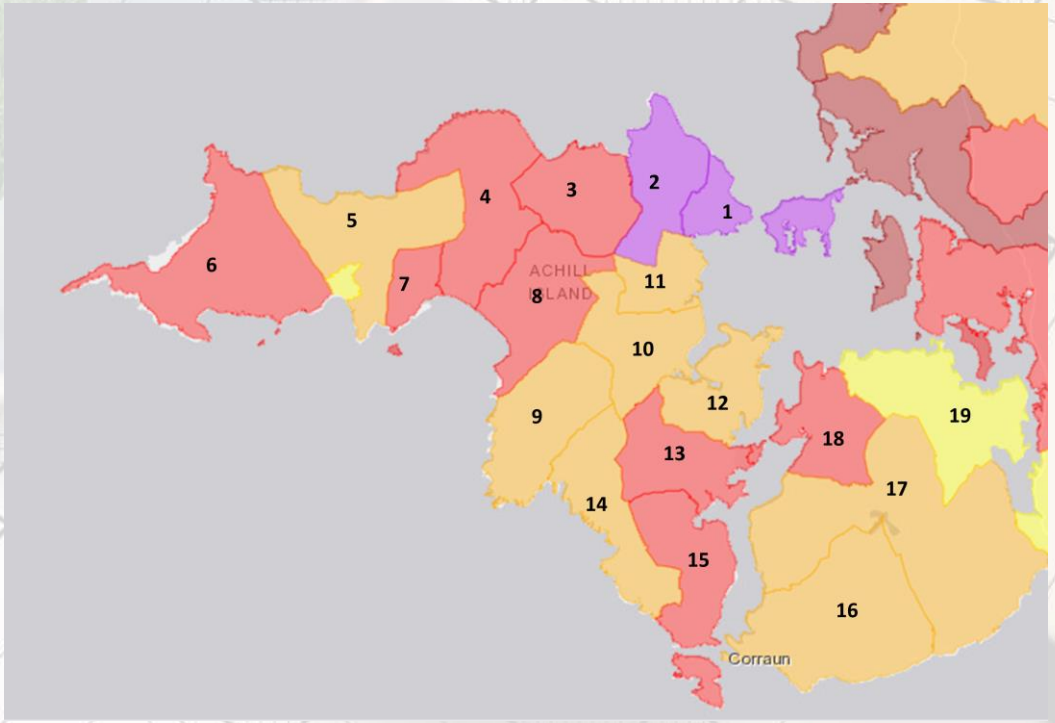
Energy Master Plan for Todhchaí Phobail Acla

Oct 2022

Overall Aims

- Turn the Parish of Achill into a sustainable and thriving community, respecting surrounding natural beauty.
- Area: Achill, Achill Island and Curran.
- Reducing energy consumption
- Producing local energy from wind and/or Biomass,
- Address the waste issue in the community.
- The produced energy can be turned into hydrogen, or fed into the grid whatever is most viable.
- Develop an energy efficiency blueprint for existing buildings in the West of Ireland, how to best insulate and become energy independent.
- Plan to be applicable to other communities in the West of Ireland and beyond.

