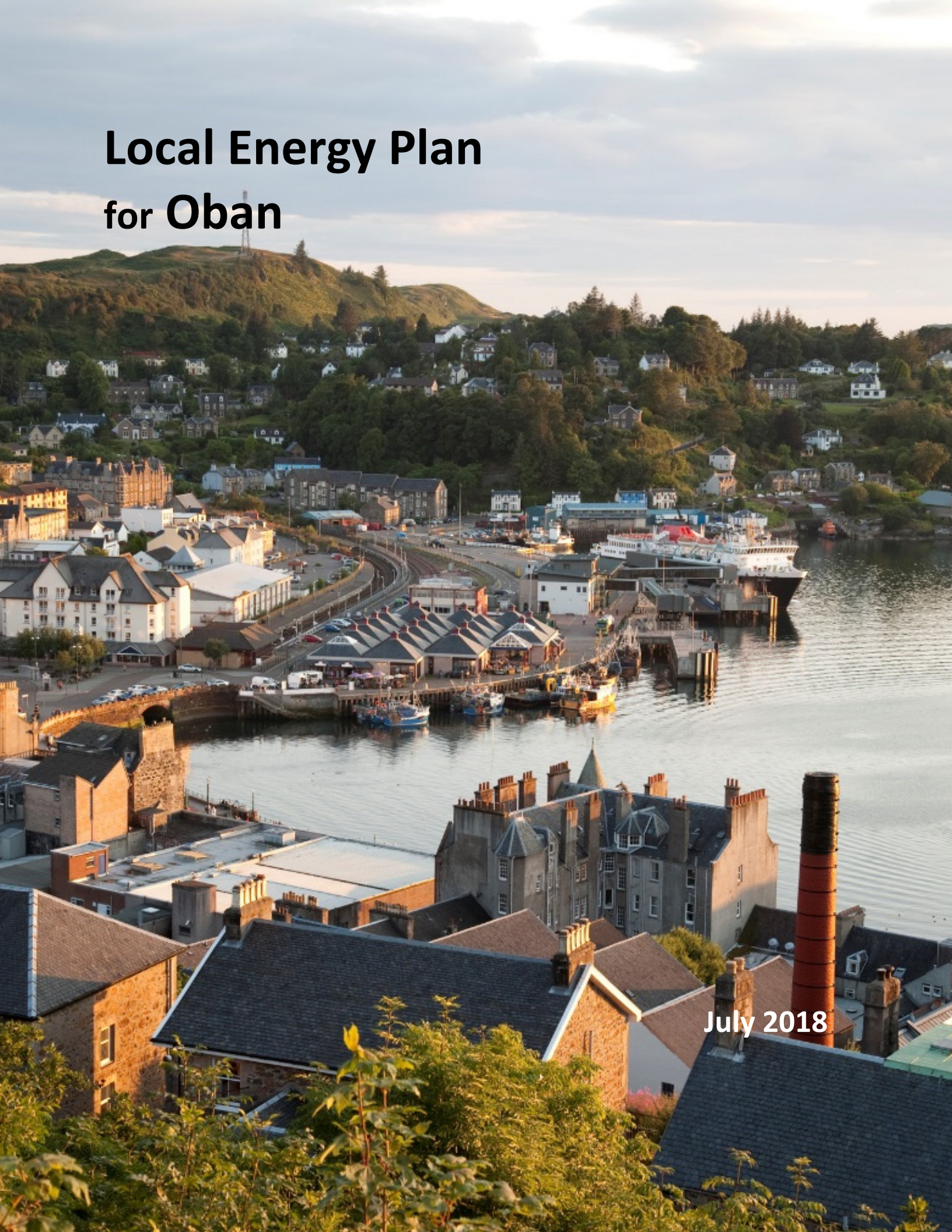
Local Energy Plan
for Oban



July 2018

A Local Energy Plan for Oban

July 2018

This Local Energy Plan has been developed to enable the community to look at its existing and future energy needs in terms of power, heat and transport and determine where it sees priorities for action. A separate non-technical summary document is also available that provides an overview of the plan.

The development of the plan has been led by a steering group that includes representatives from the Oban Community Council, Argyll Community Housing Association, West Highland Housing Association, Atlantis Community Leisure, Bid4Oban, Argyll and Bute Council, Local Energy Scotland, Home Energy Scotland and ALIenergy.

The development of the plan has been funded as part of the COBEN project (**CO**mmunity **BEN**efits of Civic Energy), an EU Interreg (North Sea Region) funded programme with fifty per cent match funding through the Scottish Government's Community and Renewable Energy Scheme (CARES). CARES is delivered by Local Energy Scotland. Technical support and plan development has been undertaken by Wood Environment & Infrastructure Solutions UK Limited. Community consultation support has been provided by ALIenergy.

Contents

1. Introduction

1.1 About Local Energy Plans

A Local Energy Plan (LEP) enables the local community to look at its existing and future energy needs (in terms of power heat and transport) and state where it sees priorities for action. It also identifies opportunities that the community determines offer practical action to support its current and future energy system developments.

Local Energy Plans are created by local communities rather than being developed for them by other bodies (e.g. local authorities or National Government). They set out key priorities and opportunities identified by the community, assisted by a range of other organisations who have an interest in this community. These include local residents, businesses, community organisations, local authorities, distribution network operators and local generators.

A key aspect of the development process is the ability for the local community to understand its own energy and transport systems, but also place them in context within the wider changes taking place across Scotland. It can therefore look for opportunities that offer local benefits consistent with national low carbon targets. These benefits can be:

- Direct - such as the generation of electricity or heat for local use displacing more expensive imported grid supplied electricity or fossil fuel.
- Economic - developing employment opportunities associated with energy supply (e.g. in hydrogen production) or enhanced efficiency (e.g. insulation and glazing work on homes).
- Indirect – such as a switch from diesel to electric vehicles reducing local emissions of particulates in car exhaust emissions and improving air quality
- Social – Production of local energy to supply homes in fuel poverty can reduce stress and enhance health outcomes for residents.
- Strategic – using energy storage mechanisms to maximise outputs from community owned generators, or use of technology to enable better trading of locally produced energy offer the community more effective use of its local resources

The LEP provides a start in the community's engagement with its energy needs. It offers a focus for immediate opportunities that can be developed in the short term. It also provides scope for longer term planning for further changes in the future.

1.2 Oban and its Local Energy System

The supply of power and heat to homes and businesses is viewed strategically at a national level. However, the local community in Oban can also play a role in shaping their energy needs. From a demand perspective, householders and businesses can look to reduce their energy needs through, for example, better insulation of buildings and using more efficient lighting and appliances. The roll out of smart meters enables better understanding of actual energy consumption, rather than relying on periodic meter readings (and estimated bills).

From a supply perspective, the Oban community can look to develop local generation to support their energy needs. This can be, for example, at an individual consumer level (e.g. solar panels on a roof) or at community scale such as investment in a wind turbine or hydro scheme.

Understanding the use of power, heat and transport energy in the community is the first step to being able to develop local energy systems. This has several benefits:

- End users can better understand the amount of energy they use (and the mix of requirements for power, heat and transport)
- The community as a whole can understand the size of energy demand and how this is proportioned between homes and businesses
- How much of this aggregate demand is met by existing local generation can be more easily understood
- Future energy requirements (e.g. new housing or business development) can be considered and compared with the size of existing demand
- Affordability and reliability of energy supply can be examined
- All these details can be collated in a single information source shared by everyone

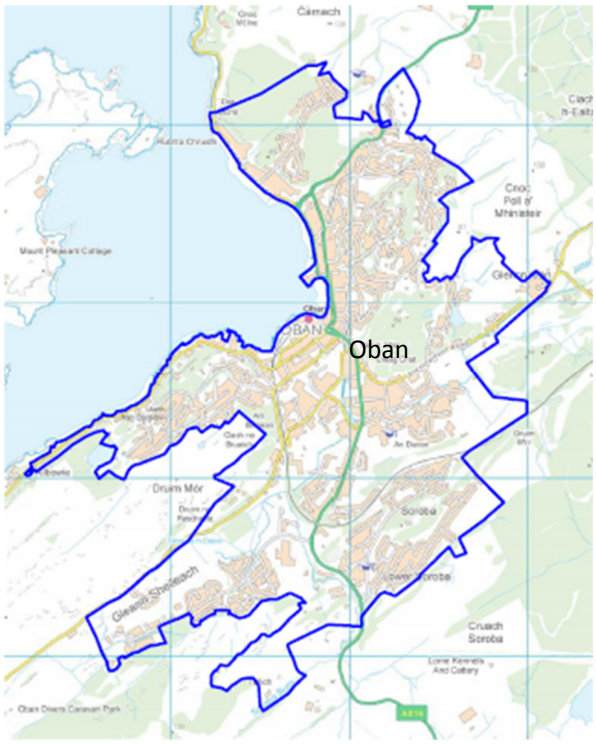
This LEP provides a summary of details collated from the community in Oban through a number of engagement routes and events.

1.3 Overview of 'whole system' approach

Our energy needs, and how these are met reliably, cost effectively and without long term environmental consequences, are one of the key considerations for every community. UK and Scottish Government commitments to global efforts to reduce greenhouse gas (GHG) emissions mean significant changes to the way in which we supply, store and use energy. For this reason the present and future energy needs of a community are most usefully considered in a 'whole system' approach. In this way the overlapping impacts of how we use power, heat and transport can be considered at the same time, rather than being seen in isolation.

In order to apply a 'whole system' approach there needs to be a study boundary drawn in order to provide a primary area of focus. This doesn't exclude the linkages with neighbouring areas or opportunities that may be available within close proximity of the LEP area (e.g. land available for energy generation). The boundary selected for use in the present LEP for Oban is shown in Figure 1.

Figure 1 Local Energy Plan Boundary (Oban)



1.4 Aims and objectives

In developing this LEP a number of engagement exercises have been undertaken in order to offer all members of the Oban community the chance to offer their views and opinions. Further details are provided in Appendix A.

From within those responses received it is clear that energy demand management within homes is well established. For example, 92% of respondents switch off lights when leaving a room, while 86% will turn off appliances when they are not being used. Almost three-quarters of respondents will only heat their home or hot water when they need it. The main motivation respondents noted was to lower energy and heating bills.

While it is clear that those responding to the survey recognise the value of reducing their overall energy needs the survey also asked for views as to what other aspects of energy use within Oban should be included within the LEP. These elements can be addressed alongside ongoing efforts to manage demand and reduce overall requirements for energy use.

Of the responses received during the development of this plan, the three main priorities that individuals wanted to see tackled by Oban's LEP were:

- Cheaper energy bills
- Warmer homes that are better insulated
- Increased local energy generation

In terms of any proposed energy projects, individuals wanted those projects to be prioritised in order to deliver benefits relating to:

- Lower fuel poverty
- Reduction in electricity prices
- Increased local energy generation

Further details from the surveys and engagement activities are provided in Appendix A.

2. Local Infrastructure

2.1 Electricity

The vast majority of Oban's electricity is supplied via the UK national grid. This consists of a transmission network of high voltage cables that transports electricity generated at large centralised power plants, linked to a distribution network that consists of lower voltage cables that feeds electricity into our homes and businesses. Devices called transformers enable the changes in voltage ('step down' when taking electricity from the transmission into the distribution system). A number of factors, include the size of the transformers, as well as the size of electric current passing along the cables, limits the amount of power that can flow through the system in any local area.

Where there is local energy generation within Oban (e.g. solar PV panels on a house roof) then if this electricity is not used within the building, it will be exported into the UK national grid. This means that there are potentially current flows running into Oban, coming from power generation sources outside the geographic area, as well as current flows running out of Oban from local energy generation.

There is a single primary substation in Oban that acts as the local point on the distribution network. (The transformer is a 33 kV/11 kV step down with a rated capacity of 24 MVA. This sub-station is presently constrained for any generation with a load of 5 MVA (approximately equivalent to 5 MW). The corresponding grid supply point (where the national transmission line is linked to the distribution network) is Taynuilt. This grid supply point is also constrained in terms of the scale of generation that can be connected into it.

Planned reinforcement works involve the construction of a North Argyll Substation (High voltage 275/132kV) as well as a new 275 kV double circuit tower line to Dalmally Substation. The double circuit (rather than single circuit) offers more capacity and greater reliability when maintenance work is required on any section of one of the circuits. The existing Inveraray – Taynuilt 132 kV towerline circuit will be reinforced. This is planned for completion by October 2021[1].

In practice this makes connection of any larger scale renewable energy generation difficult to achieve within the Oban area prior to any of the planned works being completed. There is also the potential for competition on any extension of grid capacity between existing and planned future generation.

The present Distribution Network Operator (DNO) is Scottish & Southern Electricity Networks (SSEPD). The present Transmission System Operator (TSO) is Scottish & Southern Electricity Networks (SSEPD).

