy-efficiency project. Longer term, the SEC have identified an opportunity to enhance Kinsale's tourism brand by becoming a sustainable tourism destination.

Tourism

We estimate that between 20% and 30% of the businesses we have identified are reliant on tourism in some form, principally the hospitality sector and retail. In general, the same common-sense energy-efficiency measures around improving insulation and airtightness and increasing heating-system efficiency will apply to these businesses as they do in the residential sector. Restaurants and bars will have chilling equipment, ventilation systems and lighting loads that may all offer potential for energy-efficiency improvements. There is also potential for these businesses to invest in renewable generation; in particular, there may be a good synergy between solar energy and the peak tourist season.

Developing transport links between Kinsale and sustainable long-distance modes such as trains and ferries may also be an important aspect of a future tourism experience. We have also highlighted the potential for low-impact activities such as walking and cycling around the local area.

Developing a 'brand' around sustainable tourism may be a useful catalyst in developing an awareness of sustainability among the local population, encouraging citizens to participate in the SEC's work and live up to the brand the area is projecting to the wider world.

The SEC should seek to engage the Chamber of Tourism and Business as a partner and work towards developing a more detailed vision for Kinsale as a sustainable tourism destination and potentially a definition of what a sustainable tourism business means, alongside some system of recognition. There are international models, for example the European Destinations of Excellence[11] scheme and Sustainable Travel Ireland[12].

[11] See: https://ec.europa.eu/growth/sectors/tourism/eden_en

[12] See: https://www.sustainabletravelireland.ie/our-members/

Financial Supports

The following financial incentives are available for energy-efficiency projects in businesses:

a) Accelerated Capital Allowances are available to companies and other trading structures who invest in energy-efficient equipment. This measure allows the purchaser to write off 100% of the purchase value of qualifying equipment against profits in the year of purchase.
For further information: https://www.seai.ie/energy-in-business/accelerated-capital-allowance/

b) SEAI's Better Energy Community programme also offers grant aiding for projects including businesses. In many cases, local businesses can act as catalysts for Better Energy Community projects, often sponsoring the community element of a project or offering technical assistance. Musgrave, for example, has been a driver for community partnerships in the programme. See Financial Supports and Incentives below for details.

c) SEAI also supports businesses aiming to improve their energy efficiency via technical assistance, such as for energy audits and training in energy management.
For more information: https://www.seai.ie/energy-in-business/training-and-standards/

d) Failte Ireland offer grants for the development of tourism initiatives from time to time.

Community and Commercial Energy-Saving Case Studies

As part of the fieldwork, we audited a number of buildings in the local area. The following pages present potential energy-upgrade approaches for one of those buildings, Kinsale College.

All case studies are available in a separate booklet.

Energy Audit

Building:	Kinsale Collage
Address:	Bandon road, Kinsale , Co Cork
Completed By:	S. McGovern
Date :	12.03.2020

CORK ENERGY RATING COMPANY
DOMESTIC & COMMERCIAL

Overview

Kinsale collage is a 3rd level teaching facility offering a wide range of content from healthcare, media to permaculture. The main building was constructed in the 1930s on hillside with generous surrounding space just outside of the town of Kinsale in South west county Cork. An extension was added to the rear of this building in the 1940s .There is a second building located just to the north east of the main building partially constructed at the same time with an extension added in the 2010. The main building fabric is made up as follows:

Walls are generally solid brick/concrete some have had internally insulation added but significant cold bridging remains. last extension is of cavity construction insulation level assumed to be in keeping with 2010 levels.

Main roof is a pitched construction with no visible insulation, annex to main built roof is flat roof, no insulation is assumed. The extension are also flat roof construction again no insulation assumed , last extension also has flat roof adequate insulation likely in this section but could not be verified.

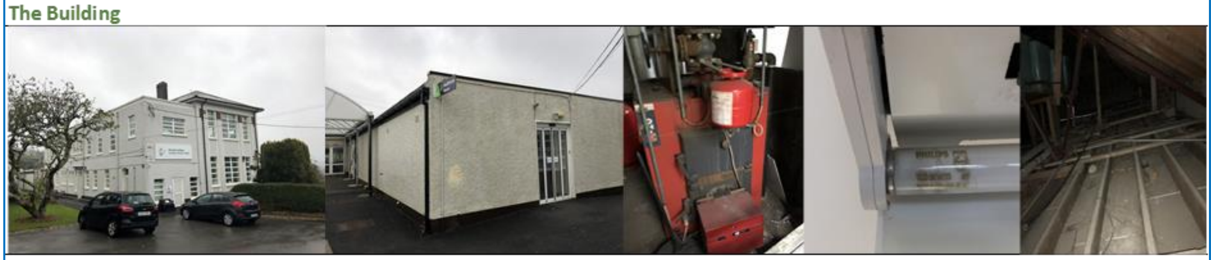
There is a mix of window types and ages all uPVC ranging in age from 1991 to 2010. Many of the older windows are extremely leaky and in bad repair.

Lighting throughout the building would generally be considered high energy usage fluorescent tube 56 Withered are other fitting and a few LED panels.

Heating is provided to the building by a 21 year old gas fired boiler supplying radiators off a header pipe and sinks in main building directly. There is a storage tank located in health care building 150 litre with no lagging or insulation this is most likely to supply water to sinks in this area but further professional survey would be required.

Cells highlighted in light green are used as input into the workbook for BEC/SEC Pilot funding application.

The Building



Baseline Energy Performance

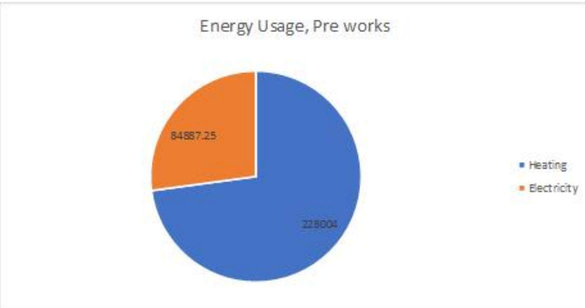
Total Floor Area (m2):	893.55
Energy Rating:	?
Year of construction:	1920
Building Volume	2681

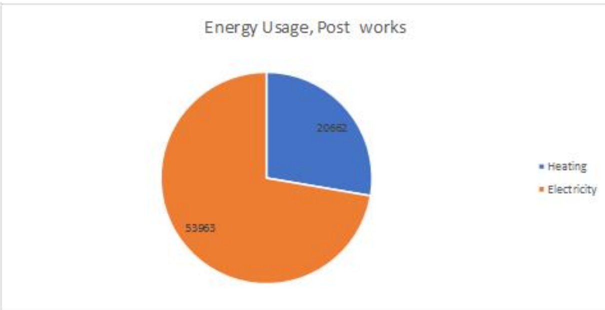
Energy consumption	Heating	Electricity	Notes
Usage (kWh/yr.)	228004	84887.25	Electricity and Gas usage taken Cibse gudance averages.
Cost per unit (€/kWh)	0.067	0.180	As per SEAI commercial fuel cost comparison, April 2018
Energy cost (€/yr.)	15276	15280	Electricity and Gas usage taken Cibse gudance averages.
Total cost		30556	Euro

Proposed Energy Upgrades

Description

Replace all high energy lighting with low energy replacements,
Install 300mm fibre wool insulation in main attic,
Install warm roof system on all flat roofs 150mm EPS,
Install external insulation throughout,
Replace all window in 3 older buildings
Replace doors in main building
replace Gas fired boiler with air source heat pump.
Install 11 kWp PV panels on flat roofs
Consider Battery and electrical vehicle charging point.





All works to comply with applicable European & Irish standards, best practice guidelines and requirements by SEAI and NSAI SR54.