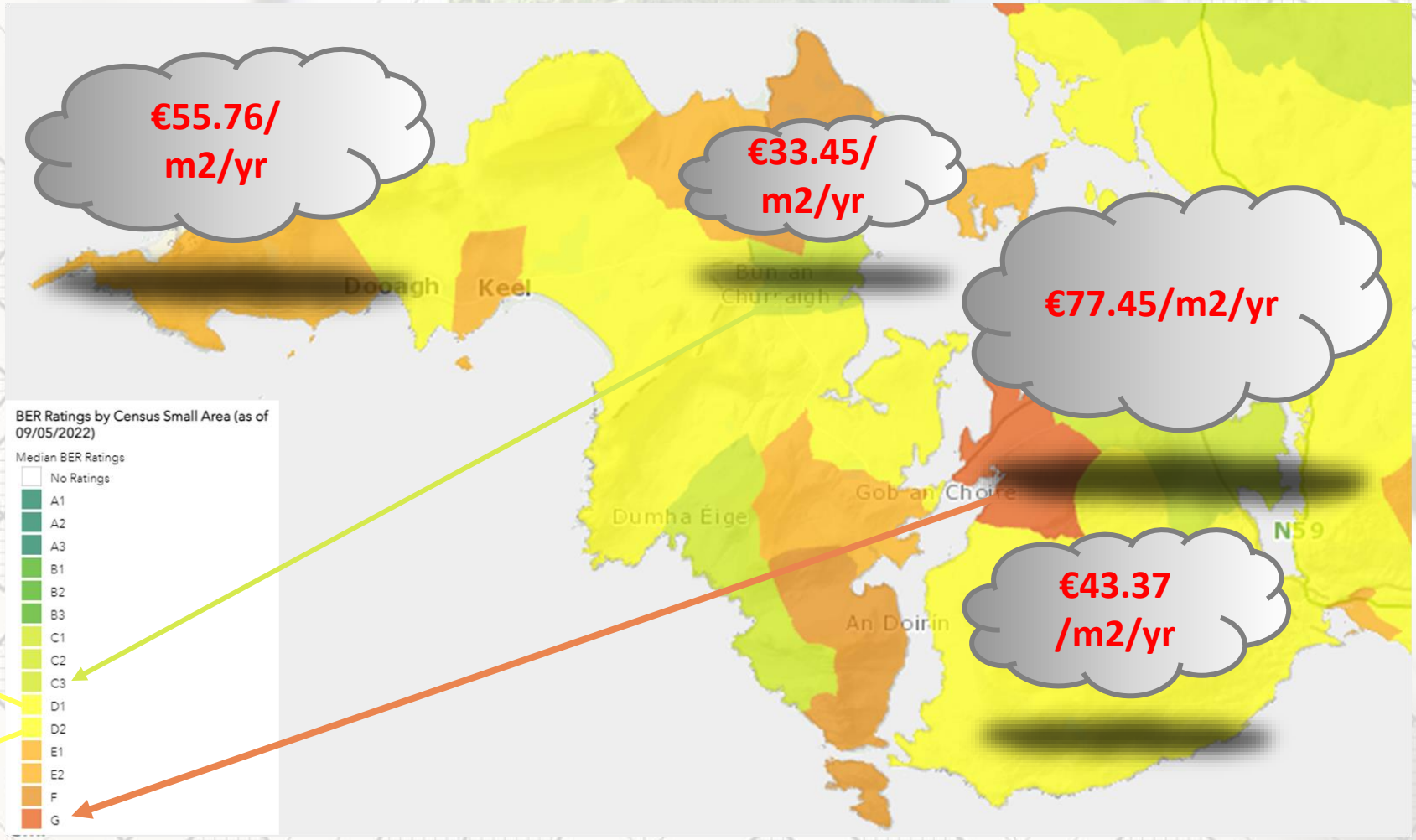
Overall Aims



EMP

- Energy Use Data Collection
- Energy Saving Opportunities
- Registry of Opportunities (RoO) for energy savings and fossil fuel replacement
  - Individual Homeowners
  - SMEs
  - Community Organisations
- Collective Community Projects