2.2 Heat

The UK national gas network operates in a similar way to the national electricity grid. High pressure underground pipes (the transmission network) enable the flow of gas from national sources (offshore gas fields, pipelines from Europe and liquefied natural gas) to be transported into the

[1] https://www.ssepd.co.uk/GenerationAvailabilityMap/?mapareaid=2 (Accessed April 2018)

distribution network. The distribution network is the lower pressure gas supply that feeds homes and businesses.

Oban is not on the UK national gas transmission network (operated by National Grid) nor its associated distribution network (operated in Scotland by SGN). However, it is served by one of 4 so called Statutory Independent Networks (SINs) operated in Oban, Wick, Thurso and Campbeltown that are supplied by liquefied natural gas (LNG). There are 1,104 customers on the SIN network in Oban[2].

The LNG used is imported into each SIN area. The Gas Safety (Management) Regulations (GS(M)R) 1996 stipulate the range of WI (Wobbe Index) that should be used in order to ensure safe combustion of natural gas. The WI is a measure of the energy delivered to a burner; too high or too low a WI can cause problems with incomplete combustion (and so higher carbon monoxide emissions) and other problems relating to flame effects.

The majority of LNG supplies available in the global market (around 90%) require further processing in order to meet the GS(M)R supply requirements. There were previously four processing sites in the UK capable of supporting onward supply of LNG to the four SINs. However, all these sites have closed. This means, without an alternative approach, that LNG is sourced from Belgium (Zeebrugge) or the Netherlands (Rotterdam) or imported to the Isle of Grain Terminal in Kent. It is then transported via road tanker to the various sites. So called nitrogen ballasting facilities would also be required to enable processing of the LNG to ensure compliance with the GS(M)R supply guidance.

This is a costly undertaking – the additional processing costs across the four SINs is estimated at around £325 million. Trials within Oban, extended to the other three networks, were therefore undertaken in the past three years to look at using a 'rich WI' gas and whether this caused problems in terms of increased safety risk. The performance of the networks was shown to be unaffected by the use of the 'rich WI' gas and an exemption for all four SINs was granted by the HSE for the period to April 2018. It is hoped to make this exemption permanent beyond this period.

In terms of the present study area, aside from the SIN, there is an existing district heating scheme at Glenshellach, which serves around 90 residential properties operated by West Highland Housing Association (WHHA). Originally operated as a wood chip supplied biomass boiler with oil back up the primary asset has undergone significant recent refurbishment. This has included a switch over to biomass pellets supplied by Balcas.

The second network operates outside of the immediate study area at Marine Court within Dunbeg. This is a wood pellet boiler working in combination with a LPG boiler backup.

2.3 Water

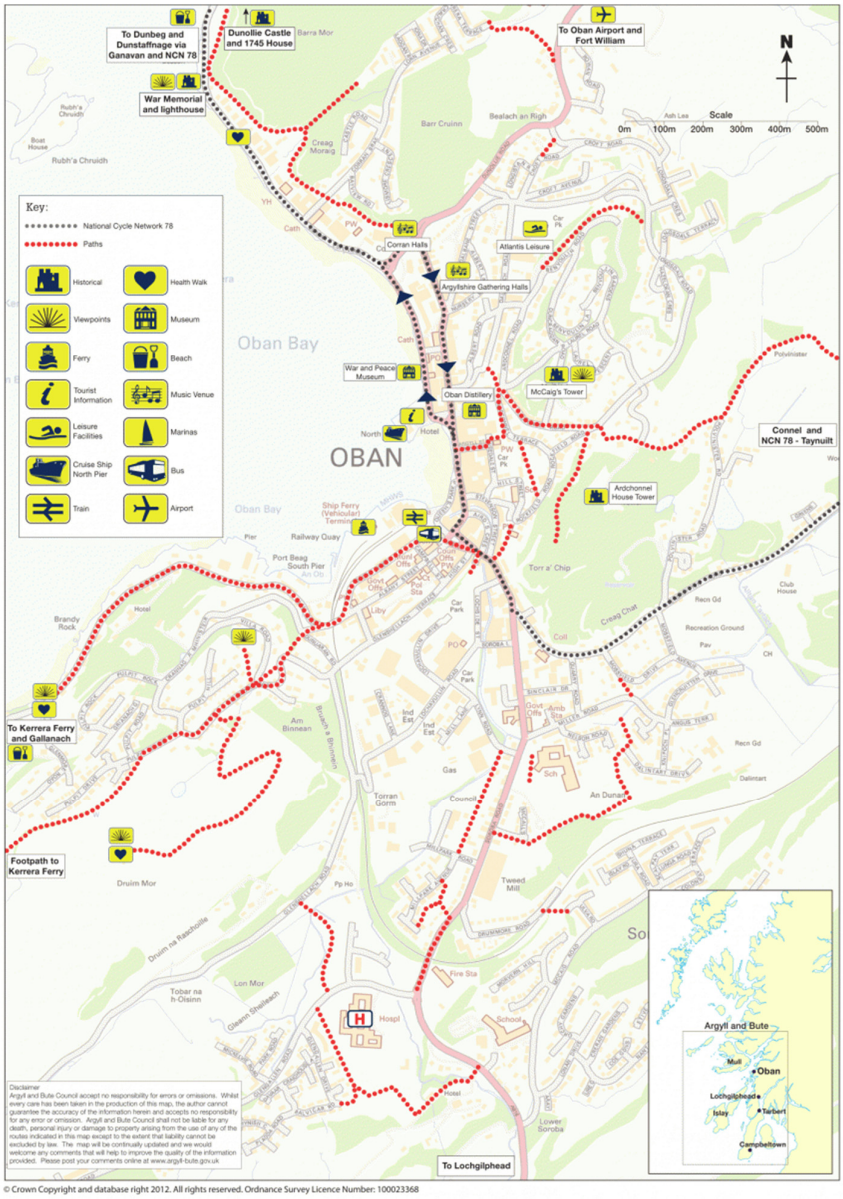
There are two sites operating within the Oban area relating to supply of drinking water and treatment of wastewater. On the northern edge of the town is the wastewater treatment works at Pennyfuir. To the south of the town is the Tullich water treatment works that has been newly extended and upgraded during 2016. The expanded site has been operational since June 2017 with a throughput capacity of 11,800 m^3 per day.

[2] https://www.sgn.co.uk/uploadedFiles/Marketing/Pages/Publications/Docs-Innovation-Oban/SGN_Gas_Market_Report_Executive-Summary-2016-170116.pdf (Accessed April 2018)

2.4 Transport

Oban is served by the A85 road from the North linking the town to Crianlarich; the A816 runs to the South linking with Lochgilphead.

Figure 2 Transport links in Oban



It is a major ferry terminal, with ferry services operating daily to a variety of island locations:

- Barra
- Coll and Tiree
- Colonsay
- Islay
- Lismore
- Mull

Oban Airport is to the North of the town and operates scheduled flights to Coll, Colonsay, Tiree and Islay. There are also scenic flights operated for visitors to the area and access for private aircraft.

Oban is on the West Highland rail line linking to Glasgow with daily services.

3. Characterisation of local area

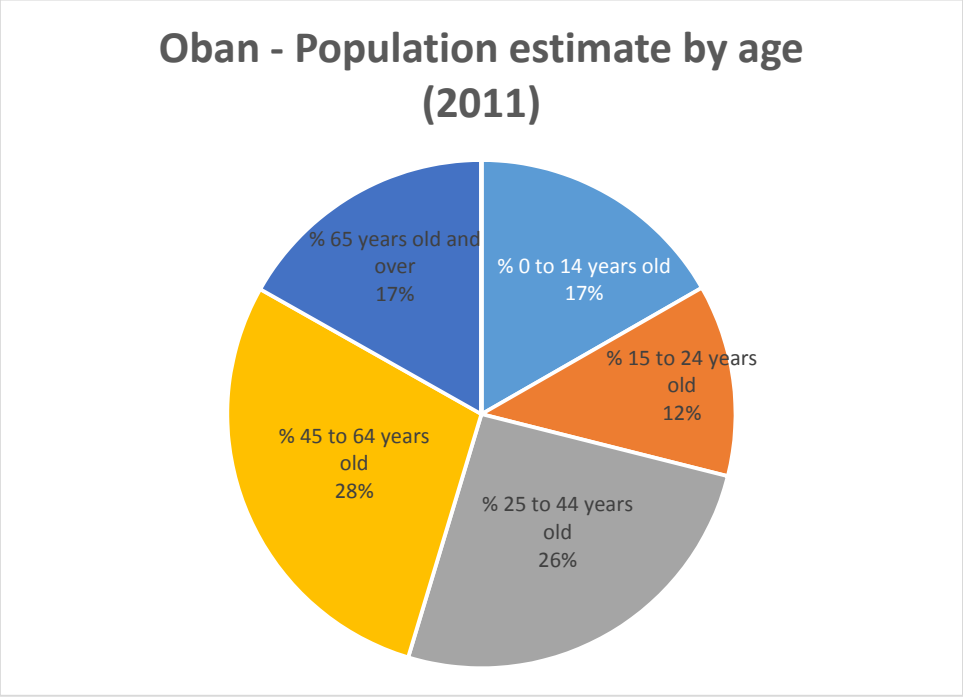
3.1 Population of Oban

Population and Employment - summary

- The population of Oban has increased by 5.6% since 2001 (2011 Census figures)
- Under-15s comprise 17% of the total population; 15 – 65 year olds 66%; Over 65s 17%
- 75% of the population are economically active and typically travel to work by car

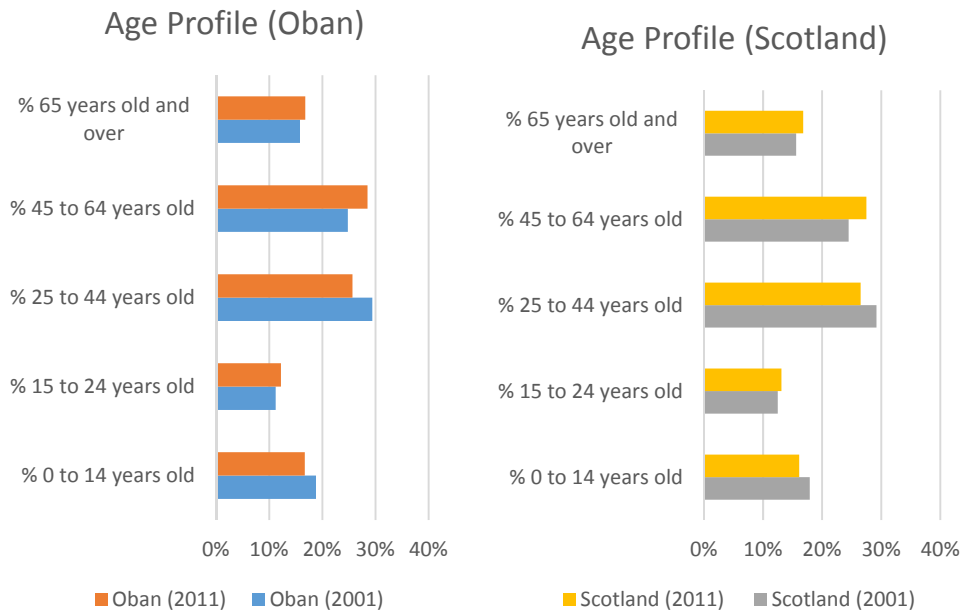
The population of Oban, based on Census figures from 2011, is 9,974 – an increase of 5.6% since 2001. A summary of the population by age is shown here.

Figure 3 Population of Oban (Breakdown by age)



The change in demographics between 2001 and 2011, and a comparison with Scotland's population as a whole is shown here.

Figure 4 Demographic Profile (Oban)



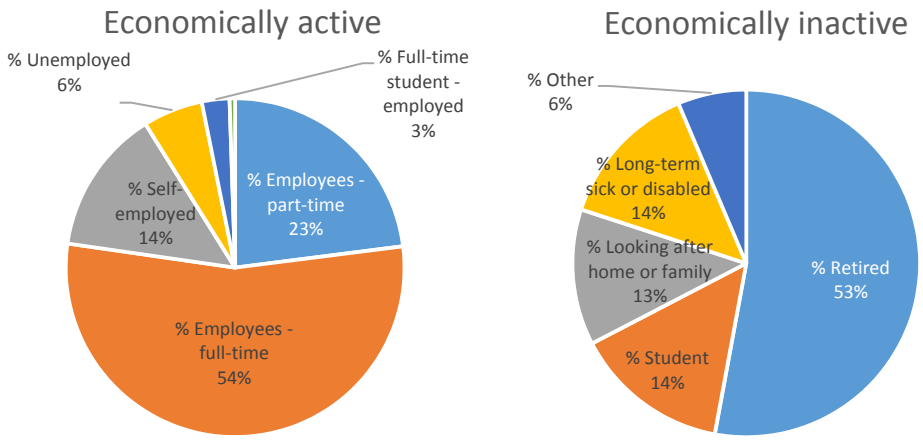
In terms of employment, around 75% of the population are economically active, with just over half of those in full time employment. A summary is provided here (Figure 5).