Preliminary specification & estimates on capital costs, energy savings, payback period

Building Fabric

Heat loss element	Description	Net Area (m2)	U-Value Before (W/m2K)	Recommended Upgrade	U-Value After (W/m2K)	Capital Cost (€)	Electrical Savings (kWh/yr.)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)	Primary Energy Saving
Wall Type 1	Solid walls	500	1.00	EWI 150mm EPD	0.25	€ 60,000		16038	€ 1,327	45	16038
						€ -		0	€ -		0
Roof type 1	attic	153	2.10	install 300mm fibre rolled	0.13	€ 1,989		12891	€ 1,066	2	12891
Roof type 2	flat roofs	473	2.10	Install warm roof system	0.20	€ 56,760		38436	€ 3,179	18	38436
						€ -		0	€ -		0
windows	all windows in older building	85	2.20	no action	0.90	€ 27,200		4726	€ 391	70	4726
						€ -		0	€ -		0
Door	Rear door	2	2.20	replace door	1.00	€ 690		118	€ 10	71	118
						€ -		0	€ -		0
								0	€ -		0

Ventilation

Heat loss element	Description	Unit	Before	Recommended Upgrade	After (ACH/hr)	Capital Cost (€)	Electrical Savings (kWh/yr.)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)	Primary Energy Saving
Air infiltration	Infiltration rate	AC/hr	0.75	Airtightness review /window servic	0.2	€ 600		487	€ 40	15	487
Ventilation	Natural Ventilation	AC/hr	1.75	install DCV	1.75	€ 6,000		487	€ 40	149	487
					0%						

Notes: Ventilation solution to be designed in line with the Department of Education's guidelines & Part F regulations, considering mould problem. Heat saving estimates are based on improved controls of air flow due to humidity/CO2 responsive vents.

Domestic Hot Water

Heat loss element	Description	Unit	Before	Recommended Upgrade measures	After	Capital Cost (€)	Electrical Savings (kWh/yr.)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)	Primary Energy Saving (kWh/yr.)
DHW requirement	Average daily DHW use	(l/day)	188	Served by ASHP	188						
Storage	cylinder	(kWh/yr.)	1460	no change	416						-
Pipework	secondary losses	(kWh/yr.)	800	same	600						

Heating System

System	Description	Performance	Before	Recommended Upgrade	After	Capital Cost (€)	Electrical Savings (kWh/yr.)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)	Primary Energy Saving (kWh/yr.)
Central Heating	Gas Fired Boiler	Efficiency	81%	Switch to air to water heat pump	450%	€ 50,000		90972	€4,669	11	90972
		Fuel	0.059		250%						

Lighting

Location	Existing Lamps	Quantity	Input Wattage Before	Replacement Lamps	Quantity	Input Wattage After	Operation Hours	operating hours reduction (%)	Electrical savings (kWh/yr.)	Notes
	CF 58W	165	56	LED	165	9	2496	1%		
	LED 8W	3	8	none	3	8	2496	1%		
	60 W	10	60	LED	10	8	2496	1%		
	compact F 28 W	6	28	LED	6	6	2496	1%		
					0					

Notes: The above schedule of replacement lights is preliminary. We recommend a detailed assessment of the lighting requirements with a specialist contractor/supplier to confirm specifications & costs.	Before (kWh/yr.)	After (kWh/yr.)	Capital Cost (€)	Electrical Savings (kWh/yr.)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)	Primary Energy Saving (kWh/yr.)
Lighting Consumption	25040	4015	€ 12,880	21024	0	€ 3,784	3	52561

Renewable energy generation

Systems	Description	Size (kWp)	Location	Capital Cost (€)	Electrical Savings (kWh/yr.)	Thermal Savings (kWh/yr.)	Saving (€)	Payback (years)	Primary Energy Saving (kWh/yr.)
	PV	11	flat roof south facing	€ 16,500	9900		€ 1,069	15	24750

Notes:

Post Retrofit Energy Performance

		Energy consumption	Heating	Electricity	Notes	
Total Floor Area:	893.55 m2					
Energy Rating:	?	Usage (kWh/yr.)	20662	53963		
Total energy credits (kWh/yr.)	241,464	Cost per unit (€/kWh)	0.136	€ 0.18		**Cibse guides**
Total Capital Cost Estimate:	€ 232,619	Energy cost (€/yr.)	€ 2,810	€ 9,713	Estimated	134,033 Thermal
Payback Period Estimate:	13	Total energy savings:	18,032.70			35,742 Electrical

Notes: Forecast energy saving are based on assumptions about the level of heating supplied to hall. Factor has been built in to A-line with bill data supplied.

Assumptions

Degree days:	1782	** For Roches point @ 15.5 degrees base	**CIBSE TM 46 Energy Benchmark:**	
Deg. Days Factor:	1	** Adjust up/down to reflect occupancy during heating season	Thermal energy (kWh/m2,yr)	150
Design delete temp (K):	25	(21 °C inside, -4 °C outside)	Electrical energy (kWh/m2,yr)	40
Occupancy (days/yr.):	200			

Current and Potential Energy Balance

Figure 21 summarises the sector-by-sector analysis we have presented in the previous sections showing the baseline energy use for Kinsale for 2016. By considering local energy demand as a whole, it is possible to identify the largest areas of consumption and prioritise areas for action. This baseline also provides a benchmark against which to measure the impact of the Kinsale's Energy Master Plan's implementation in future years.

Energy use within our study boundary, *'areas which can be directly influenced by the community'*, is dominated by housing and transport.

It follows that heating oil is the dominant energy vector in the local area, accounting for 35% of total energy demand, followed by electricity at 25% and diesel at 18%.

Finally, before outlining the options for renewable energy it is useful to consider the likely shape of energy demand in the area after energy-efficiency measures have been implemented.

Figure 23 summarises energy demand per fuel in the base case and after the energy-efficiency measures. In line with most national and international predictions around the energy transformation, the major shift is from fossil fuels to electricity, with heating oil and gas almost completely removed alongside large reductions in petrol and diesel consumption.

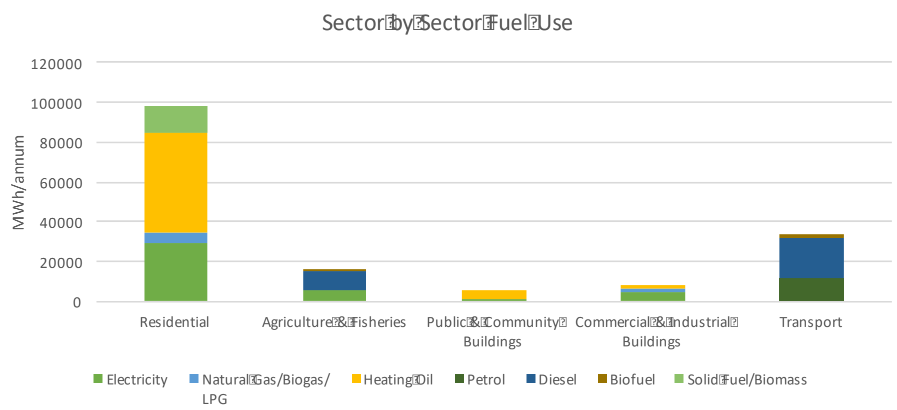


Figure 22: Sector-by-Sector Fuel Use in the Local Area

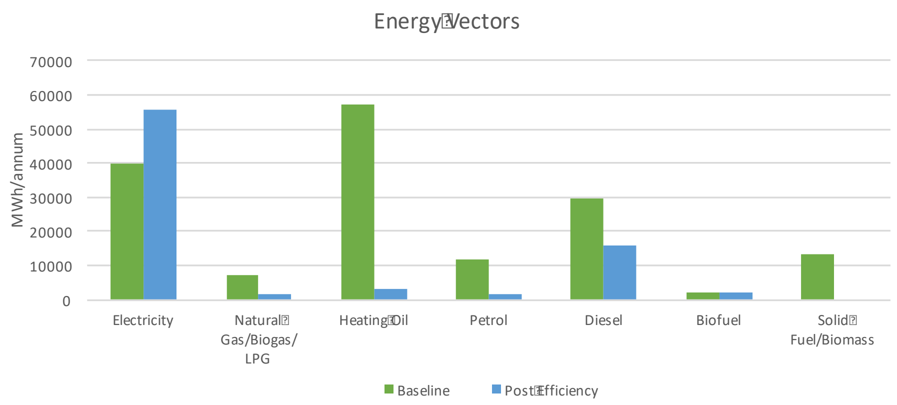


Figure 23: Shifting Energy Vectors

Renewable-Energy Resources

This section presents our estimates of the potential to capture renewable energy in the local area, which have been facilitated by SEAI's maps of Ireland's Renewable Energy potential[13] and basic physical models of renewable technologies.