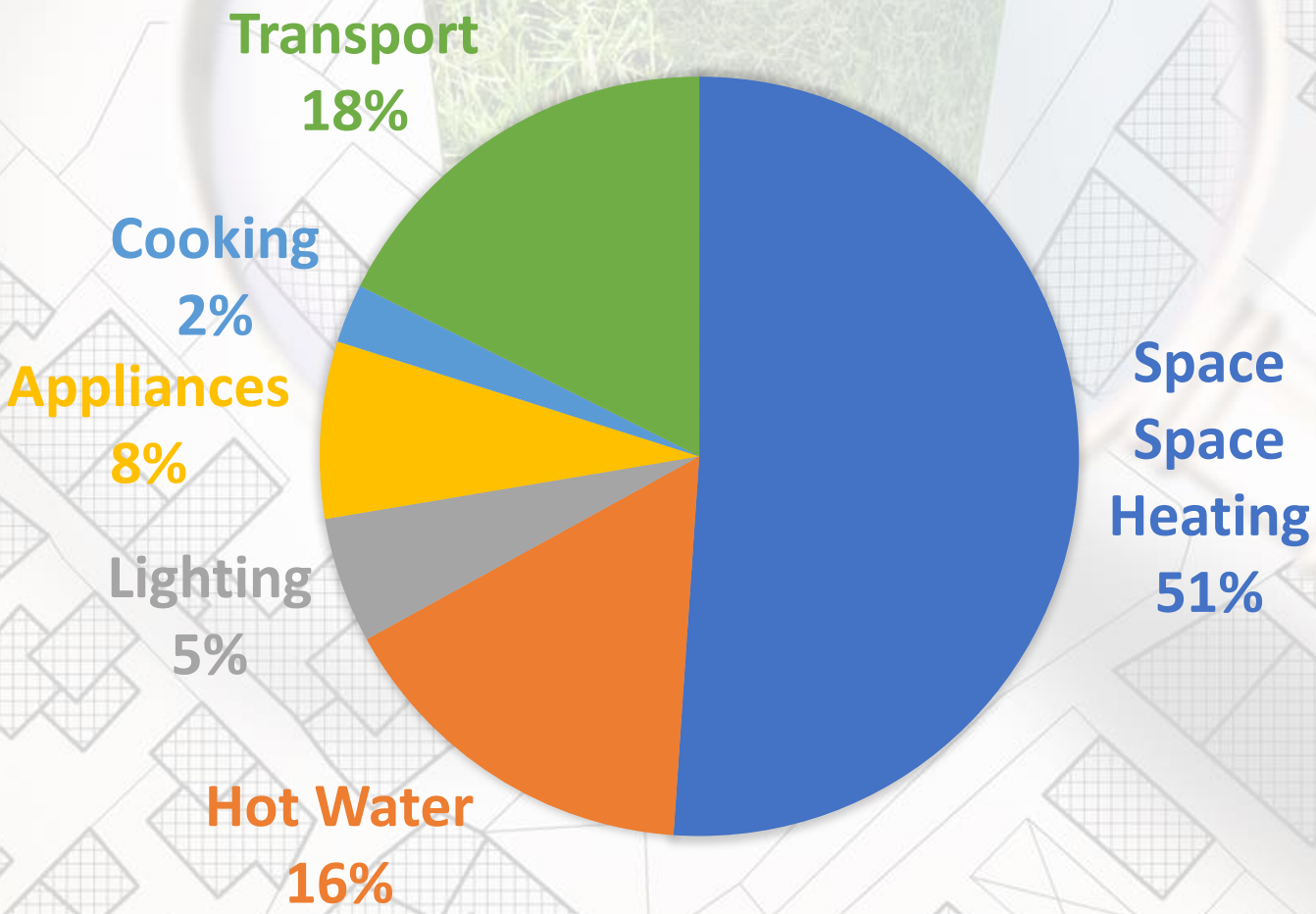
Energy Use Data Collection Homes



IRELAND

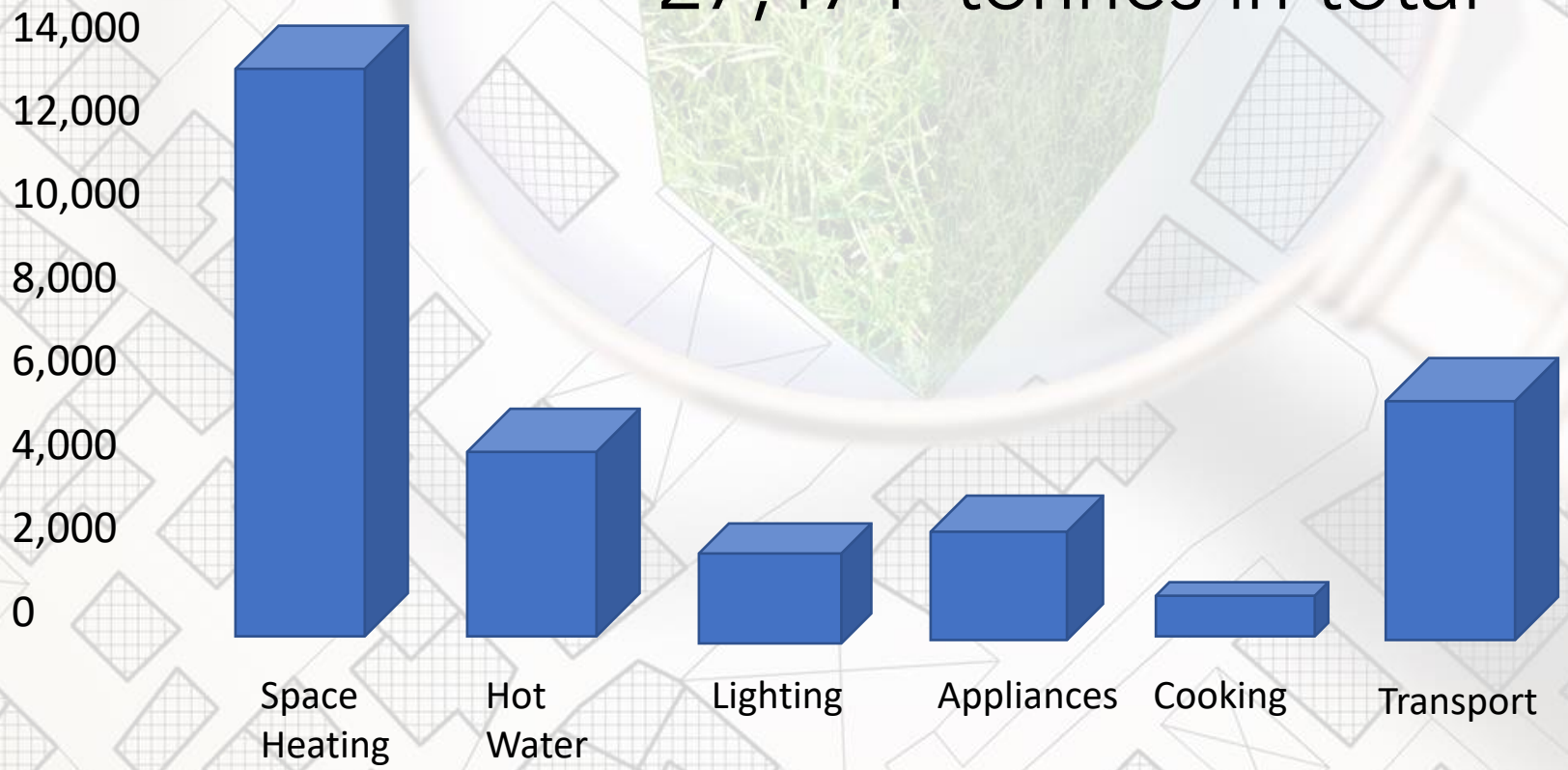
Co Mayo

Domestic Energy Use



Domestic CO2 Emissions

27,474 tonnes in total



Domestic CO2 Emissions

27,474 tonnes in total

1 Mature Coniferous Tree Absorbs 14 kg of CO2 in a year

27,474 tonnes CO2 requires

1,962,428 trees to absorb

Non-Domestic Energy Use

Type of Premises	Number of Premises	Estimated Energy Use kWh/yr
Community/ day centres	15	1,967,375
Hospitals and primary health care	1	233,800
Hotels	5	22,708,240
Industrial process buildings	6	9,501,330
Nursing residential homes	3	5,165,275
Offices	26	1,230,294
Restaurant/public houses	22	1,463,668
Retail	29	1,438,350
Schools and colleges	13	2,906,631
Sports facilities	4	1,840,488
Workshops/ maintenance depots	3	265,310
TOTAL	**127**	**48,720,761**

Farming

Area	Holdings	Cattle	Inferred total emissions cattle (kg CO2)	Sheep	Inferred total emissions sheep (kg CO2)	Total Emissions kg CO2	Energy Inputs (MWh)
Slievemore	141	144	788,256	11,442	1,710,705	2,498,961	
Dooega	62	0	0	4,204	628,544	628,544	
Acla	98	197	1,078,378	4,319	645,738	1,724,116	
Corraun	121	160	875,840	10,134	1,515,145	2,390,985	
SEC AREA	422	501	2,742,474	30,099	4,500,132	7,242,606	1,176

Bus Éireann

Day	Outward	Inward	Total Distance km/y	Diesel Use L/y	MWh/y
Mon	6	6	50,544	12,636	126
Tue	6	6	50,544	12,636	126
Wed	6	6	50,544	12,636	126
Thu	6	6	50,544	12,636	126
Fri	6	6	50,544	12,636	126
Sat	6	6	50,544	12,636	126
Sun	3	3	25,272	6,318	63
Total	39	39	328,536	82,134	821.34

All Sectors Energy Use, Carbon Emissions, cost

Energy	MWh/a	t CO2/a	Cost
Reside	77,150	16,795	€10,029,464
Reside	17,744	5,249	€4,258,665
Reside	20,260	5,430	€2,816,140
Comm	48,721	13,420	€6,333,699
Public Transport	821	222	€114,166
Agriculture	1,176	7,580	€152,882
TOTAL	**165,872**	**48,695**	**€23,705,016**

3,478,214 conifers (more if native woodland species)

15.5 tonnes CO2 per person