In terms of employment sectors the five most common, comprising around two thirds of total employment are summarised in Table 1.

Table 1 Employment by sector (Oban)

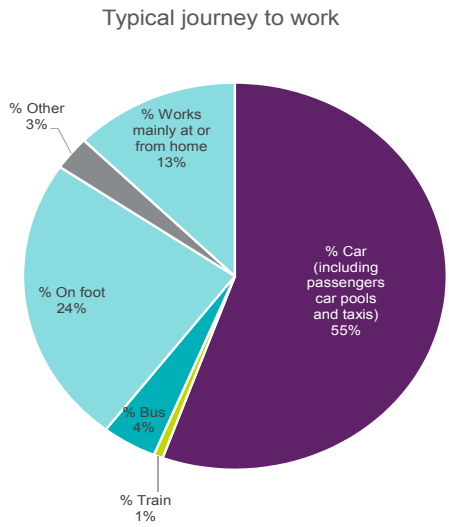
Employment Sector	% of Total Economically Active Population
Wholesale and retail trade; repair of motor vehicles and motorcycles	19.3%
Human health and social work activities	14.7%
Accommodation and food service activities	13.3%
Construction	10.1%
Transport and storage	7.4%

Figure 5 Economic activity and economically inactive (Oban)



In terms of those that are economically active, a typical journey to work is predominantly made by car.

Figure 6 Typical journey to work (Oban)



3.2 Residential

Residential Energy Use - summary

- Flats comprise 54% of the total stock and those that are houses 46%
- Two thirds of properties are owner occupied; a further 24% are owned by Housing Associations
- Electricity is the dominant primary heating fuel with around two thirds of properties using electric heating systems
- Data for Argyll & Bute suggests 45% of households currently live in fuel poverty

An overview of the domestic dwellings in the LEP area is shown here.

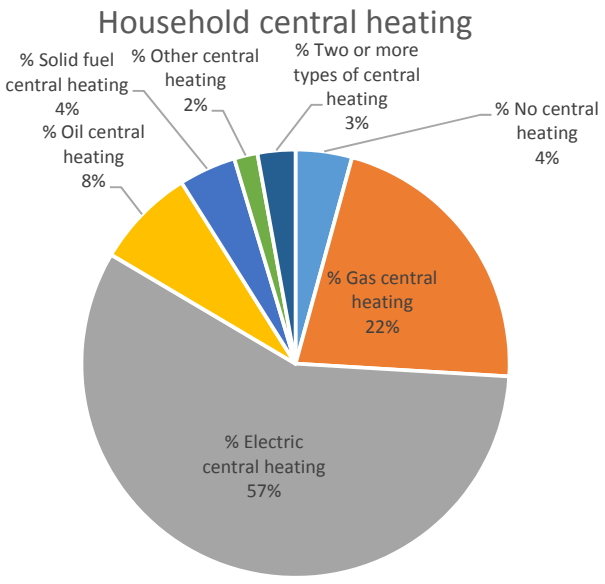
Further details are available in Appendix B, Section 1.

Table 2 Residential Property – Overview of characteristics

Characteristic	Details
Archetype	Flats comprise 54% of the total stock and those that are houses 46%
Age	Around 75% of the housing stock is at least 35 years old; 25% alone were built in the pre-1919 era The largest proportion of housing stock was built during the period 1950 – 1983 (39%)
Tenure	Two thirds of properties are owner occupied; a further 24% are owned by Housing Associations
Construction Type	Solid wall construction predominates in pre-1919 properties; cavity wall construction in the period 1919 – 1984; timber frame in modern dwellings
Primary Heating Fuel	Electricity is the dominant primary heating fuel with around two thirds of properties using electric heating systems. Just over 20% of households are served by the Oban SIN gas network.
Estimated Energy Efficiency	Around 40% of pre-1919 solid wall construction properties have an energy efficiency rating between E – G There are a large number of properties in the 1950 – 1983 age band with F-G rating (1 in 5 of that age band) The majority of properties built post 2002 have an energy efficiency rating of C.

Electric heating forms the predominant source of primary heating in residential dwellings in Oban. The majority of properties are served by stand-alone (rather than communal or district heating) systems.

Figure 7 Residential Primary Heating Source



3.2.1 Estimates of Fuel Poverty

The Scottish House Condition Survey[3] provides the main source of information regarding the general condition of housing stock across Scotland. This includes aspects of heating and insulation as well as characteristics of buildings and overall rates of fuel poverty.

Under the current definition, a household is in fuel poverty if, in order to maintain a satisfactory heating regime, it would be required to spend more than 10% of its income on all household fuel use.[4]

The latest figures for the period 2014 – 2016 include details for the Argyll & Bute Council area.

Table 3 Fuel Poverty Statistics (Argyll & Bute Council – 2014 – 2016)

Characteristic	Parameter	Argyll & Bute	Scotland
	% of LA	45%	31%
Age of Dwelling	Pre-1945	46%	36%
	Post-1945	44%	28%
House or Flat	House	45%	33%
	Flat	45%	27%
Number of bedrooms	2 or fewer	49%	31%
	3	40%	31%
Tenure	Owner occupied	44%	29%
	Social Landlord	46%	35%
	Privately rented	45%	31%
Household Type	Older	60%	45%
	Families	32%	17%
	Other	33%	29%

While specific figures for the domestic stock in Oban are not available, the dataset includes a probability estimate of each property being in fuel poverty. This is shown here.

Table 4 Estimated Probability of Fuel Poverty (Oban)

Probability of fuel poverty	Number of houses
Less than 40%	3,174
40-49%	258
50-59%	594
60-69%	267
70-79%	31
80-89%	0
90-100%	0
Unknown	25

[3] http://www.gov.scot/Topics/Statistics/SHCS/Downloads

[4] Note that the Scottish Government has looked at an alternative definition of fuel poverty as recommended by a recent review panel http://www.gov.scot/Publications/2017/11/7715

3.2.2 Overall domestic archetypes

The preceding sections have provided an overview of the residential properties in Oban. The data shows a mix of property types with different challenges for householders in terms of improving the overall energy efficiency of their homes and reducing overall energy bills.

The details have been summarised here to provide an overview of the predominant characteristics of the residential stock. This provides a guide as to the type of works (in terms of insulation improvements) that would need to be carried out in future.

Table 5 Summary of residential archetypes (Oban)

Age	Wall Type	Glazing	Loft insulation	Build type	Primary fuel	EPC Rating	Average Floor area (m^2)
Pre-1919	Solid Wall	Double / Triple	100 - 249 mm	Block of flats / Flat in mixed use building	Electricity	E	73
1919 – 1949	Cavity	Double / Triple	100 - 249 mm	Small block of flats/ dwelling converted in to flats	Mains Gas	D/E	87
1950 – 1983	Cavity	Double / Triple	100 - 249 mm	Block of flats / Detached House / Semi-detached house	Electricity	D/E	78
1984 – 1991	Cavity / Timber Frame	Double / Triple	100 - 249 mm ; 250mm+	Semi-detached house / Large block of flats	Electricity	C/D	68
1992 – 2002	Timber Frame	Double / Triple	100 - 249 mm ; 250mm+	Block of flats / Semi-detached house	Electricity	C/D	72
Post 2002	Timber Frame	Double / Triple	250 mm+	Detached house / Semi-detached house	Electricity	C	92

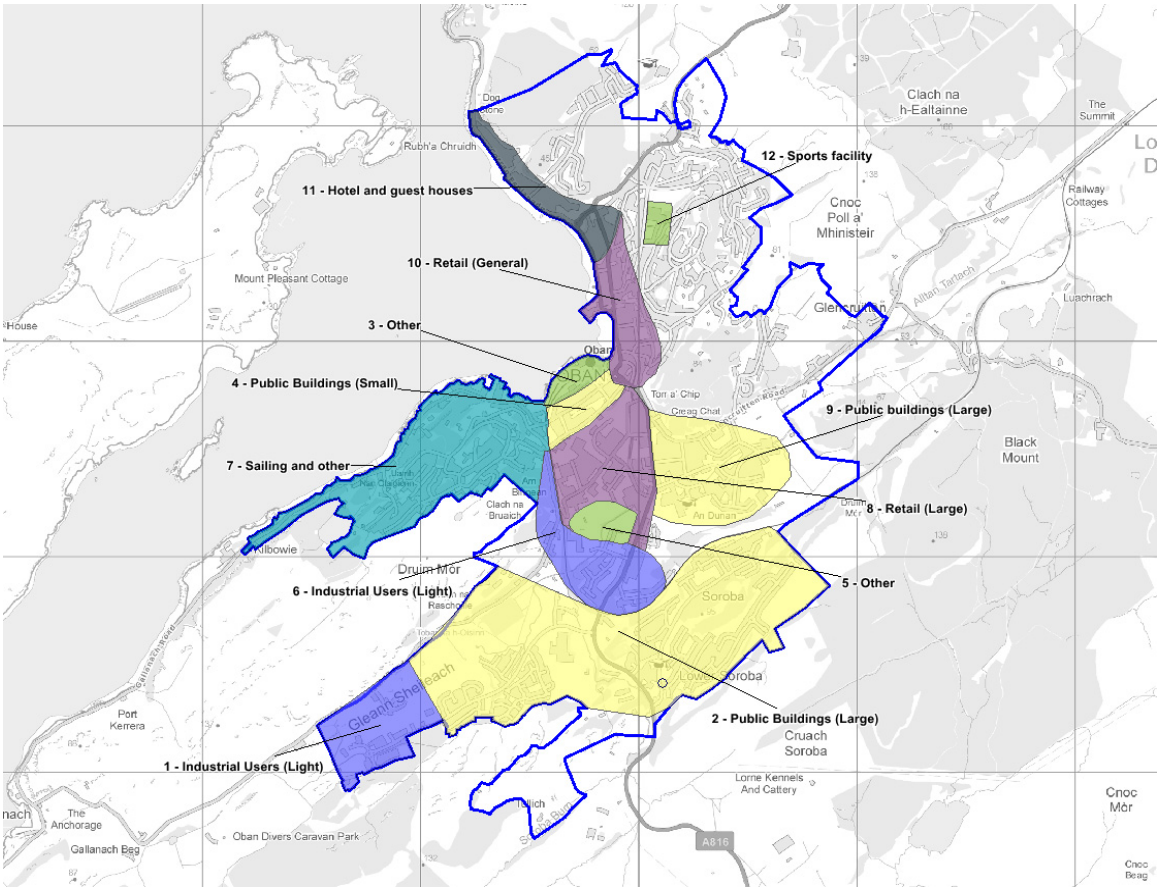
3.3 Non-residential

Non-residential Energy Use - summary

- Large energy users include three Primary Schools and the recently opened new High School, a hospital and the leisure centre. These users have self-contained energy supply assets
- Electricity is the predominant source of demand among non-domestic users, including offices, retail and hotels/other accommodation
- Buildings vary in age and design meaning any energy efficiency work will need to be targeted among specific premises

In looking at non-residential energy use in Oban it is useful to consider energy use by some of the larger public sector organisations within the LEP area, as well as what type of end users operate in different areas of the town. For the purposes of commentary, the study area has been divided into different zones of use as shown here.