Our focus has been on examining the technical potential, and therefore detailed analyses of the financial, regulatory, town planning and other constraints are beyond the scope of this report.

One of the main limitations in the production of renewable energy is the space available for the deployment of crops or energy-generation technology, therefore it is useful to start by considering the land available. The total land area under consideration in this study is approximately 4,800 hectares, dominated by agricultural uses.

Figure 25 summarises the available resources, which significantly exceed the local energy demand (shown as a grey +) after energy efficiency (shown as a negative value on the graph). The analysis is intended to illustrate the potential for the local area to make the transition to 100% renewable-energy supply in the future and point out areas for consideration by the SEC.

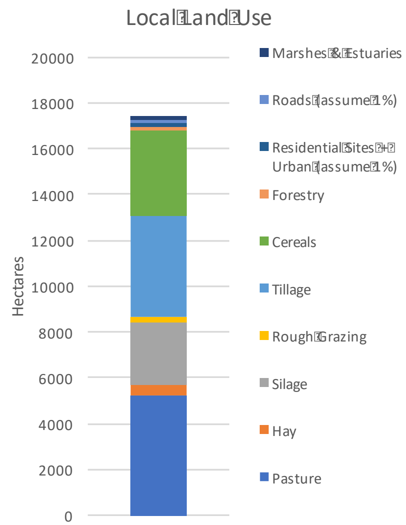


Figure 24: Local Land Use

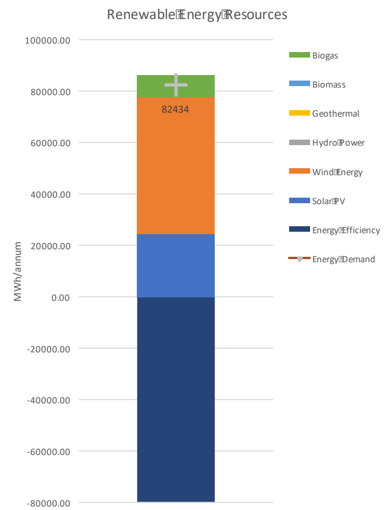


Figure 25: Estimated Renewable-Energy Resources in the Local Area

[13] See: http://maps.seai.ie/giswiki/

Solar Photovoltaic (PV)

Solar Photovoltaic (PV) systems convert sunlight into electricity. In order to evaluate the practical potential for PV, we have estimated the total roof and ground area that might be suitable for PV installations. We do not include solar farms in our analyses as there is substantial roof space available; however, these might be viable on marginal land not suited to food production, for example.

Our analysis has included:

- Roofs of a number of well-oriented commercial and community buildings, assuming 50% of the total roof area might be suitable.
- Roofs in the residential sector where we have derived roof areas from the BER dataset and assumed that 50% of the total roof space might be suitable and where owners/householders are willing to host a solar array.
- Roofs in the agricultural sector where we have measured a sample of farmyards using satellite imagery and scaled up accordingly, assuming a suitability and take-up rate of 50%.

Table 1 presents the results of our analysis of the potential for solar PV on these roof spaces, taking into account the likely proportion of roofs that are well oriented and the likely efficiency of the panels.

This analysis indicates a potential to generate circa 17,000MWh of solar electricity annually, with a total installed solar PV capacity of 18MW at an estimated cost of €15 million.

It is not currently straightforward for a building owner to generate income from the sale of exported PV energy; however, licensed energy suppliers have begun to develop power-purchase agreement arrangements. These suppliers sell electricity to a business or large community facility at a reduced cost and, in turn, buy solar power generated by these buildings.

An example of such a licensed energy supplier is Community Renewable Energy Supply (communitypower.ie) which is linked to the Templederry Community Windfarm. They are looking to develop further projects, with communities taking advantage of guaranteed income through the RESS scheme, discussed in more detail later.

PV on Residential, Commercial and Agricultural buildings are all present in the Register of Opportunities.

	Unit Roof Area (m2)	Total Available Area (m2)	Overshading & Suboptimal Orientation Factor	Penetration Rate	Potential Solar Output (MWh/annum)	Estimated Capital Cost
Public & Community Buildings		22,400	95%	50%	1543	€ 700,000
Commercial Buildings		95,750	95%	50%	6595	€ 2,992,188
Residential Roofs	50	220,250	95%	25%	6186	€ 9,635,938
Farm Buildings	150	54,501	95%	50%	3061	€ 1,703,142
Total		392,901			17384	€ 15,031,267

Table 1: Potential Solar PV Output for the Local Area[14]

[14] Please note that this practicable potential is based on the size of hosting areas identified, on buildings or on land, and the conversion efficiency of commercial PV technology. However, it doesn't take into account other factors such as grid connection constraints.

Wind Generation

Given the scenic, costal nature of the study area, Cork Council has determined that wind farm development should be 'normally discouraged' in a large proportion of the local area; however, there are areas to the east and north of Kinsale where wind energy may be considered, as illustrated in Figure . A new county development plan period will begin in 2022, however there is currently no detail around updated zoning for wind energy and substantial changes are unlikely.

We estimate this area is approximately 8,800 hectares. Although the wind resource as provided by the SEAI's Wind Atlas is significant, the relatively high population density may present a challenge in identifying suitable sites.

Should suitable sites be identified, wind could make a very significant contribution to local energy demands. Our modelling assumes 52,000MWh of annual output (equivalent to just eight turbines) would allow the local area to become energy independent alongside the other renewable sources we discuss.

There may be further potential to deploy small-scale wind turbines, although the economics of these systems are generally not as attractive, and siting needs to be carefully considered in order to ensure consistent laminar airflow.

In addition, offshore wind has the potential to make a substantial contribution, particularly with developments around floating platforms; indeed, a feasibility study for a 1GW wind farm south of Kinsale, the Emerald Project, is currently in progress[15].

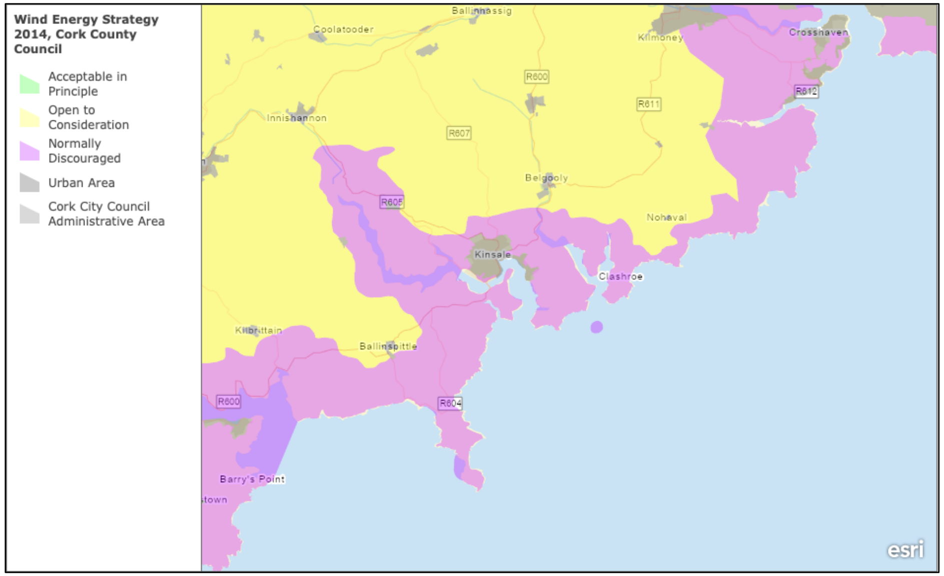


Figure 26: Cork Wind Energy Zoning (CDP 2014)

[15] See: https://simplyblueenergy.com/emerald/

Biogas

The final area of renewable energy considered here is the production of biogas using animal waste, grass and refuse. This is an area of ongoing research and development, with Gas Networks Ireland seeking to develop Gas Entry Hubs[16] allowing anaerobic digesters to export to the gas grid. Given the proximity of the gas grid to Kinsale due to the Old Head gas field, the local area may prove suitable as a site for a hub.