23% more than national Average of 12.6 t/Co2

89% more than the EU Average of 8.2 t CO2

Ní neart go cur le chéile

Individual behavior creates the foundation for action in social, economic, and environmental sustainability, and potentially guides our ability to work with one another to make life-affirming decisions. In short, it is a matter of aligning our day-to-day behaviors with our well-stated values that will result in greater sustainable community action.

Pappas & Pappas (2014)

Easier Behaviour Measures

Cost reduction measures:

Change your energy provider

Consume less electricity and bottled gas, and more oil to heat your home and water

Home Improvement Measures:

Track down and eliminate draughts: check windows, external doors, vents, floor spaces, fireplaces, and stoves.

Check insulation levels in attic, basement, walls (including the meter box), and floor spaces.

Check your boiler and stove

Easier Behaviour Measures

Energy Reduction Measures:

Switch to more efficient appliances and lower temperature settings

Don’t use standby on devices and turn off lights when possible.

Use the bus more

Energy Upgrades

‘Fabric First’: Upgrade Building before installing new plant

Insulate - Air Tightness
& **Insulate -** Air Tightness

Energy Upgrades

<u>Sample Home:</u> Single storey 1940's bungalow - Detached Dwelling

Leetherm Case Study
Cashel
NOT THE ACHILL HOME SURVEYED

CURRENT BER	G
Energy 'Efficiency' (kWh/m2/yr)	476.4
CO2 kg/yr	9,113
Heat Loss Indicator (lower the better)	5.82
<u>Energy Cost yr</u>	**<u>€7,801.02</u>**

Energy Upgrades

Leetherm Case Study
Cashel
NOT THE ACHILL HOME SURVEYED

External Walls	Pump Cavity and External Insulation 100mm	F
Roof Insulation	Upgrade Attic Insulation to > 300mm and 140mm Flat Roof Insulation	D1
New Doors	New energy efficient doors	D1
Windows	Change Windows and Slider	C3
Ventilation	Install Controlled Ventilation System	C2
Savings	€4,606.01	