Figure 8 Non-domestic energy use (Oban)



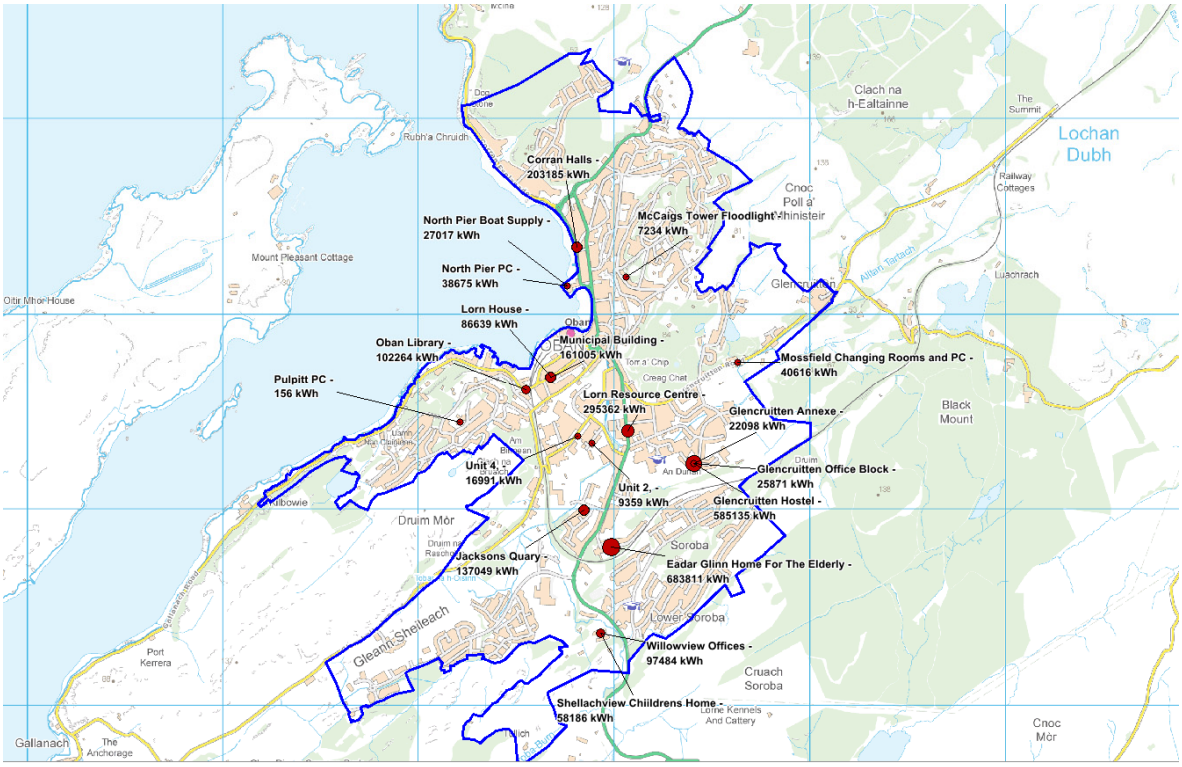
3.3.1 Local Authority Buildings

Argyll & Bute Council operate a number of offices and facilities within Oban as shown here. The majority of the buildings are electrically heated, while some of the smaller buildings with lower demand are heated from the SIN gas network. The remaining buildings are heated using gas oil or biomass.

There are three primary schools in Oban and one High School.

Further details regarding energy consumption and ongoing energy efficiency measures are provided in Appendix B, Section 2.

Figure 9 Local authority operated facilities (Oban)



3.3.2 NHS

In 2016 NHS Highland in Argyll and Bute and Argyll and Bute Council integrated health and social care services in the form of a Health and Social Care Partnership (HSCP). The HSCP includes all health services, including contracted services (those that are purchased from NHS Greater Glasgow and Clyde) and all Adult and Children and Families social work.

The main hospital in Oban, Lorn & District Hospital is on the Southern edge of the study area. The main buildings were built in 1995. The site offers a range of services:

- Minor Injuries Unit
- Chemotherapy
- A&E
- Surgical
- Maternity
- Out-patients
- Care of the Elderly
- Stroke
- Day Hospital
- X-ray

A dental clinic is also located on the site.

A snapshot of energy use for the site is provided in Appendix B, Section 2.

Lorn Medical Centre also operates within Oban. It is in a single modern building.

3.3.3 Atlantis Leisure

Atlantis Community Leisure is run as a social enterprise, having taken over the operation of the original swimming pool in 1992. Since then there has been a number of upgrades, extensions and refurbishment of facilities. A major overhaul of the heating systems in 2012 means that the Leisure Centre is heating using a combination of biomass (wood) pellets and an air source heat pump (200 kW) system. Oil boilers operate as a back-up supply in the event that the biomass and/or heat pump systems are not working.

Annual electricity consumption is of the order of 800,000 kWh per year (700,000 kWh on daily tariffs; 100,000 kWh on night time tariffs). Around 175 tons of wood pellets are consumed in heating the Leisure Centre annually (equivalent to around 750,000 kWh per year).

The back-up oil boilers consume around 30,000 kWh of oil per year.

3.3.4 Other Non-domestic Energy Use

Other non-domestic energy use can be characterised within the zones identified in Figure 9.

The area around Glenshellach, centred on the Hospital, has light industrial units of typical low storey, panelled profiled premises. Businesses operating in this area include motor repair premises, wholesalers, fuel depots and distribution warehouses as well as vehicle storage premises. Argyll College has a new building close to the hospital, which includes air source heat pumps and some solar PV in its energy supply system. Argyll Community Housing Association (ACHA) has a modern built office in this area.

Across the A816 road from the Hospital is the Community Fire Station; moving to the Southern edge of town from there is the Primary School Campus.

Moving Northwards into Oban there are two further areas of light industrial users. This includes a number of older units including a builder's merchant, bedding store and garden centre. In addition to the local authority depots there is a Forestry Commission office, a number of builders' merchants and suppliers and an Aldi supermarket. There are also a number of food distribution premises, motor works and services and West Highland Housing Association offices. The Oban Times newspaper has a single storey office here, and there a number of other small units containing engineering services and general distribution services.

Adjacent to this is the Oban Retail Park with large retail stores and a stand-alone Tesco supermarket. A Lidl supermarket is also in the vicinity of the Tesco supermarket, on the main road into the town, surrounded by a number of small storage and industrial offices.

In the area close to the new High School are a number of small industrial units, including building supplies, contractor offices and the Oban Mountain Rescue, Oban Ambulance Station and the Lorn Medical Centre.

The Ferry Terminal has a number of restaurants and cafes around it as well as the main railway station. A number of older buildings in the streets close to the Ferry Terminal are predominantly used as offices with some other retail premises.

George Street is the centre of the main central business district with a mix of retail and restaurant facilities, the North Pier services and similar services. The Oban Distillery is also in this area.

Beyond this is predominantly a mix of hotels and guest houses, with the Corran Halls and St Columba's Cathedral as other significant energy users within this area.

3.4 Transport

Transport - summary

- Just under 50% of Oban's population have access to at least 1 car or van
- Traffic count data suggests 80% of traffic flows in Oban are made up by cars and taxis
- There are 5 existing electric vehicle charging points in Oban
- Rail passenger data suggests little more than 1% of passenger trips are by commuters
- Indirect data (seasonal accommodation levels) shows the seasonal peak in traffic associated with visitors to Oban

3.4.1 Annual Traffic Movements

As mentioned earlier in the document, Oban is linked to the East via the A85 and to the South via the A816. Without any significant means of bypassing the town, traffic volumes inevitably build up during the tourist season.

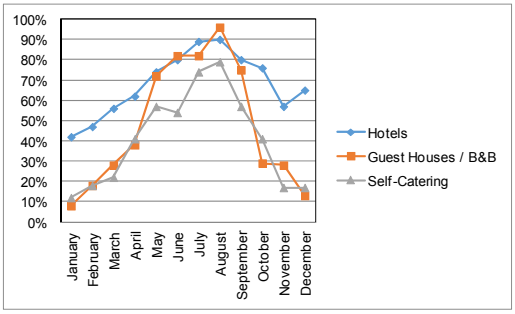
While there is no data that has been available to this study regarding specific volumes of traffic within Oban it is possible to identify a seasonal impact by looking at accommodation occupancy rates in the region over a 12 month period.

Visit Scotland publishes details for the Argyll, Loch Lomond and Forth Valley [5] in terms of occupancy rates, which are summarised here.

[5] http://www.visitscotland.org/pdf/Tourism_in_Scotland_Regions_2016.pdf (Accessed April 2018)

Table 6 Net Room Occupancy (%) – Argyll, Loch Lomond and Forth Valley

	Hotels	Guest Houses & B&B	Self-Catering
January	42%	8%	12%
February	47%	18%	18%
March	56%	28%	22%
April	62%	38%	41%
May	74%	72%	57%
June	80%	82%	54%
July	89%	82%	74%
August	90%	96%	79%
September	80%	75%	57%
October	76%	29%	41%
November	57%	28%	17%
December	65%	13%	17%
Average	68%	47%	41%



The peaking numbers in the spring and summer months are noticeable for all three categories of accommodation, but particularly in the case of guest houses, B&B and self-catering accommodation.

It is also useful to consider the mix of vehicle types that are passing through Oban each day. Traffic count and flow data is collated by the UK Government Department for Transport (DfT) for three locations within Oban.

Average daily vehicle flow details are available for each of the count points. The data shows that:

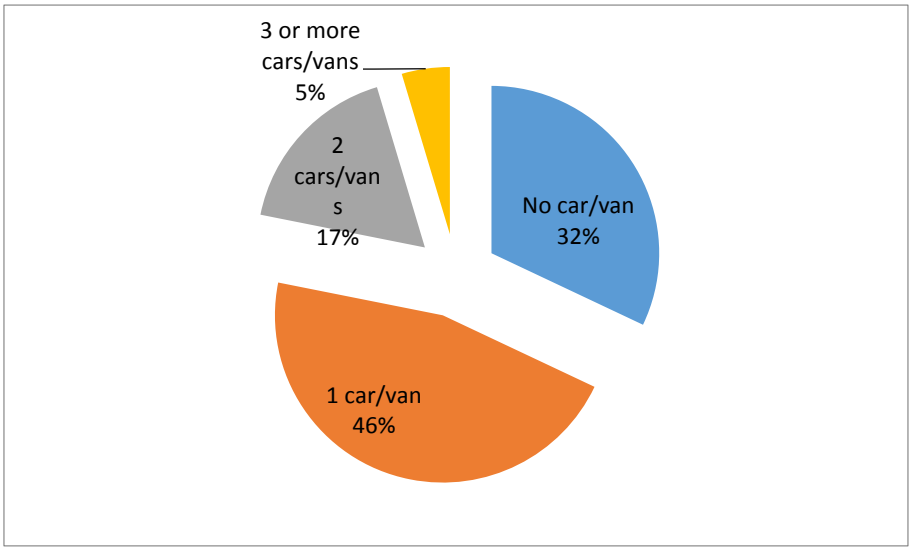
- There is little or no cyclists passing through the central areas of Oban (a maximum of 1% of traffic flows are pedal cycles)
- Cars/taxis make up around 80% of the total traffic flows
- Light goods vehicles (LGV) account for a further 14 – 18% of traffic
- Heavy goods vehicles (HGV) make up around 3% of traffic
- Buses and coaches account for 1 – 2% of traffic

Further details are available in Appendix B, Section 3.

3.4.2 Household vehicles

The estimated total domestic vehicle ownership within Oban is 3,700 with the percentage breakdown of number of cars or vans per household (based on Census data) shown here.

Figure 10 Household transport (Oban)



No specific statistics in terms of vehicle fuel type and use are available to this Local Energy Plan. In order to estimate household vehicle energy use therefore, it has been presumed that the mix of vehicle fuel type will be similar to that for Scotland as a whole. On this basis the mix of fuel types is as shown here.

Table 7 Estimated fuel type of household vehicles (Oban)

Fuel Type	Estimated number of vehicles
Diesel	1,707
Petrol	1,967
EV/Hybrid	22
Other	3

Statistics from Transport Scotland provide a breakdown of vehicle-km travel within each local authority region and by road classification. This can be combined with energy statistics that provide a breakdown of vehicle fuel usage estimated for each local authority area.

Using these base figures provides an average travel distance of 10,700 miles per year (17,300 km) per vehicle. This equates to annual fuel use of somewhere in the range of 900 – 1,000 litres of fuel at a cost of £1,240 - £1,360 per year.

3.4.3 Electric Vehicles

The total number of electric vehicles (either fully electric vehicles or plug-in hybrids) on the road in Scotland during 2017 was 5,521. Of these 100 licenced vehicles were registered by owners in Argyll & Bute (Q4 2017) with a total of 64 registered at the start of the year (Q1 2017)[6]. The detail of data available does not extend to the number of registered owners of electric vehicles within Oban itself.

[6] https://www.gov.uk/government/statistical-data-sets/all-vehicles-veh01 (Accessed April 2018)

At present there are a total of 35 public EV charging points within Argyll & Bute; of these five are in Oban:

- Tweedale Car Park – one rapid, one fast charger
- Oban Ferry Terminal – one rapid charger
- Oban Railway Station – one fast charger
- Argyll College UHI – one fast charger

Analysis suggests that 15 of the total 35 charging points across Argyll & Bute were used at least once in 2017 (43%)[7]. The average energy use for each rapid charge was 9.6 kWh. Using this figure and considering partial billing information available for the Tweedale Car Park charging points, this suggests that there were around 100 vehicle charges during the past 12 months.

3.4.4 Rail Services

Oban railway station is on the West Highland line running to Glasgow. ORR statistics provide an estimate of the number of passengers either entering Oban station to commence a journey, or exiting Oban station to complete a journey.

The present timetable offers a total of 7 trains daily to and from Glasgow Queen Street with one additional afternoon service to and from Dalmally.

The Sunday service has 3 trains to and from Glasgow in winter and 4 trains in the summer period.