Slurry output from farm animals has been estimated by using data available in the agricultural census for the total number of animals and estimates from the EPA[17] for daily slurry production per head. Assuming 50% of the total output for the area can be captured for anaerobic digestion (AD) we estimate the potential for 7,600MWh/annum of energy to be produced. Methane produced from AD can be combusted to produce heat and/or electricity.

Finally, wet household and commercial wastes can be used for the production of biogas through AD. The total volume of waste produced in the area has been estimated using EPA statistics as described previously. Assuming 50% of this is captured for AD, there is the potential to produce 1,100MWh/annum of energy.

The total potential for biogas is therefore estimated at 8,700MWh/annum.

Transition Town Kinsale previously conducted a feasibility study into the construction of an anaerobic digester which concluded that the project would be feasible[18].

Figure 27: Anaerobic Digester in Timoleague (Source: www.southernstar.ie)

[16] See: https://www.teagasc.ie/media/website/publications/2017/AgriForValor-GNI-03-10-2017.pdf http://www.german-irish.ie/fileadmin/ahk_irland/New_Website_2011/Events/Marketing_2017/08_Gas_Networks_Ireland_James_Browne.pdf

[17] See: http://erc.epa.ie/safer/iso19115/displayISO19115.jsp?isoID=38

[18] See: http://www.transitiontownkinsale.org/our-projects/anaerobic-digester/

Next Steps for Developing Renewable Energy

The role of communities in renewable-energy development has been the subject of a lot of attention in recent years, particularly in the context of opposition to developer-led wind farms by local communities, but more recently in the evolving policy for this element of our energy transition. The idea of citizen and local ownership and participation in renewable-energy generation, distribution and energy efficiency is taking root at grass-roots level as well as at governmental level.

While community energy is struggling to become a reality in Ireland, it is a growing movement in Europe[19] and a number of Irish communities are pioneering initiatives in this area, such as the Cloughjordan[20] biomass-fuelled district-heating system, the Templederry Community Wind Farm[21] and Polecat Springs Group Water Scheme's Solar PV Plant[22].

Government has recognised the value of these pioneering projects and the policy framework is starting to respond to the role of community participation in renewable-energy development. The Climate Action Plan,[23] for example, stated an intention to *'Open up opportunity for community participation in renewable generation'.*

The Department of Communications, Climate Action and Environment (DCCAE) has developed a new Renewable Electricity Support Scheme (RESS) that aims to deliver increased community and citizen participation in renewable-electricity projects[24]. The scheme aims to remove some of the barriers to investment in small-scale projects by providing guaranteed export rates. While the Climate Action Plan highlights the need to provide an export tariff for a domestic-scale generation plant, there are detailed plans for this beyond a pilot scheme being operated by Electric Ireland[25].

Actions for the SEC

The principle opportunities for renewable generation in the local area are solar PV, wind and biogas (deemed feasible in a previous study). Given the nature of the area it may be sensible to focus on the development of solar PV generation in the first instance.

The first step is to identify a suitable site. For example, the Kinsale Community School has approximately 1,200m^2 of flat roof and the Sáile Centre has approximately 400m^2 of south-facing roof space. Many sites will be technically suitable, so to some extent the opportunities will depend on the connections and contacts available to the SEC. Having identified a potential site (or sites), PV installation companies will be able to provide cost estimates.

Grant aid may be available at up to 30% from the SEAI BEC Scheme and organisations such as Community Power will be able to advise on the potential to generate returns through the RESS.

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[19] See: http://www.communitypower.eu/en/
[20] See: http://www.thevillage.ie/
[21] See: https://tippenergy.ie/projects/templederry-community-wind-farm/
[22] See: https://www.veolia.ie/media/news-and-press-releases/group-water-scheme-launches-new-solar-energy-project
[23] See: https://www.dccae.gov.ie/en-ie/climate-action/publications/Documents/16/Climate_Action_Plan_2019.pdf
[24] See: https://www.dccae.gov.ie/en-ie/energy/topics/Renewable-Energy/electricity/renewable-electricity-supports/ress/Pages/default.aspx
[25] See: https://www.electricireland.ie/residential/help/efficiency/electric-ireland-micro-generation-pilot-scheme

Financial Supports and Incentives

In tandem, a number of incentives for medium- to large-scale renewable-energy projects are becoming available in Ireland.

a) The SEAI recently announced a grant for residential solar PV and battery-storage systems. Solar PV are being supported at a rate of €700 per kWp up to 4kWp with €1,000 available for battery systems. More information is available here: https://www.seai.ie/grants/home-energy-grants/solar-electricity-grant/
b) The Renewable Energy Support Scheme provides a guaranteed price for renewable generation, making projects more investor friendly. See: https://www.dccae.gov.ie/en-ie/energy/topics/Renewable-Energy/electricity/renewable-electricity-supports/ress/Pages/default.aspx
c) For renewable heat: the Renewable Heat Incentive (RHI) is the primary support mechanism in the heating sector designed to meet Ireland's renewable-energy obligations. The RHI supports the adoption of renewable-heating systems by commercial, industrial, agricultural, district heating, public sector and other non-domestic heat users not covered by the emissions trading system. It will have two components:
    1. An ongoing operational support (paid for a period up to 15 years) based on useable heat output in renewable-heating systems, in new installations or installations that currently use a fossil-fuel heating system and convert to using biomass heating systems or anaerobic-digestion heating systems.
    2. A grant (of up to 30%) to support investment in renewable-heating systems that use air/ground/water source heat pumps.

    For more information: https://www.dccae.gov.ie/en-ie/energy/topics/Renewable-Energy/heat/Pages/Heat.aspx
d) For renewable gas: there is ongoing work at policy level to support the development of biogas for injection into the natural gas network in Ireland, as a pathway to decarbonising urban centres. The role of biogas as a transport fuel in compressed natural-gas engines is a key element of this policy development. For more information: http://www.irbea.org/biogas-and-anaerobic-digestion/

Energy Infrastructure

The use of energy is supported and influenced by the presence of specific energy infrastructure in the local area. In terms of electricity supply, Figure 27 presents the major electricity transmission lines in the local area which run to the north of Kinsale.

The local area has relatively easy access to the gas network, as illustrated by Figure 28. Gas Networks Ireland have recently signalled their intention to facilitate the development of a biogas infrastructure[26].

Figure 28: Local Electricity Transmission Grid. Source: Eirgrid

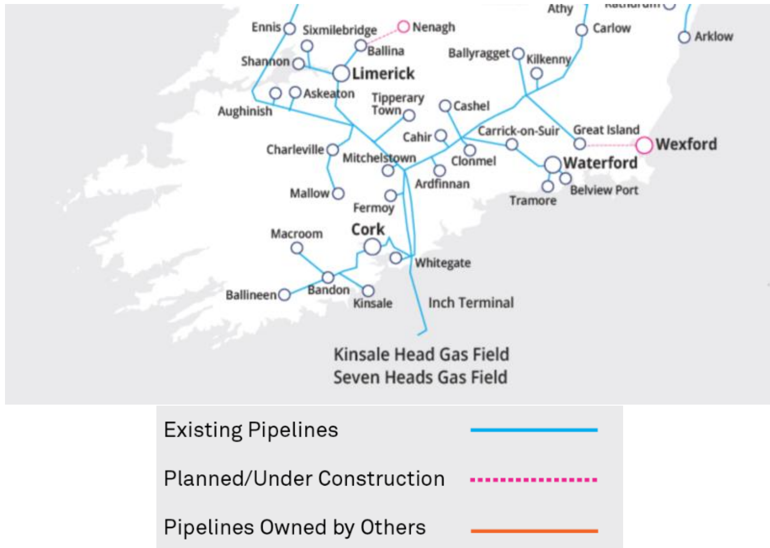


Figure 29: Regional Gas Grid (Source: ireland2050.ie)

[26] See: www.gasnetworks.ie/corporate/company/our-commitment/environment/renewable-gas/

The Energy Master Plan

Previous sections have examined current energy demand, potential for energy efficiency and potential to provide for remaining energy demand locally. Kinsale has significant potential to generate energy locally via solar and wind. However, in order to cost-effectively achieve energy independence, energy efficiency will be crucial. We have identified potential to cut local energy demand by almost 50%, with a deep retrofit of the housing stock and the electrification of transport. This potential reduces to 30% with a medium housing retrofit. The development of a sustainable tourism brand for the town has also been identified as a potential driver of efficiency in the commercial sector and also a route to wider awareness of issues around sustainability among the local community.