Energy Upgrades

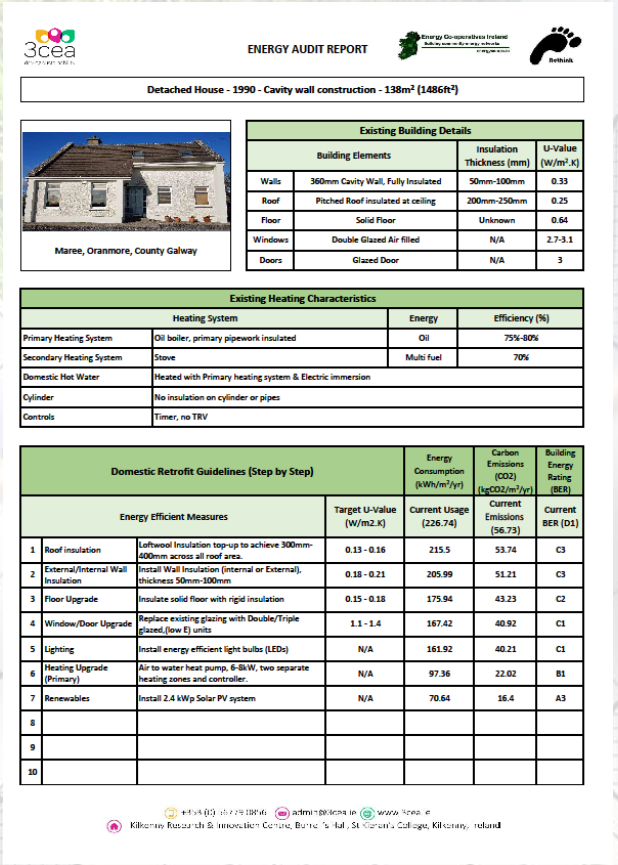
Leetherm Case Study
Cashel
NOT THE ACHILL HOME SURVEYED

Heating	Install Air to Water Heat Pump for heating and hot water (zoned full time & temperature controls)	B3
Electrical	Add 7 PV Panels to South facing roof 2.5Kwp (assuming 360 watts per panel)	A3
Total Cost Savings	€6,765.49	
Total Carbon Savings	7,900 kgs	**565 Trees**
Est Cost (nett grant)	~€35-40,000	
Est Payback	5-6yrs	

Energy Upgrades

- Available at energyco-ops.ie/resources/energy-audits-10-examples-from-galway-county/
- May get Achill Homes there also after consultation with homeowners

Energy Upgrades



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ENERGY AUDIT REPORT

Detached House - 1990 - Cavity wall construction - 138m² (1486ft²)

Maree, Oranmore, County Galway

Existing Building Details			
Building Elements		Insulation Thickness (mm)	U-Value (W/m².K)
Walls	360mm Cavity Wall, Fully Insulated	50mm-100mm	0.33
Roof	Pitched Roof insulated at ceiling	200mm-250mm	0.25
Floor	Solid Floor	Unknown	0.64
Windows	Double Glazed Air filled	N/A	2.7-3.1
Doors	Glazed Door	N/A	3

Existing Heating Characteristics			
Heating System		Energy	Efficiency (%)
Primary Heating System	Oil boiler, primary pipework insulated	Oil	75%-80%
Secondary Heating System	Stove	Multi fuel	70%
Domestic Hot Water	Heated with Primary heating system & Electric immersion		
Cylinder	No insulation on cylinder or pipes		
Controls	Timer, no TRV		

Domestic Retrofit Guidelines (Step by Step)				Energy Consumption (kWh/m²/yr)	Carbon Emissions (CO2) (kgCO2/m²/yr)	Building Energy Rating (BER)
Energy Efficient Measures			Target U-Value (W/m2.K)	Current Usage (226.74)	Current Emissions (56.73)	Current BER (D1)
1	Roof insulation	Loftwool Insulation top-up to achieve 300mm-400mm across all roof area.	0.13 - 0.16	215.5	53.74	C3
2	External/Internal Wall Insulation	Install Wall Insulation (internal or External), thickness 50mm-100mm	0.18 - 0.21	205.99	51.21	C3
3	Floor Upgrade	Insulate solid floor with rigid insulation	0.15 - 0.18	175.94	43.23	C2
4	Window/Door Upgrade	Replace existing glazing with Double/Triple glazed,(low E) units	1.1 - 1.4	167.42	40.92	C1
5	Lighting	Install energy efficient light bulbs (LEDs)	N/A	161.92	40.21	C1
6	Heating Upgrade (Primary)	Air to water heat pump, 6-8kW, two separate heating zones and controller.	N/A	97.36	22.02	B1
7	Renewables	Install 2.4 kWp Solar PV system	N/A	70.64	16.4	A3
8						
9						
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Energy Upgrades