In 2016/17 total entries and exits amounted to 164,332[8]; this is 6.7% lower than the 2015/16 figure of 176,104. Of the total figure:

- Full price ticket entry/exits are estimated at 60,054 (36.5% of total)
- Reduced fare ticket entry/exits are estimated at 102,214 (62.2% of total)
- Season ticket entry/exits are estimated at 2,064 (1.3% of total)

This would suggest that the majority of rail passengers are short term visitors to the town, rather than regular commuters.

3.4.5 Ferry Services

Caledonian MacBrayne operate a number of ferry services from Oban linking to a number of the island communities. The carrying statistics for 2017 provide a guide as to the numbers of passengers and vehicles passing through Oban to use these services[9].

[7] https://www.racfoundation.org/wp-content/uploads/2017/12/Scotland_EV_Network_Makwana_Dec_17.pdf (Accessed March 2018)
[8] http://orr.gov.uk/statistics/published-stats/station-usage-estimates (Accessed April 2018)
[9] https://www.calmac.co.uk/article/5831/Carrying-Statistics-2017 (Accessed April 2018)

Table 8 Carrying Statistics (Ferry Services from Oban 2017)

Route	Total Passengers	Total Cars	Total Coaches	Total Commercial Vehicles	Total Vehicles
Oban to Mull (Craignure)	670,248	168,150	2,041	7,707	177,898
Oban to Barra (Castlebay) and Lochboisdale (South Uist)	47,235	17,107	71	1,094	18,272
Kennacraig to Islay, Colonsay and Oban	22,222	7,336	11	836	8,183
Oban to Coll / Tiree / Barra	5,382	1,839	0	232	2,071
Oban to Coll / Tiree	58,717	18,809	11	1,750	20,570
Oban to Colonsay	13,415	4,930	4	196	5,130
Oban to Lismore	25,971	6,691	22	631	7,344
TOTAL (All Routes)	843,190	224,862	2,160	12,446	239,468

Table 9 Carrying Statistics (Ferry Services from Oban) – comparison of 2017 with 2016

All Oban Routes	2017	2016	% Change
Total Passengers	843,190	809,285	4.2%
Total Vehicles	239,468	229,446	4.4%
Total Cars	224,862	215,518	4.3%
Total Coaches	2,160	2,042	5.8%
Total Commercial Vehicles	12,446	11,886	4.7%

3.4.6 Pedestrian travel

Statistics from Transport Scotland[10] provide an estimate of the number of days in the previous seven days on which a person made a trip of more than a quarter of a mile by foot. This is available per urban/rural classification (Oban is categorised as Remote Small Town). A summary of the latest data is provided here.

Table 10 Data on journeys by foot (Remote Small Town Scotland) - % of respondents

Number of days	As means of transport	Just for pleasure or to keep fit
None	31.3%	43.1 %
1 – 2 days	18.7%	18.1%
3 – 5 days	29.5%	15.5%
5 – 7 days	20.5%	23.3%
1+	68.7%	56.9%

[10] https://www.transport.gov.scot/publication/scottish-transport-statistics-no-36-2017-edition/chapter-11-personal-and-cross-modal-travel/#Table11.11 (Accessed April 2018)

3.5 Environment

Environment - summary

- There are a number of environmental and cultural heritage designations that would need to be taken into account in the design of any large scale local energy generation
- Wind resource in the LEP area can support medium and large scale wind projects
- Solar resource in the LEP area is moderate
- Hydro resource close to the LEP area offers some potential for small-scale run-of-river hydro
- Forest Enterprise Scotland seek to manage local forestry to support local users of wood fuel

In considering potential opportunities for use of different energy supply technologies it is important that any impacts on the local environment are thought about at an early stage. This ensures that the environmental character of the area is maintained, while also avoiding costly or difficult negotiations when dealing with planning permission requirements.

Small scale technologies used on individual buildings, such as Solar PV panels for example, will generally have little or no impact on local environments and habitats. Large scale community assets, such as a large wind turbine, for example, need to consider the potential impacts on a wider area than the scale of the present LEP boundary.

For these reasons it is useful to look in a little more detail regarding environmental designations and cultural heritage listings within a 5 km radius of the present LEP area. A summary is provided here.

Further details are available in Appendix B, Section 4.

3.5.1 Summary of environmental designations and other relevant heritage items

Site of Special Scientific Interest (SSSI) - SSSIs are those areas of land and water that are considered best represent our natural heritage in terms of their: flora – i.e. plants; fauna – i.e. animals; geology – i.e. rocks; geomorphology – i.e. landforms; a mixture of these natural features. There are four SSSI areas (three areas of the same SSSI) within 5 km of the LEP area.

Special Area of Conservation (SAC) – A SAC protects one or more special habitats and/or species – terrestrial or marine – listed in the Habitats Directive. There is one SAC within 5 km of the LEP area.

Marine and Inshore Fisheries Closed Areas (MCA) - Marine and inshore areas closed to fisheries or exempt from closure and their timing, as defined by EC, EU and Scottish Statutory Instrument (SSI) regulatory legislation between 1997 and 2010. Legislation relates to the EU Common Fisheries Policy which is currently under review[11]. There are two within 5 km of the LEP area covering Loch Etive and another covering the Firth of Lorn.

Shell Fish Growing Areas and Shellfish Water Protected Areas - The Shellfish Waters Directive (2006/113/EC) ('SWD') was introduced to protect designated waters from pollution in order to

[11] http://www.scotland.gov.uk/Topics/marine/Sea-Fisheries/common-fisheries-policy

support shellfish life and growth. There are two designations one that is set in the Sound of Kerrera and another on the north side of the island of Kerrera.

Semi Natural Ancient Woodland - There are 457 areas of Semi-natural and planted woodland within 5 km of the LEP area, and tree type and coverage is as follows:

Tree type	Hectares
80-90% Conifer	8.4
Broadleaf	1,108.7
Conifer	2,641.3
Mixed Broadleaf/Conifer	532.5
Scrub	2.5
Grand Total	4,293.4

Environmentally Sensitive Areas (ESA) – the ESA aims to conserve specially designated areas of the countryside where the landscape, wildlife or historic interest is of particular importance and where these environmental features can be affected by farming operations. There are three within 5 km of the LEP area; these cover the islands of Kerrera, Eileen Mor and Maiden Island.

3.5.2 Cultural Heritage Designations

A summary overview of existing cultural heritage designations is provided here. Further details can be found in Appendix B, Section 4.

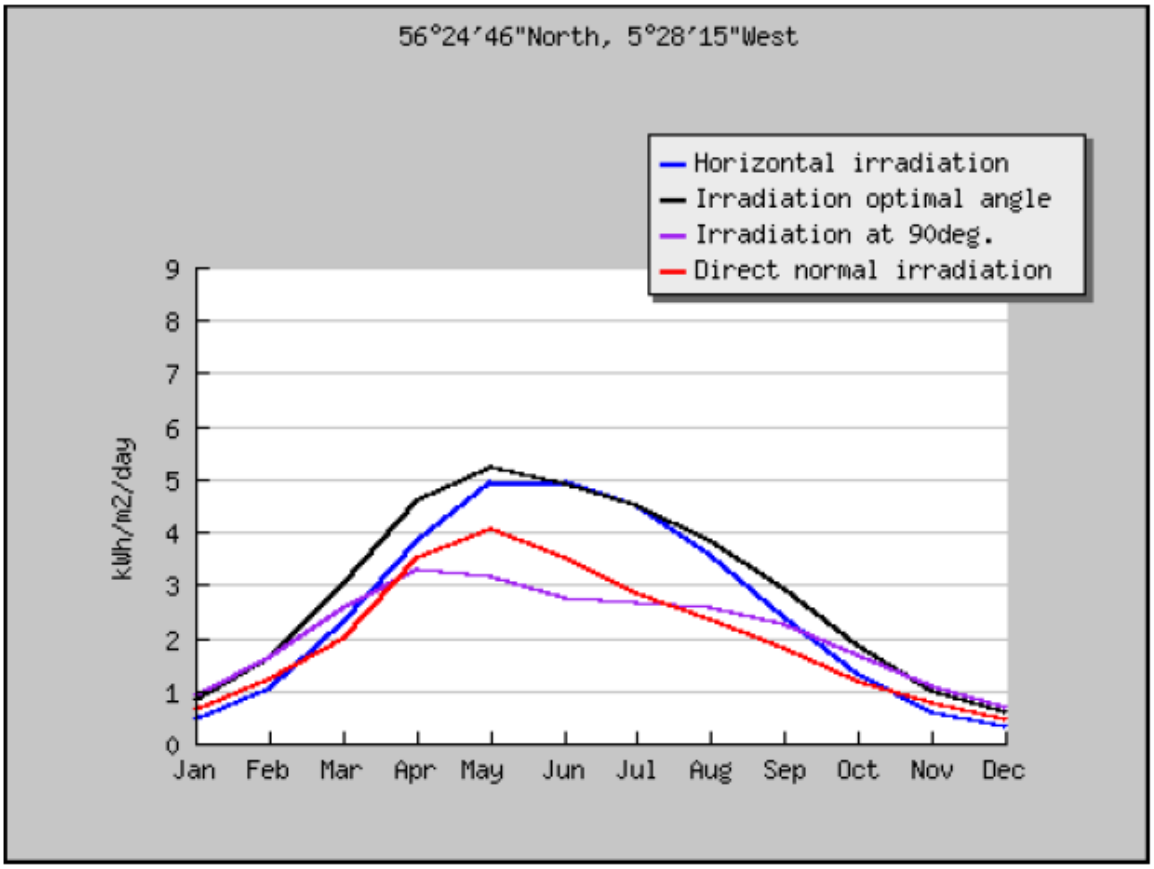
Scheduled Monuments – There are 21 scheduled monuments within 3 km of the LEP area.

Listed buildings – There are 115 category A, B and C listing buildings within 3 km of the LEP area.

3.5.3 Estimated solar resource

Oban can have a solar irradiance of up to 835 W/m^2. The potential annual irradiation for the Oban LEP area is shown in Figure 11. In terms of available resource, it is lower than other parts of the UK.

Figure 11 Estimated annual solar irradiation[12]



Due to the lower annual irradiation of Oban solar technology (solar photovoltaic and solar thermal) commercial viability will depend on the purchase cost of equipment. Over the last few years the system costs have dropped dramatically enabling their installation in areas where previously they were prohibitively costly.

3.5.4 Estimated wind resource

The wind resource in the area is good with an available average wind speed of around 5.5 m/s at 10 m a.g.l. Key considerations can be summarised as:

- Larger turbine opportunities are limited within the study area due to its urban setting;
- There may be opportunities in the wider area near the LEP area, however, they may have already been explored by other third parties;
- Certain areas within the LEP area will have a poor resource at lower heights due to likely shielding by buildings and other infrastructure;

[12] Source: Photovoltaic Geographical Information System, EU Joint Research Council (JRC), http://re.jrc.ec.europa.eu/pvgis/apps4/pvest.php?lang=en&map=europe

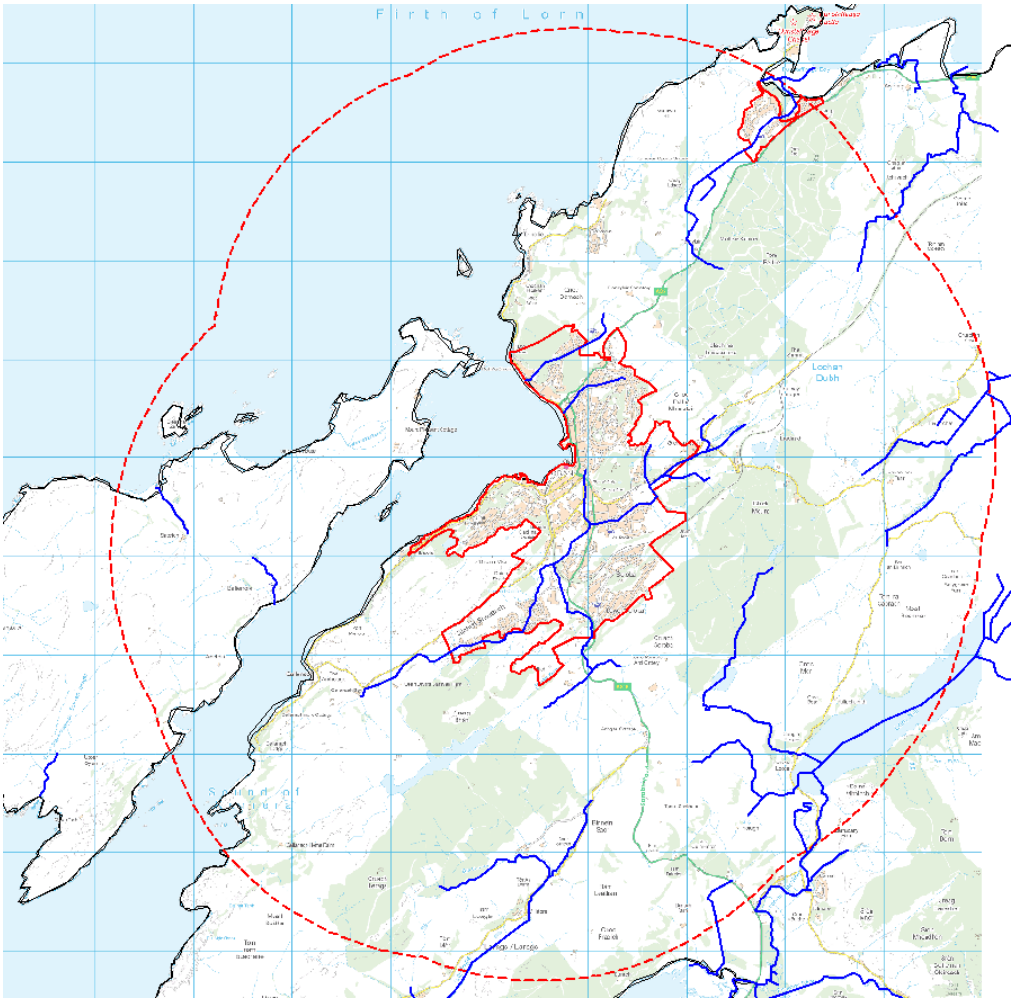
- Resource on the surrounding hills is good.