If deep cuts to energy consumption are achieved, the study area has the potential to achieve energy independence through the capture of solar and wind energy alongside biogas.

aims to illustrate how this might be achieved through energy efficiency and local renewable generation.

The next section presents an action plan as a framework for the Energy Master Plan implementation. Following this the Register of Opportunities, a list of the top 10 energy-demand-reduction and renewable-energy-production opportunities identified in previous chapters is presented.

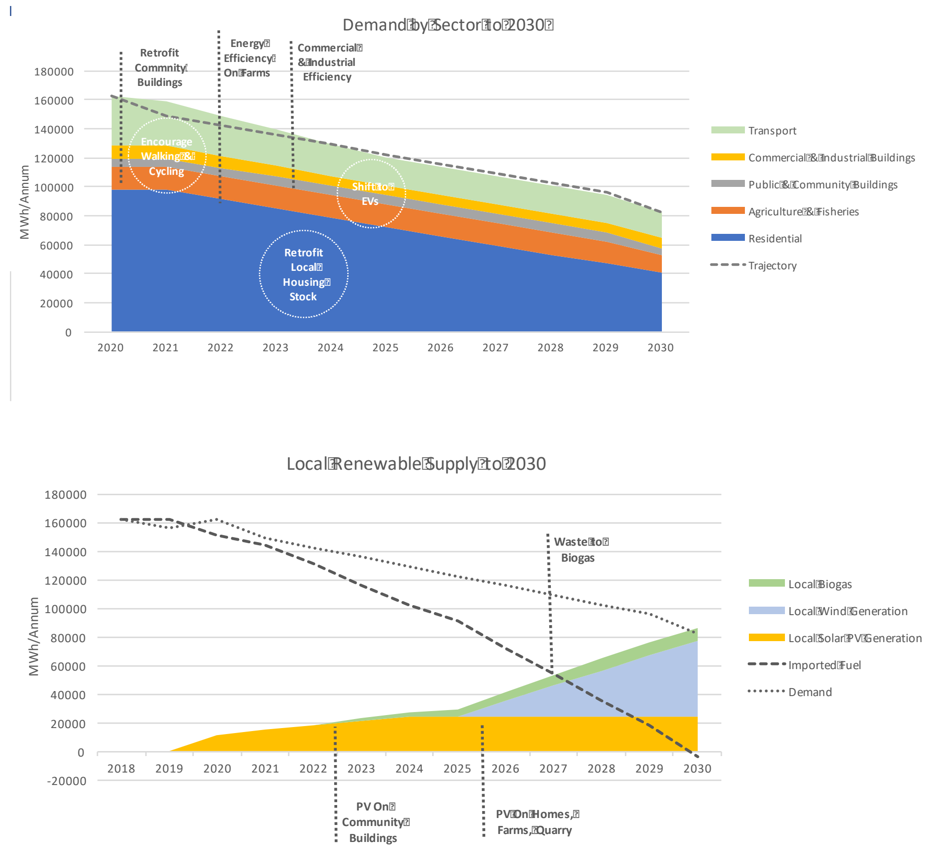


Figure 30: Illustrative Trajectories for Energy Efficiency and Renewables

Action Plan

The following pages aim to provide a template for the SEC to take forward five workstreams. Four of these are focused on energy efficiency according to the areas of highest potential as identified by the EMP:

- **retrofit in the domestic sector**;
- **transport**;
- **commercial and tourism sectors**;
- **agricultural sector**.
- The fifth workstream focuses on developing **renewable energy** in the local area.

Each workstream has a number of suggested action items or projects for the SEC to engage in that are a mix of community engagement and momentum building, as well as the delivery of practical energy-efficiency and renewable projects. These action items are centred around the principle energy-efficiency and renewable-generation opportunities that have been identified through the EMP process, as well as some of the ideas and priorities that have been highlighted by the SEC.

Suggested timeframes are offered, however the team recognise that the timeframe of a programme, if dependent on a volunteer or a volunteer working group, is more difficult to determine and the SEC would emphasise that for effective roll-out of the energy transition in their area, resources are required to drive the delivery of the action plan outlined. Also critical is the engagement of the outlined 'essential stakeholders' under the different workstreams.

WORKSTREAM 1 – RESIDENTIAL RETROFIT

	Ongoing	Short term	Long term
	Retrofit forum	**Deep retrofit in ten homes, one community building and five businesses**	**Community Retrofit Scheme**
Aim	Facilitate knowledge sharing through expert forum and peer-to-peer learning	Secure funding for residential retrofit, one community building and five businesses through a BEC application	Establish housing retrofit as a 'business as usual' activity including community and commercial buildings
Building on	Community awareness initiatives carried out by Transition Town Kinsale, the Parish Assembly (Warmer Home Scheme), through the Green School Programme and others	EMP launch Knowledge sharing via energy forum and residents who have carried out this work in the area	Volunteer programmes and lobbying activities
Progress through EMP process	Exemplar houses audited throughout area with participants agreeable to share learnings	Initial identification of those interested in carrying out a deep retrofit Energy audit of Old HSE Dispensary building Energy audits of two local businesses (B&B and café)	Understanding the scale of the challenge Understanding of the house types and ages which will benefit most
Proposed actions	EMP launch to include energy forum with retrofit experts and installers and suppliers Run quarterly events thereafter with guest speakers and discussion Promotion of one simple retrofit activity for all householders in the area	Gain commitment from at least ten homeowners to participate Liaise with Renovation Committee for Old HSE Dispensary Contact a project co-ordinator (see SEAI List) and complete application Ensure learning is publicised via the Retrofit Forum	Identify a salaried resource to run a rolling annual retrofit scheme Scale this scheme to achieve 200 retrofits annually by 2030

	Ongoing	**Short term**	**Long term**
	Retrofit forum	**Deep retrofit in ten homes, one community building and five businesses**	**Community Retrofit Scheme**
Resources required	EMP launch funded via EMP grant funding Resources required for room hire, advertising, speaker expenses (at least) for energy forum Promotional material and advertising costs required for 'simple retrofit' promotion	Person required to liaise with homeowners to establish their commitment to the deep retrofit programme Person required to liaise with assigned project manager on behalf of this residential group	
Transition Town Kinsale and KCEP **Volunteer commitment October 2020**	Organise EMP launch and first energy forum Establish if person or working group is willing to drive regular energy-forum-type events Establish if person or working group is willing to drive simple retrofit programme	Reconnect with our energy forum mailing list to establish interest and potential participants in a BEC application Liaise with Renovation Committee for Old HSE Dispensary (Men's Shed, Kinsale Youth Café and Kinsale Youth Support Services) Facilitate the establishment of a working group for this initiative	To lobby for same
Essential stakeholders	Transition Town Kinsale and Kinsale Community Energy Project	Working group Project co-ordinator: (www.seai.ie/grants/communitygrants/ project-coordinator/)	Cork County Council – possibly through network created via Climate Action Regional Offices SEAI or other State body

	Ongoing	Short term	Long term
	Retrofit forum	**Deep retrofit in ten homes, one community building and five businesses**	**Community Retrofit Scheme**
Potential collaborators	Retrofit experts; Local suppliers and installers, local organisations, clubs, societies and church groups to disseminate information	Cork County Council – liaise with council on retrofit programmes they are carrying out in the area	Transition Town Kinsale (KCEP) Kinsale Chamber of Tourism and Business Local organisations, clubs, societies and church groups Future Kinsale My Town My Plan Group (SECAD 2020)
Timeframe	To commence on completion of EMP	To commence on completion of EMP	Lobbying by Transition Town Kinsale has commenced