Building Energy Rating	Estimated Number of Homes Surveyed	Estimated Total kWh/yr	Current Energy Costs €/y	Potential Cost Savings €/y	Potential Emissions Savings kgCO2/y
D1-D2	417	13,833,872	€1,922,908.21	€807,621.45	11,343,775
E1-E2	620	26,730,486	€3,715,537.55	€3,158,206.92	21,918,999
F-G	485	27,697,576	€3,849,963.06	€3,156,970	22,712,012
ALL	1,522	68,261,934	€9,488,408.83	€7,122,798	55,974,786

That's nearly a million conifers

Transport Emissions - cars

- Reduce the most inefficient journeys where possible, i.e., 3 kms or under
- Save up to 1 tonne of CO2 and €1,000 per year by sharing journeys.
- Plan ahead by combining trips (shopping, school runs etc.)
- For cars that do not automatically turn off when idling, switch off if you will be stopped for more than 9 seconds
- An energy-aware driving style can save 13% on fuel and emissions
- Inflate tyres correctly to manufacturer's recommendation
- Avoid harsh acceleration followed by heavy breaking also slowing down in good time saves fuel, smooth style around bends
- Cars are parked 95% of the time, do you need a second car?

Transport Emissions - cars

- The sun-roof fully open consumes up to 4% more fuel, half-open - 3%
- A roof rack can increase fuel consumption by 40% and a cycle rack with two bicycles by 10% - 15%
- Use air-conditioning only when needed – it increases fuel costs
- Rear screen heater's increases fuel consumption by 3% - 5%, so switch it off once the window is demisted
- Front windows left half open consume more fuel at higher speeds so use the air vents instead
- Do not carry unnecessary weights in the boot, clean it out!
- The average new car emits 120g of carbon dioxide for every kilometre. SUV's can emit a staggering 330g carbon dioxide per km.

Transport Emissions: BUS

Each km travelled by bus produces 82g of CO2 in contrast to the average emissions from a diesel car of 178g CO2/km.

568 people reported driving themselves to work by car in the SEC area (64% of all commuters).

67% of commuter journeys were reported as taking less than half an hour.

Therefore, it can be assumed that there is a significant number of commuters in the SEC that could feasibly travel by bus.

Motivational behaviour change campaign to demonstrate the feasibility for commuters to switch to bus commuting

Target of 60 passengers ('bus ambassadors') in 2024. This would reduce emissions by approximately 83,341kg CO2 per year

Commercial Emissions

SEAI Energy Academy

Climate Toolkit 4 Business

SME Energy Audits

SEAI SME Guide to Energy Efficiency

'Based on experience, the average SME could reduce its energy bill by up to 30% by implementing energy efficiency measures. Typically, 10% saving can be achieved with little or no capital cost.

Some investment may be required to get the remaining 20% but the payback is generally around 1.5 years. You won't make a better investment!'

Energy Generation

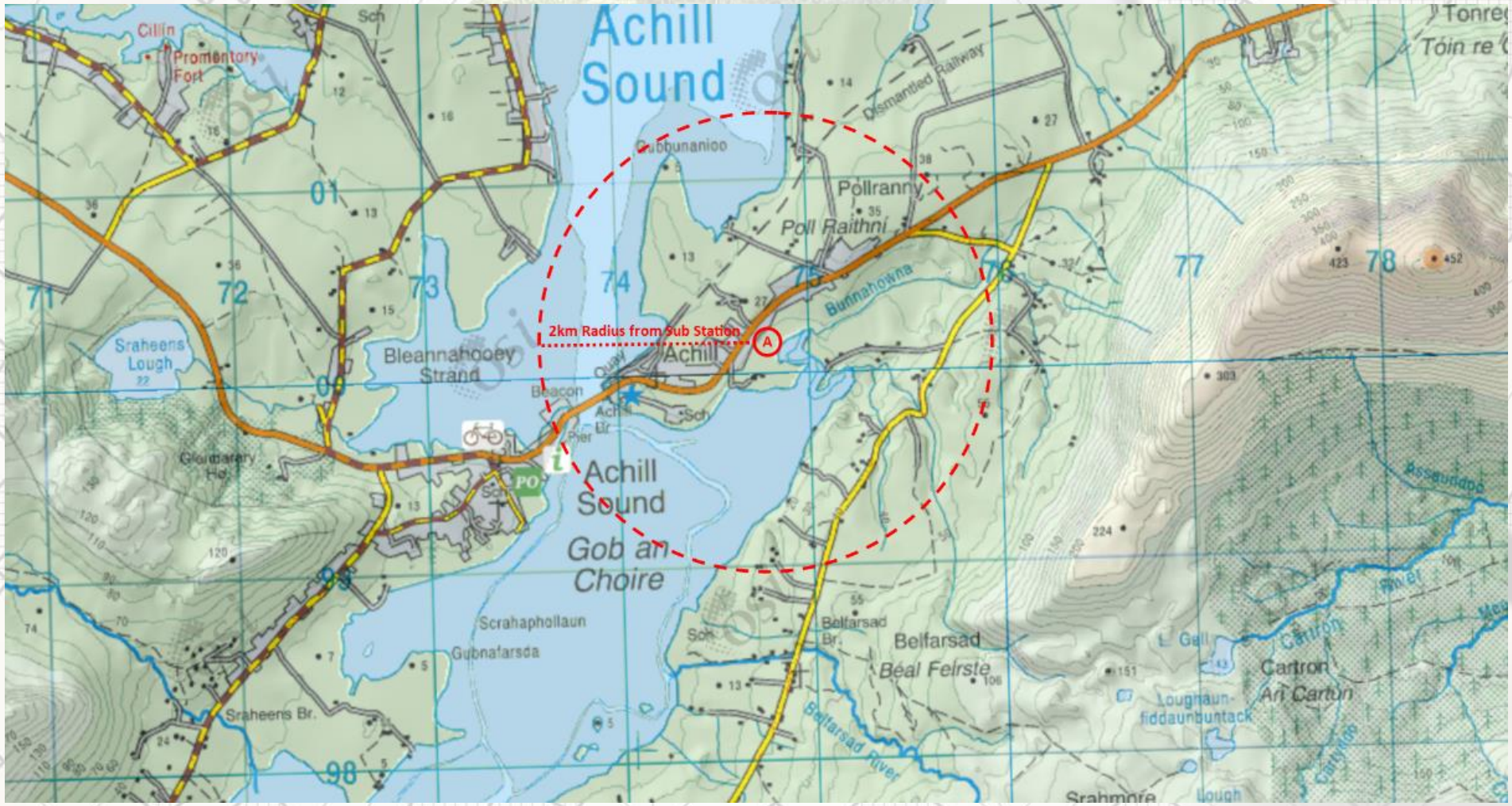
Planning Designation in County Plan makes wind difficult