Further details are provided in Appendix B. Section 4.

3.5.5 Estimated hydro resource

There are a number of watercourses, burns and rivers within 3 km of the Oban LEP area, as shown in Figure 12. Details of these rivers can be found in Appendix B, Section 4.

Figure 12 Rivers and Burns around Oban



3.5.6 Estimated biomass resource

Forest Enterprise Scotland is the agency responsible for managing the National Forest Estate on behalf of Scottish Government Ministers. There are ten Forest Districts; Oban lies within the West Argyll District.

The management priorities and objectives within each District are set out in a Strategic Plan.[13]

In the area including Oban there is a commitment to deliver timber production of at least 500,000 m^3 each year. This includes an increase in the area of broadleaf trees for the production of

[13] https://scotland.forestry.gov.uk/managing/who-manages (Accessed June 2018)

quality hardwoods and woodfuel. There is also a specific commitment that timber brought to the competitive market will be suitable for biofuel projects.

The Strategy also commits to a 'log-shop' event annually for the local sale of specialist timbers to support small-scale wood processing. It also seeks to assist small-scale timber business start-ups with short-term wood supplies.

Further details regarding biomass suppliers within the greater Oban area are provided in Appendix B, Section 4.

4. Energy Baseline

In framing the energy needs of the community in Oban it is useful to understand the present scale of energy consumption and how it is used by homes and businesses. This then supports an understanding of how this can be managed, where largest uses of energy can be identified and informs how changes to demand and supply of energy can have an impact in the local area.

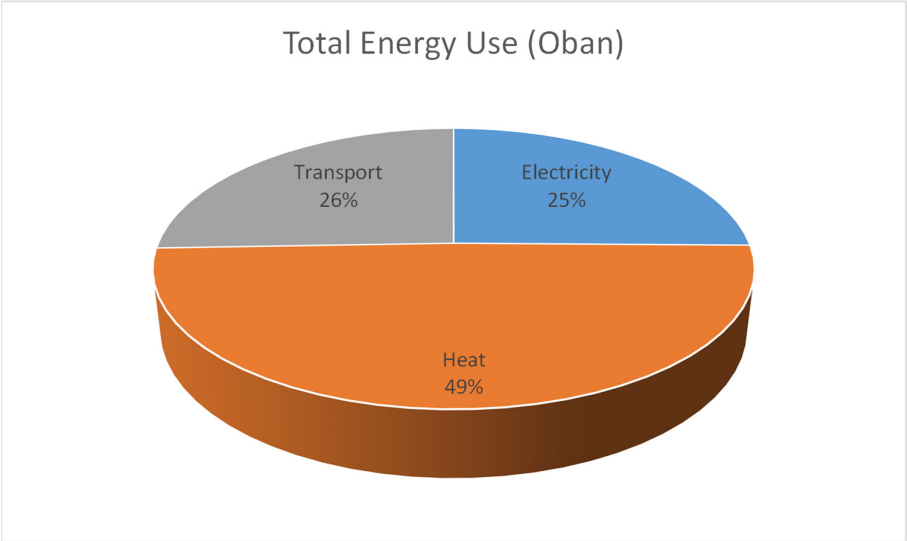
It is helpful to think about the total energy use over a 12-month period, since this then captures some of the fluctuations in monthly demand in responding to weather patterns and the need for space heating and lighting, to meet tourism requirements, for example.

The snapshot of energy use here has pulled together information from a variety of data sources in order to develop the overall figures. These include direct billing information from some organisations as well as data on household energy use modelled using SAP (Standard Assessment Protocol – the formal software used in producing EPC details and evidencing compliance with Building Regulations in the case of new build properties). Where energy bill data is not available, estimates of energy use have been derived using nationally published benchmarks. Transport data has been derived using information available from Scotland's Census and nationally published data from Transport Scotland.

4.1 Overall energy demand

Of the energy data available to the present study a summary of total energy use in the study area is provided here.

Figure 13 Total annual energy use (Oban study area)



A breakdown of these three areas of energy use is provided in the Table here.

Table 11 Breakdown of energy use (Oban)

Source	Annual Energy Use (GWh/yr)	Annual Carbon Emissions (tCO_{2e}/yr)
Residential, *of which:*	120.3	36,803
Electricity	24.3	9,348
Heating	53.9	15,737
Transport	42.1	11,718
Non-Domestic, *of which:*	44.4	14,567
Electricity, *of which:*	17.2	6,624
Hotel & Guest House	2.44	937
Sports Facility	0.34	130
General Retail	7.36	2,828
Large Retail	3.76	1,445
Light Industrial	1.35	519
Public Buildings	1.79	705
Other	0.16	60
Heating, *of which:*	27.2	7,943
Hotel & Guest House	7.66	2,238
Sports Facility	0.94	274
General Retail	6.34	1,853
Large Retail	1.76	514
Light Industrial	5.56	1,624
Public Buildings	4.31	1,258
Other	0.62	181
Total (All Sources)	164.7	51,370

4.2 Future changes

The current Local Development Plan was adopted by Argyll & Bute Council in 2015. A new Local Development Plan (LDP2) is currently in preparation with a view to being adopted in 2020. A Main Issues Report was provided for consultation in late 2017. Further details are provided in Section 5.2.

In terms of future development in Oban, one significant change from the existing LDP would be an overall reduction in the scale of proposed new housing, including in Oban East and Oban South. Given lower housing allocations these developments will form a small proportion of the overall stock of property within the present LEP area.

Any new housing or commercial buildings will need to comply with current Building Regulations and planning guidance, which includes provision for the use of renewable generation in meeting the energy needs of the new buildings.

Given these details the impact of new development in Oban on the overall energy demands within the present LEP area is unlikely to be significant.

Larger scale development is proposed in the Dunbeg area, which is just to the North of the current study area. A Masterplan for proposed development in the area was approved in May 2017[14], subject to subsequent detailed planning permission.

The multi-phase development will result in up to nearly 600 new houses being built, as well as some shops and business premises. At such an early stage in the development process only outline details as to the type of housing that will be built are available. A summary of the present proposals for housing development across the masterplan are provided here.

Table 12 Masterplan for Dunbeg – Proposed Housing Mix[15]

Site Ref	Semi-detached	Apartment	Town House	Terrace	Sub-Total
13	22	104	0	12	138
10	33	24	21	0	78
9	31	16	9	0	56
8	24	8	24	0	56
7	26	16	6	0	48
6	28	8	6	26	68
4	16	8	6	0	30
12	24	8	9	0	41
11	30	0	12	11	53
All Sites	234	192	93	49	568

As an initial estimate of the energy requirement that these units might have details from the masterplan have been combined with EPC data for new build properties of similar design. This gives an initial overall energy demand estimate as shown here.

[14] https://www.argyll-bute.gov.uk/news/2017/may/major-masterplan-approved-dunbeg (Accessed April 2018)
[15] Dunbeg Masterplan documents

Table 13 Estimated energy demand (Dunbeg proposed housing)

Site Ref	Semi-detached		Apartment		Town House		Terrace		Sub-Total (kWh/yr)	
	Heating	Electricity	Heating	Electricity	Heating	Electricity	Heating	Electricity	Heating	Electricity
13	101,363	126,704	801,074	1,001,343	-	-	62,080	77,600	964,517	1,205,647
10	152,045	190,056	184,863	231,079	161,755	202,194	-	-	498,664	623,330
9	142,830	178,538	123,242	154,053	69,324	86,655	-	-	335,396	419,245
8	110,578	138,223	61,621	77,026	184,863	231,079	-	-	357,063	446,328
7	119,793	149,741	123,242	154,053	46,216	57,770	-	-	289,251	361,564
6	129,008	161,260	61,621	77,026	46,216	57,770	134,506	168,133	371,351	464,189
4	73,719	92,149	61,621	77,026	46,216	57,770	-	-	181,556	226,945
12	110,578	138,223	61,621	77,026	69,324	86,655	-	-	**241,523**	**301,904**
11	138,223	172,779	-	-	92,432	115,540	56,906	71,133	**287,561**	**359,451**
All Sites	248,801	311,001	61,621	77,026	161,755	202,194	56,906	71,133	**529,084**	**661,355**

5. Options Appraisal

5.1 Scottish context

Scottish context - summary

- The Scottish Government sees local energy solutions as a vital element of the wider transition taking place across Scotland in the way our energy systems operate
- Encouraging a greater sense of ownership and control among all communities is seen as beneficial, not only in terms of security of supply but also in realising the wider benefits of sustainable, affordable energy among homes and businesses
- No access to feed-in tariffs from April 2019 means local electricity generating schemes need to look to use the energy in the local area in order to gain greatest economic benefit

Scotland's Energy Strategy was published in December 2017[16]. It provides a route map that outlines the vision that the Scottish Government has of what our future energy systems and needs might look like from now out to 2050.

The overall vision is set out in the introduction to the document:

Our Vision

A flourishing, competitive local and national energy sector, delivering secure, affordable, clean energy for Scotland's households, communities and businesses.

This vision is guided by three core principles:

A Whole-System Approach – Work to date has focused heavily on the production of electricity using low carbon sources and improvements to the efficiency with which we use our energy. The strategy recognises that these are important areas of action but need to be worked on alongside heat and transport. All of these elements influence each other in the energy systems that we need to create in future

[16] http://www.gov.scot/Resource/0052/00529523.pdf

An Inclusive Energy Transition – Changes to the whole energy system are driven by a need to decarbonise our energy use in line with targets set out within the Climate Change (Scotland) Act. While this will show Scotland's contribution to global action on climate change, this needs to be done in a manner that is fair to everyone. This means ensuring that inequality and poverty are addressed as well as promoting a fair and inclusive jobs market. Greater efficiency in energy use by businesses and householders offers the opportunity to reduce bills (and associated carbon emissions) leading to lower fuel poverty levels and enhanced competitiveness for business. As part of efforts to ensure that benefits from the low carbon energy transition are enjoyed by all, the Scottish Government intends to create a new energy company. This will be publicly owned and run on a not-for-profit basis.

A Smarter Local Energy Model – Local energy economies are at the core of the transformation of Scotland's Energy Systems. Local solutions for local energy needs, linking local generation and use, provide a platform for vibrant local rural and urban communities. Local Heat & Energy Efficiency Strategies (LHEES) will provide prospectus for local area in terms of investment in energy efficiency, district heating and other heat decarbonisation opportunities.

Further details can be found in Appendix B, Section 5.

5.1.1 Financial support for renewables

For smaller scale renewable generation (of a size up to 5 MW) the UK Government has put in place two support schemes – the Feed in tariff (for electricity generation) and Renewable Heat Incentive (for heat generation). Eligible technologies receive a payment for each kWh of energy that they produce. These payments are received over the operational lifetime of the technology (typically 20 years).

In its Autumn Budget of 2017[17] the UK Government announced a review of the Levy Control Framework (LCF) that ultimately sets outs how much money is committed from UK Government funds to pay for feed-in tariffs, and schemes relevant for large scale generation (over 5 MW capacity), specifically Contracts for Difference and the Renewables Obligation. In the near term this means that no new carbon electricity levies will be put in place until 2025.

This means that there will not be access to feed-in tariffs for electricity generators until 2025. Pre-accreditation applications to the scheme will need to be completed by April 2019.