WORKSTREAM 2 – TRANSPORT

	Short term	Long term
	Facilitate walking and cycling	**Develop a local vision for public transport**
Aim	Facilitate and promote walking to school	To understand the needs of the people of the area with regards to increasing the use of public transport and decreasing reliance on the private car
Building on	Kinsale Transportation Study Work done by Kinsale Age Friendly Town regarding mobility and access in Kinsale Town Centre Lobbying by many groups for improved pedestrian experience in Kinsale Town Centre and upgrading of pathway network in all villages Findings of Future Kinsale Survey – where development of walking and cycling trails, an edge-of-town coach park with shuttle service to the town centre and pedestrianisation of parts of the town centre were all prioritised by respondents	Services in place via Bus Eireann and Local Link Efforts to create car-share schemes locally Learning from other rural areas in Ireland and beyond
Progress through EMP process	The desk research has shown that the potential impact of switching to walking and cycling would be modest in terms of overall energy demand, however it is free to implement and delivers many ancillary benefits	Build on the EMP survey to develop an in-depth understanding of public transport needs locally
Proposed actions	Develop a map/list of the shortcomings in footpath provision to local schools and proposals to improve same Establish a local school forum to develop a programme to develop a strategy to promote walking buses etc.	Develop a set of clear recommendations to pilot through community participation and a needs analysis and consideration of rural transport solutions in other rural communities
Resources required	Working group to lobby Cork County Council to carry out this study and to liaise with local schools	Funding required for a needs analysis study through effective community participation Access to research on rural transport successes

	Short term	**Long term**
	Facilitate walking and cycling	**Develop a local vision for public transport**
Transition Town Kinsale and KCEP **Volunteer commitment October 2020**	Establish if person or working group is willing to drive regular energy-forum-type events	Lobby for the roll-out of this programme
Essential stakeholders	Cork County Council Local schools – Boards of Management, school principals and Parents Associations	Cork County Council – possible pilot study as part of their transport portfolio
Potential collaborators	Transition Town Kinsale HSE – Active Health Programme My Town My Plan Group (SECAD 2020)	Bus Eireann and Local Link Kinsale College and Kinsale Community School Kinsale Age Friendly Town Transition Town Kinsale Local organisations, clubs, societies and church groups to disseminate information
Timeframe	To commence on completion of EMP	Lobbying by Transition Town Kinsale, Age Friendly Town and other groups in progress

WORKSTREAM 3 – SUSTAINABLE BUSINESS AND TOURISM

	Ongoing	Short term	Long term
	Deliver efficiency measures in five businesses	**Scope Kinsale's sustainable tourism brand**	**Blueway-greenway development**
Aim	Secure commitment of five businesses to participate in the SEC's first BEC application	Become an applicant for the European Destinations of Excellence (EDEN) competition	Reduce the reliance of car transport for local sight-seeing. Develop a 'sustainable tourism' measure alongside a potential project being considered locally to develop a blueway-greenway to connect Kinsale and hinterland
Building on	Energy-efficiency measures businesses in the area have already undertaken, for example: Energy-efficiency upgrades in local hotels Solar panels on Friar's Lodge 5MW solar array development by Eli Lilly	Chamber of Tourism and Failte Ireland's promotion of Kinsale The Good Food Circle Local food suppliers and farmers' market International reputation as a Transition Town – 50 Mile Meal Award, Edible Landscaping initiative, Biodiversity Action Plan, EMP and energy efficiency of tourism businesses Tidy Towns initiatives Kinsale College – international students and the amphitheatres as a green, cultural space Walking and cycling potential – connecting the green spaces in the Kinsale area	Mapping of potential walkways and cycleways by groups in the area, including Transition Town Kinsale, Courceys Integrated Rural Development Association, Belgooly Estuary Walkway and Tracton Arts and Community Centre

	Ongoing	Short term	Long term
	Deliver efficiency measures in five businesses	**Scope Kinsale's sustainable tourism brand**	**Blueway-greenway development**
Progress through EMP process	Energy audits were carried out on two local businesses – a B&B and a café	Identified as an important opportunity to tie together a series of individual initiatives and gain momentum with the local population	
Proposed actions	Promote the BEC project opportunity via the Chamber of Tourism and Business and other networks Maintain a register of interest and make appropriate introductions to the BEC project co-ordinator	Document and promote vision for a sustainable tourism experience Develop a plan for the delivery of this vision	Carry out an initial feasibility study for the development of a local blueway-greenway In the interim, local businesses could develop maps and promotional material similar to the Kinsale Map created by *Kinsale Advertiser* to outline walkways and good cycle routes in the area
Resources required	Representative from the business community to join the working group to develop BEC application	Secure Failte Ireland funding for salaried staff to progress the project	
Transition Town Kinsale and KCEP **Volunteer commitment October 2020**	Facilitate the establishment of a working group for this initiative	Liaise with the Chamber of Tourism and Business and other stakeholders to progress	Work with My Town My Plan Group to obtain funding to carry out an initial feasibility study
Essential stakeholders	Working group Project co-ordinator: (www.seai.ie/grants/communitygrants/project-coordinator/)	Failte Ireland Chamber of Tourism and Business Businesses in area providing accommodation, activities, etc Transition Town Kinsale	Cork County Council

	Ongoing	Short term	Long term
	Deliver efficiency measures in five businesses	**Scope Kinsale's sustainable tourism brand**	**Blueway-greenway development**
Potential collaborators	Transition Town Kinsale – KCEP Kinsale Chamber of Tourism and Business	Future Kinsale My Town My Plan Group (SECAD 2020)	My Town My Plan Group (SECAD 2020) Kinsale Chamber of Tourism and Business Kinsale Outdoor Education Centre Future Kinsale Local bike hire and watersports businesses (Wild Atlantic Sports etc) Local development groups across the area New businesses which develop from this
Timeframe	To commence on completion of EMP	Scoping complete 2021	Funding application for feasibility study 2021

WORKSTREAM 4 – AGRICULTURE

	Short term	**Long term**
	Energy efficiency in farming	**Development of agro-forestry project**
Aim	Facilitate adoption of energy-efficiency measures through local knowledge sharing	Develop a local agro-forestry model project
Building on	Energy-efficiency measures already adopted by local famers	Work carried out at Kinsale College through the permaculture course
Progress through EMP process	Energy audit of local dairy farm	
Proposed actions	Local farmer to be part of public launch of EMP and energy forum Disseminate this audit through local IFA representative Raise awareness beyond local area through Co-operative (Carbery)	Identify potential land to develop Source funding to develop Work with local IFA representative to share learnings
Resources required	Person or working group to drive programme	Person or working group to drive programme
Transition Town Kinsale and KCEP **Volunteer commitment October 2020**	To initiate this program	Donal Chambers is driving this project through Kinsale College

	Short term	**Long term**
	Energy efficiency in farming	**Development of agro-forestry project**
Essential stakeholders	Local Farmers IFA Macra na Feirme Local co-operatives	
Potential collaborators		Kinsale College IFA Macra na Feirme Local landowner Transition Town Kinsale
Timeframe	To commence on completion of EMP	Ongoing

**** Note renewable energy on farms will also be addressed through Workstream 5.**

WORKSTREAM 5 – DEVELOPING LOCAL RENEWABLES

	Short term	Medium term	Long term
	Rooftop solar array	**Facilitate a group purchase scheme for solar PV**	**Revisit the Anaerobic Digester Scheme**
Aim	Secure the participation of one site in investing in solar PV – potentially as part of a BEC application	Facilitate the growth of domestic solar PV generation in Kinsale	To reconsider the potential of developing an anaerobic digester in the area, based on the feasibility study completed in 2011
Building on		The idea to create Kinsale 'solar town'	Transition Town Kinsale – Feasibility Study for Local Anaerobic Digester
Progress through EMP process		Potential participation by interested homeowners	Energy audit of local dairy farm
Proposed actions	Identify suitable participants (For example: Sáile's 400m^2 roof space and KCS's 1,200m^2 roof space) Establish interest Liaise with solar PV provider to price the installation Secure the commitment of one site to participate in the BEC project	Create an initial register of interested homeowners Liaise with a solar PV provider and secure funding for further marketing Develop promotional materials Provide list of interested homeowners to PV provider PV provider to secure participation	Identify a suitable site for the digester and principle project sponsor Explore models for community ownership or investment. Liaise with Community Power and other experts in this sector Establish a development company to deliver the project
Resources required	Person or working group to drive programme	Person or working group to drive programme	Project sponsor or champion on the ground

	Short term	**Medium term**	**Long term**
	Rooftop solar array	**Facilitate a group purchase scheme for solar PV**	**Revisit the Anaerobic Digester Scheme**
Transition Town Kinsale and KCEP **Volunteer commitment October 2020**	Transition Town Kinsale will liaise with Sáile and Kinsale Community School to establish interest	Person has committed to establish this programme	Transition Town Kinsale will liaise with IFA, Carbery Co-operative and local famers to consider project sponsor role
Essential stakeholders	BEC Working Group Representative from participating organisation Project co-ordinator: (www.seai.ie/grants/communitygrants/project-coordinator/)	Transition Town Kinsale – Kinsale Community Energy Project PV provider	Local farmers Local Co-operative
Potential collaborators	Sáile Kinsale Community School Kinsale College (see Friends of the Earth school programme for installation of solar panels)	Retrofit experts Local suppliers and installers Residents Associations Local organisations, clubs, societies and church groups to disseminate information	IFA Transition Town Kinsale and Kinsale Community Energy Project Community.power.ie Future Kinsale
Timeframe	To commence on completion of EMP	December 2021	To commence on completion of EMP

Register of Opportunities

The Register of Opportunities below provides an estimate of the impact of some of the activities and projects listed in the previous pages where these are quantifiable. Estimated costs and annual savings or the value of annual energy generation are presented, as well as the percentage impact compared to baseline energy demand.