Solar PV

5MW PV sites require approximately 10 hectares of contiguous land in a relatively low-lying flat location (incline <5 degrees) with an unobstructed South facing aspect, sheltered from the sea with a good solar resource.

A proximity of less than 2km to 38kV substation with open capacity is advantageous.

PV 5MW


Achill Sound
Cillin
Promontory Fort
Dismantled Railway
Gubbunanioo
Pollranny
Poll Raithní
2km Radius from Sub Station
A
Achill
Bleannahooey Strand
Sraheens Lough
Beacon
Achill Sound
Gob an Choire
Scrahapholaun
Gubnafarsda
Belfarsad
Béal Feirste
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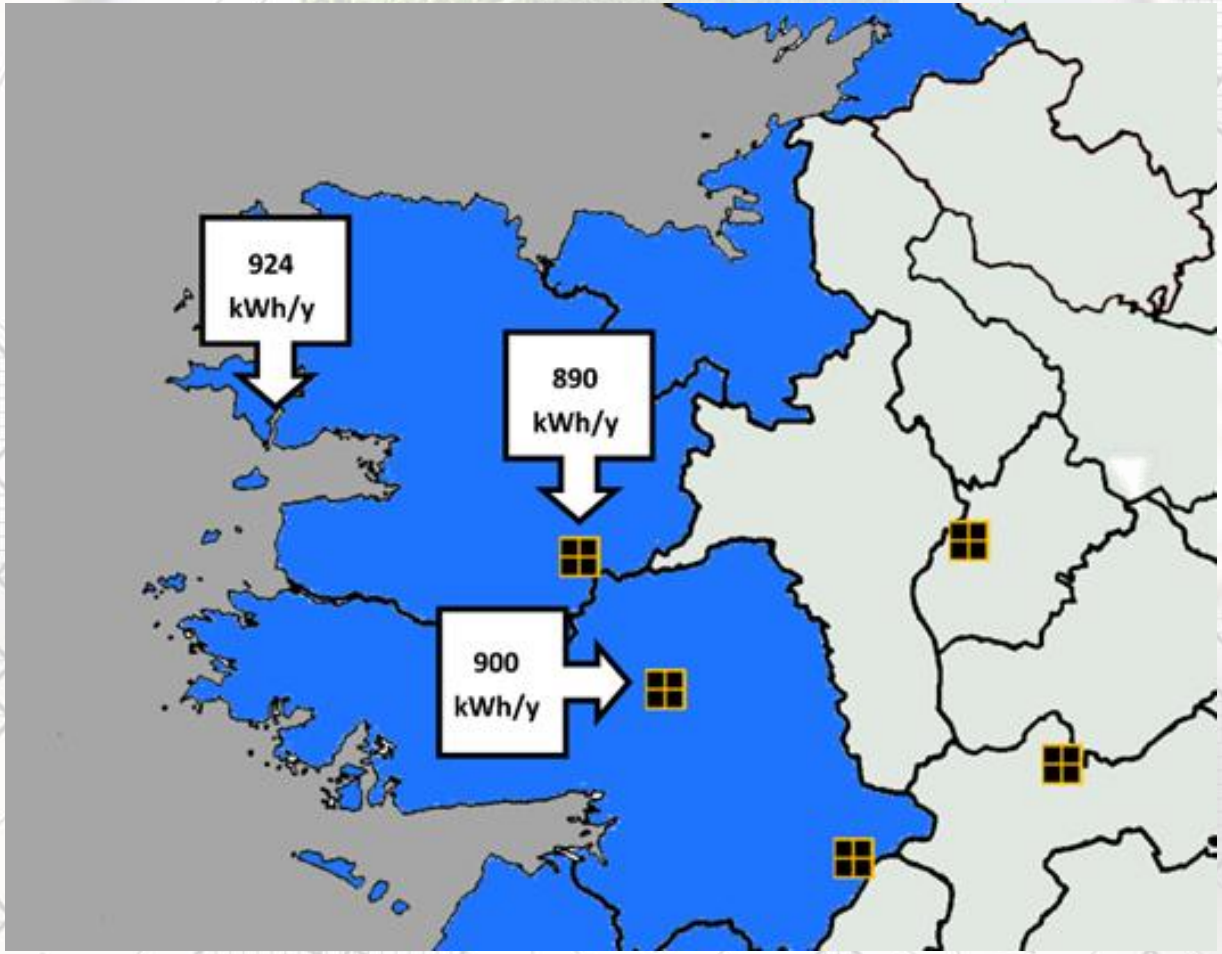
PV 5MW