17 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/661480/autumn_budget_2017_web.pdf (Accessed April 2018)

5.2 Local context

Local context - summary

- Any community led energy or transport projects will need to be developed in a manner that accounts for relevant existing planning policies and guidance documents
- The latest Local Development Plan(LDP2) allocates a number of sites for development in Oban, though these are fewer in scale than in the previous Plan
- Ongoing initiatives by Argyll & Bute Council and other agencies are seeking to reduce overall fuel poverty levels and offer increasingly sustainable energy supply systems

Any changes to the way in which energy is used and generated within Oban won't happen in isolation. It needs to be consistent with local planning requirements and, ideally, support and complement ongoing initiatives and programmes of work already supported by the various organisations and agencies operating in Oban and Argyll & Bute more widely.

A brief overview of relevant details, as a local context for any future development, is provided here.

5.2.1 Argyll and Bute Outcome Improvement Plan (previously the Community Plan and Single Outcome Agreement)

The Argyll and Bute Outcome Improvement Plan (ABOIP) sets out the Community Planning Partnership's (CPP) vision for achieving long term outcomes for communities in Argyll and Bute. The Planning Partners constitute a range of organisations that support the delivery of services to the people of Argyll & Bute, including Argyll & Bute Council, Police Scotland, NHS Highland, Scottish Fire & Rescue Service, HIE, Scottish Enterprise and University of the Highlands & Islands.

This document therefore provides the overall view of how organisations within the Argyll & Bute region intend to manage service delivery to the benefit of all in the community.

The overall objective of the ABOIP for the 10 years to 2023 is that **"Argyll and Bute's economic success is built on a growing population."**

There are six long term outcomes that sit beneath this overall objective:

In Argyll and Bute:

1. The economy is diverse and thriving.
2. We have infrastructure that supports sustainable growth.
3. Education, skills and training maximises opportunities for all.
4. Children and young people have the best possible start.
5. People live active, healthier and independent lives.
6. People live in safer and stronger communities.

Further details are provided in Appendix B, Section 6.

5.2.2 Argyll and Bute Local Development Plan

The Council formally adopted the Argyll and Bute Local Development Plan in March 2015 and it provides the local planning framework for the Council area (excluding the Loch Lomond and

Trossachs National Park area). The next plan (LDP2) is currently being prepared and due for adoption in 2020.

A key area for development in Oban by 2024 is to ensure it is a greener place with community led smaller scale renewable energy projects and larger scale commercial off shore wind, wave and tidal projects that have helped grow the local and national economy.

The LDP also needs to ensure that for the potential for growth to be fully realised through a planned expansion of Oban, including the Dunbeg Corridor, that at the same time addresses known infrastructure constraints, including the need for high quality affordable housing.

A Main Issues report formed the basis of a consultation on LDP2 that ran in late 2017[18]. This proposes retaining its overall vision and setting out a simplified set of objectives, aligned with the ABOIP.

Further details are provided in Appendix B, Section 6.

5.2.3 Argyll & Bute Strategic Housing Investment Plan 2015/16 - 2019/20

The Strategic Housing Investment Plan (SHIP) is an integral element of the Local Housing Strategy (LHS) process and sets out the key priorities for affordable housing development within the local authority area over a five-year period.

Argyll and Bute Council is committed to the national priority of sustainable development through improving energy efficiency and environmental standards in new housing developments, and to the aim of reducing carbon dioxide emissions and ultimately helping to meet the challenge of climate change. This Council, as with all public bodies, is required to meet its duties arising from the Climate Change (Scotland) Act 2009 and the LHS and SHIP have been developed to ensure that the provision of new affordable housing is compliant with the Act.

The Council are looking to improve the quality and condition of housing. The Council requires affordable housing developments to have a low environmental impact and to contribute to the LHS objectives of addressing fuel poverty and to ensure at least minimum standards of sustainability as required under Scottish Building Standards Agency regulations.

5.2.4 Oban, Lorn and the Isles Area Community Planning Action Plan 2017-2020

The Community Empowerment (Scotland) Act requires Community Planning Partnerships (CPP) to have focused action plans to reduce inequalities within a community. The plan is reviewed every 12 months and monitored at quarterly Area Community Planning Group meetings.

The actions contained within it do not feature in any other plans and complement ongoing activity from individual organisations.

A key aspect of the present plan was that the Scottish Index of Multiple Deprivation 2016 ranked one of the twenty-seven data zones within Oban, Lorn and the Isles as being among the 15% most overall deprived data zones in Scotland. This data zone is within Oban South.

The actions identified for Oban are:

- Identify where small business units could be sited and supply:
    - European Marine Science Park
    - Other areas

[18] https://www.argyll-bute.gov.uk/ldp2 (Accessed April 2018)

- Investigate road transport issues and develop solutions
- Investigate transition between children and adult disabled services, and set up focus group.
- Review and explore parking arrangements within the town

5.2.5 Oban Regeneration - The Lorn Arc Programme

The Lorn Arc Programme aims to develop vital infrastructure which will attract new businesses to the Lorn Arc area and create jobs for the people of Argyll and Bute. This started in 2014 with a £600,000 project to enable a business park development at Oban Airport.

The remainder of the £18.9M will be invested in the Dunbeg Gateway, the Halfwayhouse roundabout/ Dunbeg development road, the south Oban development zone, the North Pier and the Barcaldine business space.

This area has significant economic growth potential in the marine science; marine tourism; aquaculture and renewable energy sectors. Argyll and Bute Council's vision is to turn the Oban area into the main hub on the west coast of Scotland for offshore renewables.

5.2.6 Argyle & Bute Renewable Energy Action Plan

Argyll and Bute's Renewable Energy Action Plan has been developed to assist in realising a vision for the development of renewable energy:

"Argyll and the Islands will be at the heart of renewable energy development in Scotland by taking full advantage of its unique and significant mix of indigenous renewable resources and maximising the opportunities for sustainable economic growth for the benefits of its communities and Scotland."

In order to support this vision, the Council has recognised the need for continual improvement of infrastructure and a growing skills base in renewables.

It is recognised that part of this is also supporting community based renewables and the benefits they generate through the Community Renewable Opportunity Portal (CROP), direct support and events, as well as investigating opportunities for shared ownership of renewables.

Further details are provided in Appendix B, Section 6.

5.2.7 Argyll and Bute Council Carbon Management Plan

The Argyll and Bute Council Carbon Management Plan (CMP) is in the process of being updated. The previous CMP published in 2009 identified a target to reduce its carbon emissions by 20% by March 2014. The low carbon vision is to:

"Reduce the Council's greenhouse gas emissions by harnessing the imagination, commitment and innovation of our staff and the deployment of smart, well researched and reliable technologies which complement and maximise the fantastic opportunities afforded by our weather, landscape and seascape within Argyll & Bute".

Areas of action in recent years have included:

- Development of the new Oban High School building
- Ongoing rationalisation of operational sites to suit needs of services
- Programme of LED replacement for street lamps
- Ongoing energy efficiency improvements to Council building stock including re-lamping where practical to do so
- Development of low carbon generation where feasible

- Reduction in staff business mileage and associated travel planning
- Fuel saving initiatives around Council fleet vehicles
- Ongoing staff awareness and energy saving programme

Under the requirements of the Climate Change (Scotland) Act Argyll & Bute Council is required to report annually on its carbon emissions associated with service delivery and ongoing initiatives to mitigate or reduce these.

5.2.8 Argyll and Bute Council Single Investment Plan

Argyll and Bute Council's Single Investment Plan has been developed in order to align future infrastructure investment with strategic economic priorities to help drive a step change in economic activity in the area.

It provides an overview of where strategic investment is seen as supportive of the service delivery outcomes set out in the ABOIP.

The proposals within this are not fully costed, and it is recognised that the scale of investment required to bring all of the aspirations set out in the Investment Plan can't be achieved via Council funding alone.

One key priority area is to improve transport links and facilities. This includes investigating options to reduce congestion and improve traffic flows in and through Oban Town Centre through new/upgraded road, parking and active travel infrastructure and upgrading active travel infrastructure across the region.

Additionally, the plan looks to the main train companies to make rail enhancements to increase service frequencies and reduce journey times to the Central Belt from key settlements such as Oban.

5.3 Community commentary on areas of action

As part of a wide-ranging community engagement process, a survey was posted online for people to reflect on aspects of how they use energy at the moment, what areas of action they would like to see moving forward and what barriers they perceive as needing to be overcome in order to achieve change.

Further details of the overall responses are provided in Appendix A.

As noted in Section 1.4, in terms of community scale renewable energy generation projects, individuals wanted projects to be prioritised in order to deliver benefits relating to:

- Lower fuel poverty
- Reduction in electricity prices
- Increased local energy generation

There was specific interest in installation of renewable energy systems that could supply to homes and businesses. There was also interest in the value that energy storage could play in enabling full use of the energy output from these schemes.

In terms of energy use in homes, respondents were asked to rank a number of potential projects in terms of their own prioritisation (a score of 1 was the highest priority; a score of 5 the lowest priority). On this basis the top three areas in which the community would like to see further action are:

- A home insulation and draught-proofing project (weighted average score 1.74)

- A home heating upgrade project (e.g. replacing old boilers, installing more efficient heating, improved control systems) (weighted average score 1.55)
- A lower energy tariff for Oban residents (pay less for the energy you use) (weighted average score 1.41)

A similar question was asked in relation to transport and where respondents would like to see action. Again, respondents were asked to rank a number of potential projects in terms of their own prioritisation (a score of 1 was the highest priority; a score of 5 the lowest priority). The three areas in which the community would like to see action are:

- Support to individuals to own Electric vehicles (weighted average score 1.5)
- Low emissions buses (e.g. electric or hydrogen powered buses) (weighted average score of 2.0)
- Walking and cycling paths (weighted average of 1.76)

Respondents were also asked about the present challenges they face in changing behaviour associated with energy and transport. In terms of energy use in the home the main barriers were identified as:

- Cost of change (80% of respondents)
- Not the property owner (27% of respondents)

In terms of changing transport behaviours, particularly increased use of public transport and active travel to work, there were three main challenges identified:

- Lack of cycle paths (43% of respondents)
- Reliance on own vehicles for their job (42% of respondents)
- Inability to afford change (38% of respondents)

Further details are provided in Appendix A.

5.4 High level technology review

There a number of technologies that could be considered for use within the Oban area. The following section provides a brief overview of the major technologies that could be considered and some details regarding how they work and an overall suitability rating in the context of energy needs in Oban.

A simple Red/Amber/Green qualitative scoring system is used. Red means that the technology is not well suited to Oban's needs; Green means that it is well suited to Oban's needs.

Table 14 Technology overview (Oban)

Overall Technology suitability for Oban	Technology	Commentary
HIGH	Heat Pumps	Air-source heat pumps offer potential alternative to electric heating. Ground source and water source heat pumps are more expensive options (more civil works are required during their installation). Fitting to existing properties needs to be linked with building fabric improvements.
	Biomass	Potential cost effective alternative to oil fired systems. Not a direct alternative for electrically heated properties (requires wet heating system).
MEDIUM	Wind	Wind resource is good in the LEP area. Opportunities for medium and small scale turbines are likely to exist.
	Gas CHP	No mains gas supply to the LEP area makes this option expensive. Alternative gas supplies would need to be imported and processed prior to use in any system.
	Biomass CHP	This is an expensive option and could not operate effectively at the scale of heat demand within the LEP area.
	Solar PV	Rooftop solar PV offers potential for householders. There is limited immediate land area available within the LEP for larger ground-based systems.
	Energy from waste	The main potential route would be anaerobic digestion. Costs are likely to be prohibitive since there are no existing food waste collections in place for households. Scale of generation would be low.
	Energy storage	Household scale storage systems (often linked to solar PV) are expensive. The benefit of individual storage would be limited for THTC users given a lower tariff for electricity overnight. Multi-property storage systems could be viable.
	Tidal	The scale of system is likely to be larger than the demand for electricity in Oban. This will be constrained by present grid capacity and make the scheme unviable.
	District Heating	The size and distribution of heat demand in the LEP area is not well suited to a district heating scheme. Small scale clusters of housing served by a communal system may be viable.
	Electrolysers	Given potential wind output available due to constrained export capacity community-scale electrolyser systems could be viable. These would provide a means of producing hydrogen that could be used as a transport fuel.

LOW	Solar Thermal	Given local solar resource there will be limited benefit from solar water heating for the majority of households and businesses. A supplementary heating system would need to also be in place.
	Geothermal	An initial pre-feasibility study suggests geothermal resource. Any system would be expensive to install (deep boreholes and associated civil works) and require the ability to supply all heat users via hot water. Those with electrical heating at present don't have the necessary plumbing in place.
	Fuel Cells	Some limited potential use in the LEP area if able to supply larger non-domestic building.
	Hydro	There are a number of local water courses offering potential for small scale hydro schemes.
	Wave	The scale of system is likely to be larger than the demand for electricity in Oban. This will be constrained by present grid capacity and make the scheme unviable.