These actions represent a total investment of €17 million in the local community and would generate annual savings of almost €2.7 million.

Opportunity	Estimated Annual Savings				
	Fuel Type	[kWh]	[€]	[kgCO2]	Capital Cost
Deep Retrofit in 10 Houses (2x of the 5 typologies)	Other	205,898	€25,320	54,357.1	€410,762
Residential Solar PV (Group Purchase Scheme with 10 Participants)	Electricity	56,000	€10,080	29,064.0	€30,000
Energy Efficiency in 5 Commercial Buildings (Cosy Café, B&B + 3 others)	Other	76,417	€13,827	20,174.1	€124,320
Energy Efficiency in Old HSE Dispensary	Electricity	75,062	€13,511	75,062.0	€67,596
Solar PV Saile Centre	Electricity	21,000	€3,780	10,899.0	€11,000
Increase rates of Walking and Cycling	Transport Fuels	174,399	€235,439	46,041.3	€0
Deep Retrofit in 200 Homes	Other	2,097,391	€137,642	553,711.2	€5,911,095
Agricultural Energy Efficiency	Electricity	2,845,728	€512,231	1,476,932.8	€3,104,520
Anerobic Digester / Biogas Scheme	Natural Gas	8,776,000	€605,544	2,150,120.0	€2,932,027
Residential Solar PV (Group Purchase Scheme with 400 Participants)	Electricity	1,123,000	€202,140	582,837.0	€625,000
Solar PV Farm Buildings (Group Purchase Scheme with 300 Farms)	Electricity	3,061,000	€550,980	1,588,659.0	€1,703,142

Table 2: Register of Opportunities

Please note that budget costs for the projects above are indicative only; investment decisions should be made based on appropriate design and specifications of relevant measures, and quotations should be sought from qualified solution providers.

Delivery Plan

The Kinsale Community Energy Project was established in 2018 with the goal of delivering

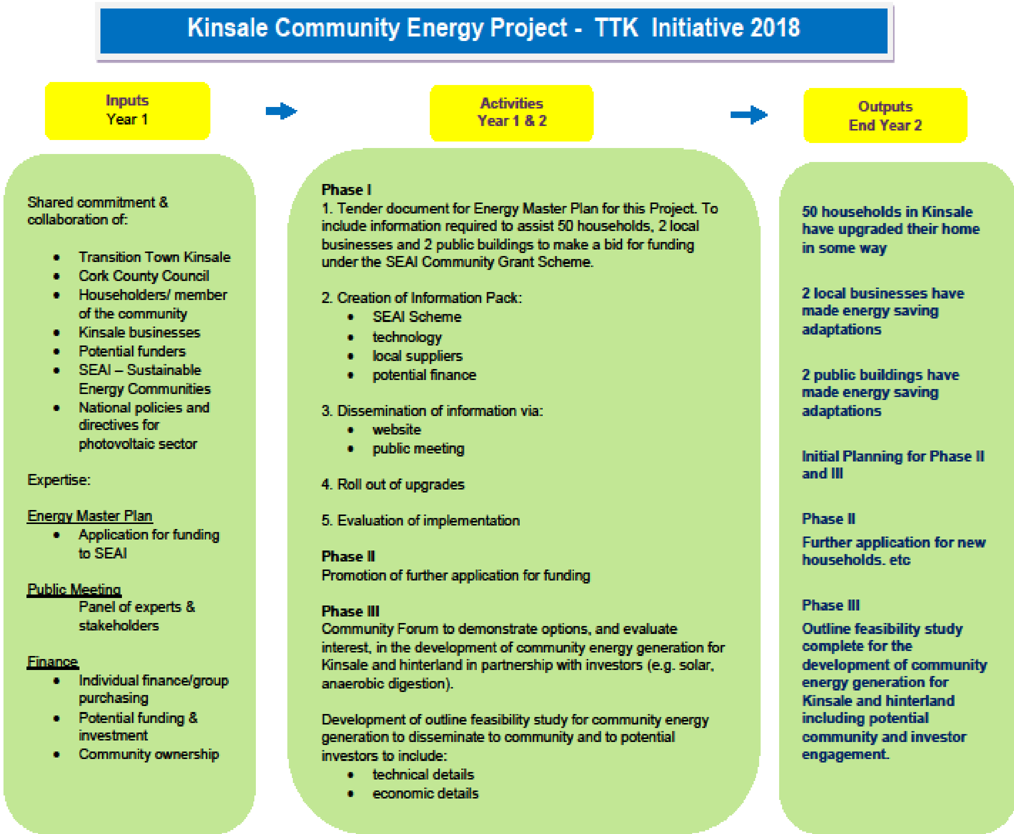
1) an Energy Master Plan for Kinsale and

2) an initial BEC-funded project

These initial efforts are being driven by a small number of volunteers; however, to achieve the level of ambition set out in this document and achieve our national carbon targets, more robust supports and structures are required alongside community enthusiasm and activism.

A majority of the action plan items include some element of handover to other organisations that have the capacity and funds to resource ongoing activity. These are principally:

- The County Council who have a responsibility to deliver infrastructure and services to Kinsale
- The local Chamber of Business and Tourism who will benefit from branding around sustainable tourism and business energy efficiency
- Local development groups such as Tracton Community Council, Courceys Integrated Rural Development Group and Future Kinsale
- Home retrofit and renewables providers who have an interest in project development



The remainder of this section outlines the key steps for Kinsale SEC to progress the five workstreams described on the previous pages.

1) **Launch and disseminate the EMP** among the community and relevant institutions such as the Local Authority, SEAI, etc, to raise awareness and understanding of its purpose and the opportunities it presents. Dissemination activities should be tailored to the needs of specific target groups, in terms of format and content and emphasise how the broader community will benefit; as well how it will be a signal of Kinsale’s commitment to playing its part in the energy transition required to combat climate change.
2) **Conduct community engagement** and outreach activities as an extension of dissemination activities, with the purpose of generating commitment to the EMP’s vision and goals and encourage community members to act for its implementation. As part of this process the SEC should liaise with the key stakeholders identified and develop collaborations to progress the workstreams.
3) **Create working groups as outlined within the workstreams** and develop the processes required to facilitate the development and implementation of BEC-type projects by developing relationships with those who will benefit financially from these initiatives. These partners should be in a position to provide project management, financial management, health and safety, grant administration, design and specification of measures, procurement, site supervision, commissioning and handover. Meanwhile the SEC should continue to engage with the community and facilitate the development of a project pipeline.
4) **Avail of further funding** where available to support the specific areas being progressed in each of the workstreams.
5) **Continue availing of ‘soft support mechanisms’ from SEAI’s SEC programme**, in particular at project-development stage. Having identified key gaps in the SEC’s competencies, request technical assistance from SEAI’s panel of experts. SEAI’s mentors can also help with coaching on organisational aspects, as well as community engagement activities.
6) **Evaluate progress on each of the five workstreams regularly** with quarterly updates from working groups to enable an overall SEC progress report to be written and disseminated within the community.