Micro PV

A 1kWp solar PV system would require 3 or 4 solar panels on your roof.

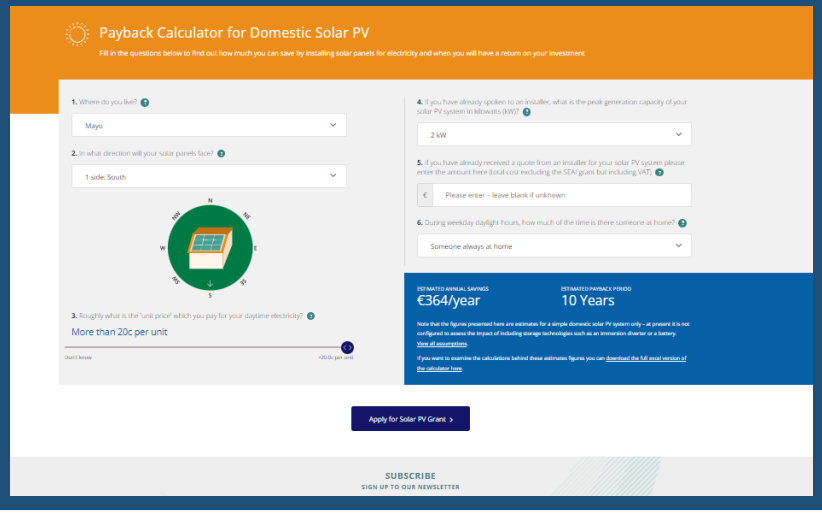
In the SEC area, 1kW installed will generate approximately 924kWh of electricity per annum.

Since a consumer pays approximately €0.23 per kWh to their electricity provider, a 1kWp PV panel (if all the energy is consumed by the home owner) will save the homeowner €212.52 per year.

There is also a €0.135 payment for each kWh sold to the grid by the homeowner reclaimable from you energy provider

There are grants up to a maximum of €2,400 through the SEAI

Micro PV

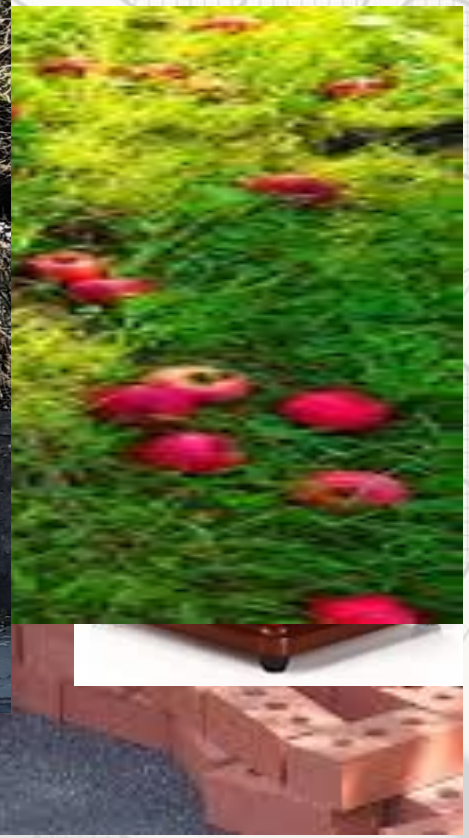


The SEAI has a useful Calculator that shows payback period for typical installations, customisable by county, size of system and retail price of electricity.

Economics of a 2kWp System in Achill

System Cost (with grant)	Annual Savings	Payback Period	Lifetime Profit
€3,600	€364/year	10 Years	€4,368

What is to be done now



Continue the Journey with the SEAI

Míle Buíochas
Thank you