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Appendix 1: Detailed Methodology

Study Boundary

In determining the study boundary, we have aimed to take a pragmatic approach that maximises the relevance of our outputs to the local community. In practice, this means only areas of energy use that can be directly influenced by community action have been included.

This means that energy use for personal transport, such as our choice to walk or take the car, has been included but energy consumption for the transport of groceries to the supermarket is not.

Residential Demand Modelling

In order to conduct more detailed analysis of the housing stock and understand energy use, we have collated Domestic Building Energy Rating (DBER) data for Waterford. This data has been gathered in order to complement BER assessments and describes energy usage in the home for space heating, domestic hot water, lighting, pumps and fans.

In order to better reflect dwellings in the local area, the results of our analysis for Cork have been scaled according to the CSO data on the age of the local housing stock and the main heating fuel.

Electricity use for appliances, which is not covered by the BER data, has been estimated by adjusting country-level data, provided by the SEAI Energy Policy Statistical Support Unit (EPSSU) to take into account slightly larger household sizes in the local area.

Transport Modelling

Our transport consumption model draws on the transport mode and commute-length data available for the local area in Census 2016.

Our modelling converts commute length from time to kilometres by assuming an average speed of 60km per hour which allows the 'total distance commuted' for the community to be established.

Based on the CSO data, we assume 70% of all journeys are made by car. The result is doubled to account for non-commuting car use. The final estimate indicates that car use (16,400km/car/annum) is slightly lower than the national average (18,000km/car/annum) as presented by the CSO's Transport Omnibus (2016).

Estimates for kilometres travelled by public service vehicles (taxis and buses) in the area have been calculated by scaling Transport Omnibus data for Waterford county on a per-capita basis.

Appendix 2: Detailed Model Outputs

	ENERGY DEMAND (MWh/annum)									ENERGY SPEND (€/annum)					CARBON EMISSIONS (t/annun	
	Total		Electricity	Natural Gas/Biogas/ LPG	Heating Oil	Petrol	Diesel	Biofuel	Solid Fuel/Biomas s	Total	per Unit	Electricity	Heat	Transport Fuels		
Residential	98156	*60.5%*	28915	5632	50172				13436	€ 9,847,973	€ 2,236	€ 5,536,377	€ 4,311,597	€ -	36816	70%
Agriculture & Fisheries	15365	*9.5%*	5571	0	0		9423	371		€ 1,746,410	€ 4,807	€ 1,109,803	€ -	€ 423,541	2527	5%
Public & Community Buildings	6155	*3.8%*	1210	0	4945				0	€ 523,470		€ 241,106	€ 282,364		1840	3%
Commercial & Industrial Buildings	9006	*5.5%*	4489	2123	2393					€ 1,370,956		€ 894,232	€ 476,724		3278	6%
Transport	33654	*20.7%*	0	0	0	11587	20156	1911	0	€ 4,477,356	€ 344.49			€ 4,477,356	8355	16%
TOTAL	**162336**		40186	7756	57511	11587	29578	2283	13436	**€ 17,966,165**	**€ 4,078.58**	**€ 7,781,517**	**€ 5,070,685**	**€ 4,900,897**	**52816**	**4.06**

	ENERGY EFFICIENCY POTENTIAL (MWh/annum)										VALUE OF SAVINGS (€/annum)					CARBON EMISSIONS (t/annur	
	Total	% Change	Electricity	Natural Gas/Biogas/ LPG	Heating Oil	Petrol	Diesel	Biofuel	Solid Fuel/Biomas s		Total	per Unit	Electricity	Heat	Transport Fuels		% Saving
Residential Efficiency Projects (Medium Retrofit)	(22,433)	-22.9%	(2,702)	(1,521)	(14,610)				(3,600)		€ 1,723,033	€ 391.15	€ 497,821	€ 1,225,211		8262	22%
OR Heating Demand Shift to Electricity (Deep Retrofit)	*(57,753)*	*-58.8%*	*11,488*	*(5,632)*	*(50,172)*				*(13,436)*		*€ 2,265,762*	*€ 514.36*	*€ (2,045,834)*	*€ 4,311,597*		*20291*	*55%*
Dairy Farm Efficiency	(2,591)	*-16.9%*	(2,591)								€ 516,172		€ 516,172			1060	42%
Public & Community Building Efficiency Projects	(1,972)	*-32.0%*	(307)	-	(1,604)	-	-	(61)	-		€ 152,807		€ 61,244	€ 91,563		562	31%
Commercial & Industrial Efficiency Projects	(1,616)	*-17.9%*	(898)		(718)						€ 219,842		€ 178,846	€ 40,995		800	24%
Encourage Walking & Cycling	(1,744)	*-5.2%*				(737)	(1,007)				€ 235,195				€ 235,195	457	5%
Shift to Electric Vehicles	(14,239)	*-42.3%*	8,118			(9,445)	(12,912)				€ 1,398,063		€ (1,617,053)		€ 3,015,116	2538	30%
	-	*0.0%*				-	-										
TOTAL	(79,915)	(0.49)	15,809	(5,632)	(52,494)	(10,182)	(13,919)	(61)	(13,436)		**€ 4,245,112**	**€ 391**	**€ (362,969)**	**€ 1,357,770**	**€ 3,250,312**	**13678**	**26%**

RENEWABLE ENERGY POTENTIAL (MWh/annum)									
	Total		Electricity	Natural Gas/Biogas/ LPG	Heating Oil	Petrol	Diesel	Biofuel	Biomass
Solar PV	25765		25765						
Wind Energy	52916		52916						
Hydro Power	0		0						
Geothermal	0								
Biomass	0								0
Biogas	8776			8776					
TOTAL	87456	0	78681	8776	0	0	0	0	0

Appendix 3: The Better Energy Community Programme

The Better Energy Community (BEC) programme run by SEAI has been funding communities' sustainable energy projects around the country for over five years. Innovative and pioneering partnerships between sectors are encouraged. This might include collaborations between public and private sectors, residential and non-residential sectors, commercial and not-for-profit organisations, or financing entities and energy suppliers. BEC 2018 had a total budget of €28 million leveraging an estimated €70 million investment. Successful BEC projects must demonstrate some or all of the following characteristics:

- Community benefits
- Multiple elements
- Mix of sustainable solutions
- A clear road map
- Innovation and project ambition
- Justified energy savings
- An ability to deliver the project

In 2018, the following funding levels applied:

- Residential:
    - Private, fuel poor — Up to 80%
    - Private, non-fuel poor — Up to 35%
    - Local Authority — Up to 35%
    - Housing Association — Up to 50%
    - Deep Retrofit (BER A3) + 15%
- Non-residential:
    - Not-for-profit/community — Up to 50%
    - Private and public sector — Up to 30%
    - Public sector (exemplar) — > 30% ≤ 50%

So far, there have been two main approaches for the development and implementation of BEC projects:

a) Firstly, community-based organisations have developed their own technical, financial and organisational capabilities to deliver projects. This approach increases opportunities to generate revenues for the community group and create local employment, notably for project co-ordination. When successful, the required skill sets become embedded in the local community and often lead to repeat BEC projects. However, this approach typically requires significant volunteering commitment from key people in the community, and the need to bankroll the projects can put significant stress on community groups.

b) The second one generally involves a professional service provider who acts as project co-ordinator, working in conjunction with a lead applicant. The lead applicant can be a community group, a business or a public body; and projects often involve wider cross-sectoral partnerships. The benefit of this approach for a community group is that the project co-ordinator typically takes responsibility for the technical delivery of the project, from project development to commissioning stage. The project co-ordinator can also arrange bankrolling of the project for the community element of BEC projects until after SEAI's grant funding has been paid.

There are many benefits for local community stakeholders to join forces in an SEC-led Better Energy Community project, as opposed to applying for funding individually:

a) Generally, the level of funding available through the BEC programme is higher than in programmes targeting individual applicants, such as the Better Energy Homes.
b) Stakeholders such as businesses, community groups and public buildings have limited opportunities for funding other than the BEC programme.
c) In addition to funding capital investment, the BEC programme also supports some of the project development (design and specification) and project management costs.
d) A BEC project is based on a multi-stakeholder partnership which provides joint project co-ordination and can also provide technical assistance, as well as a source of finance for bankrolling the overall project.