6. Review of local options

The preceding sections have shown the diverse mix of energy use and supply systems within Oban. There is no single technology or project solution that will tackle the existing and future energy requirements outlined in this report.

In setting out some opportunities for consideration the following details are seeking to achieve a balance between meeting the objectives of the LEP as determined through wider community consultation and the technical challenges that each option faces.

The following section looks at the details of how the main areas of community interest can be tackled.

6.1 Cheaper Energy Bills

In seeking to reduce energy bills for end consumers there are three main strands of opportunity:

- Demand management to reduce overall energy needs
- Access to lower tariffs for energy use in the supplier market
- Alternative sources of energy supply

6.1.1 Demand Management

Energy Efficiency Awareness and Support

Support is already available to the community of Oban via a number of agencies including Argyll & Bute Council, Home Energy Scotland, Resource Efficient Scotland and Energy Saving Trust.

- Argyll & Bute Council can apply for funding (via the Scottish Government Home Energy Efficiency Programmes Scotland – Area Based Scheme) available to install energy efficient measures in eligible properties. Residential properties owned by Argyll & Bute Council and local Housing Associations are required to meet national targets within the Energy Efficiency

Standard for Social Housing (EESSH) to ensure their properties achieve a minimum standard of efficiency.

- Home Energy Scotland (HES) – provide clear and impartial advice on saving energy at home, including travel. HES help people access Government-funded energy efficiency schemes and support from local service providers. Their advice covers the actions that can be taken and support available to help save money on energy bills and transport costs. They provide information on home energy efficiency schemes and financial support available including:
    - Warmer Homes Scotland
    - Area-based scheme (see above)
    - Home Heating Cost Reduction Scheme
    - Scottish Government interest free loans and cash back
    - Renewable heat incentives and feed-in-tariffs
    - Other local and national schemes as they become available.

  Home Energy Scotland is funded by the Scottish Government and managed by Energy Saving Trust.
- Resource Efficient Scotland – provide energy efficiency support to businesses. They can work with the local community and the steering group to raise awareness within the business community in Oban on what is available to them. They can:
    - Work with local business facing organisations and advisors to disseminate information on the support available
    - Provide stakeholder packs with promotional text and relevant case studies/testimonials for newsletters, emails, social media feeds etc to assist with local engagement efforts

  The programme is delivered by Zero Waste Scotland and funded by Scottish Government and the European Regional Development Fund.
- Energy Saving Trust – provide clear and impartial advice on energy saving. This includes support in accessing funding through grant and loan schemes. Energy Saving Trust's work in Scotland is funded by the Scottish Government, and transport advice is funded by Transport Scotland, the Scottish Government's national transport agency.
- ALIenergy - works locally to promote sustainable energy use and renewable energy generation, to address fuel poverty and reduce carbon emissions

Local Housing Associations also continue to provide support to tenants in managing their energy use within their homes and seeking opportunities to improve control of heating and electricity use.

These support schemes will continue to offer an important first action point in supporting residential and business energy users understand their own energy use and some of the options that they have to help reduce their overall demand.

Proposed Action Point #1

Deliver community energy awareness event, showcasing the emerging Local Energy Plan and the work of the above agencies in supporting ongoing efforts to use energy efficiently and further develop renewable energy opportunities. This could include trial opportunities to use electric vehicles and/or electric bikes.

Proposed Action Point #2

Community to work with relevant agencies to promote local understanding and uptake in actions relating to energy efficiency and transport among non-domestic organisations. This to include

promotion of potential support available through Resource Efficient Scotland and Energy Saving Trust.

Access to lower tariffs

In terms of residential energy use the predominant primary fuel sources are electricity and gas supplied via the SIN.

The majority of non-domestic energy users use electricity as a primary heating source as well as general power requirements.

From a residential perspective, there continues to be work to open up the wider electricity market to all consumers in order to offer the potential for cheaper energy bills.

In the electricity market this means awareness raising of new entrants in the market offering competitive tariffs that are cheaper than standard tariff packages typically in use at present within Oban. This is particularly important for customers on Total Heat Total Control (THTC) or Economy 7/10 tariffs. A number of emerging offerings in the market provide opportunities for cost savings on consumer bills.

However, these are often short term packages (e.g. 12 month tariff reduction). This means a need to also offer support in managing the process of application (particularly for more vulnerable community members) and in assisting renewal packages to ensure sustained lower fuel bills.

A Competitions and Market Authority (CMA) report in September 2017[19] recommended a number of actions that increase the requirements on energy suppliers to provide suitable advice to consumers to make switching tariffs easier and more transparent.

For consumers using heating oil there are a network of heating oil clubs set up in various communities across Scotland who co-ordinate fuel purchase in order to deliver bulk discount benefits to individual consumers. There is no existing heating oil club in Oban, though some satellite villages do have clubs in operation (e.g. Benderloch).

Proposed Action Point #3

Community to work with Argyll & Bute Council, Housing Associations and Citizens Advice Scotland, along with other agencies, to promote awareness of potential alternative electricity tariffs which residents can explore. Seek means of support to be provided in switching account details and subsequent follow up to avoid return to standard tariffs (where short term tariffs are available).

Alternative Sources of Energy Supply

Initial advice from Home Energy Scotland and Resource Efficient Scotland can assist homes and businesses in identifying opportunities for alternative energy sources to be used in their individual buildings. This advice also provides details of how these can be funded via existing interest free loan schemes.

Energy Saving Trust can provide similar advice in respect of electric/hybrid vehicles and the installation of vehicle charging points in individual homes or business premises.

Larger scale energy generation schemes are considered in a later section.

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[19] https://www.gov.uk/government/news/cma-makes-switching-easier-for-700000-uk-energy-customers (Accessed April 2018)

6.2 Warmer Homes that are better insulated

Home Energy Scotland offers a primary route by which individual households can determine the insulation needs for their property and what support can be provided in terms of funding these measures and sourcing reputable suppliers to carry out the works.

Housing Associations continue to be driven by national targets within the Energy Efficiency Standard for Social Housing (EESSH) to ensure that all properties under their management achieve a minimum standard of efficiency. This means ongoing investment in the housing stock under management within Oban.

The Local Authority, via the Home Energy Efficiency Programme Scotland (HEEPS) Area Based Schemes (HEEPS: ABS) also continue to support insulation improvements for hard to treat homes.

The direct impact of any measures to improve energy efficiency will depend on the individual properties. However, the Home Analytics database dataset provides a means of estimating the impact of a range of energy efficiency interventions across the residential stock in Oban. This therefore offers an indication of the scale of impact that this can provide.

While delivery of these measures is best delivered in conjunction with Argyll & Bute Council and other agencies, it is useful to consider the relative impact of these individual measures. A summary is provided here.

The larger and more disruptive works would be the delivery of both internal and external wall insulation programmes and replacement of existing electric heaters with high efficiency storage heaters.

In terms of the energy cost savings delivered for each pound of expenditure, the cavity wall, room in roof insulation and loft insulation measures are estimated to offer a simple payback in a period of up to 5 years.

Internal wall insulation and underfloor insulation is estimated to offer a simple payback in a period of 10 – 15 years.

The remaining measures would offer a simple payback in excess of 20 years.

Different dwellings will benefit to a larger or greater extent depending upon individual circumstances. Measures with longer payback periods can be used in a targeted way for particular households, where finances can be made available.

Alongside the existing funding schemes and programmes described in Section 6.1 the Scottish Government is currently developing its EES Programme (Energy Efficiency Scotland Programme) to be delivered from 2020. This will encourage investment programmes of works that combine action in social housing and owner occupied dwellings in order to target a small geographical location.

Table 15 Insulation and energy efficiency measures (residential stock)

#	Measure	Estimated Capital Cost (£)	Estimated Energy Cost Saving (£/yr)	Estimated Energy Saving (kWh/yr)	Estimated Carbon Emission Saving (tCO_{2e}/yr)
1	Replacement of incandescent lightbulbs with LED equivalent	£68,248	£71,962	479,748	184
2	Loft insulation top-up	£463,544	£73,410	489,397	188
3	Room in roof wall and sloping areas insulation	£276,855	£33,739	224,925	86
4	Internal wall insulation	£3,575,411	£156,237	1,489,755	573
5	External wall insulation	£6,291,172	£165,981	2,621,321	1,008
6	Cavity wall insulation	£179,151	£76,114	507,424	195
7	Underfloor insulation works	£4,042,815	£237,702	1,684,506	648
8	High efficiency storage heaters	£13,112,557	£339,999	5,463,565	2,100
9	Replacement of existing oil boilers	£524,079	£31,122	218,366	84
10	Replace entry doors with modern insulated uPVC equivalent	£2,234,198	£62,529	930,916	358
11	Install A-rated windows (uPVC frames)	£14,469,867	£237,592	1,583,946	609

Proposed Action Point #4

Argyll & Bute Council, Housing Associations and other relevant agencies to continue to seek funding for range of insulation improvements and heating system upgrades for individual residential dwellings. This to include promotion of support for owner occupier householders as well as tenants.

6.3 Increased local energy generation

6.3.1 Existing Housing

Given the predominance of electric heating in the existing housing stock promoting greater use of Solar PV, where there is suitable roof areas available, will support actions to reduce energy bills and increase local energy generation. This scale of generation does not require planning permission and is not restricted by current grid capacity.

Proposed Action Point #5

Owner occupiers and landlords to be encouraged to consider installation of Solar PV where roof areas are suitable. Exploration of potential for community body to take on a role in investment or delivery of programme of Solar PV installation.

Consumers on the present SGN gas network do not have a cheaper alternative fuel supply that offers a practical alternative. Any fuel switching would mean not only changing the boiler in the dwelling but also any cooking appliances also connected to the gas supply. This is costly and potentially difficult given physical space constraints for new boilers in many dwellings. Alternative fuels would be oil or biomass, neither of which are available from local sources.

Micro-CHP systems are available that operate using natural gas. These systems provide both space heating and hot water supply as well as some electrical output. These systems are typically larger than standard boilers so will be physically constrained in a number of dwellings. The ratio of heat output to electricity generation is typically better suited to older properties with higher heat demands.

Houses using oil as a heating fuel could look to switch to using biomass as an alternative. Biomass boilers would be at least as large as existing oil boilers and in some cases need more physical space for installation. There is also a need for storage space for the biomass fuel, in a location accessible to fuel delivery vehicles. Biomass comes either in chip or pellet form; pellets offer the most energy intensive form and greater reliability in terms of fuel efficiency. Pellets would be imported from outside the Oban area (rather than produced from local forestry). An alternative is to use air source heat pumps, which would avoid the additional fuel storage requirements of biomass. However, this would also best be served with enhanced insulation works in order to reduce heat losses and therefore maximise value of the heat output from the heat pump. Ongoing maintenance requirements for an air source heat pump are likely to be lower than those for either an oil or biomass boiler.

Retrofit of heat pumps (particularly in flats) will be difficult to achieve since the heat output from such systems is lower than existing systems. This means that the supply of heat into the home is best served by underfloor heating. Otherwise, large conventional designs are required to supply sufficient heat. These options can be expensive to install, significantly disruptive if fitting underfloor systems, and may not be feasible in smaller properties given physical space constraints.

6.3.2 New Build Housing

New build housing should typically require lower space heating input per unit floor area than existing buildings given current Building Regulations requirements. The opportunity to use heat pumps (typically air source heat pumps) offers an alternative to standard electric heaters. These can be integrated with rooftop solar PV where roof orientation allows.

Where a number of housing units are built in a single development phase then the potential for a district heating schemes can be explored. At the scale of development likely in the present development area this could be served either using a biomass boiler or a large scale ground source heat loop. Given the present capacity available to new connections on the SGN gas network this isn't a fuel source that could be used at any large scale.

The proposed development at Dunbeg offers an opportunity to consider district heating solutions.

Proposed Action Point #6

Seek designs for new build dwellings that use heat pumps (air or ground source) and other renewable options where appropriate as the primary heat source alongside high levels of insulation and fabric.

6.3.3 Non-domestic buildings

Similar considerations are true for non-domestic buildings in the study area.

The majority of businesses in Oban have relatively low heating energy needs so would typically benefit from any local sources of generation that provide electricity. Solar PV is therefore an immediate technology option for individual buildings.

The existing larger heat consumers in the area all have primary heating assets that are relatively modern and sized for their needs. There is little scope for surplus heat from these sources being used to supply a proposed district heating scheme. The density of development within central Oban, while offering a medium to high heat demand density, would make any retrofit district heating scheme prohibitively expensive given the amount of hard dig that would be required to route pipework and associated services. The other barrier to district heating is the extent of use of electricity as a primary heating fuel. This means many buildings are using a dry heating system, rather than a wet radiator system that would best suit any district heating scheme. The number of flats in the area also limits the physical space that is available for plumbing services and the heat interface units (HIUs) that are typically used to convey heat from a district heating scheme into individual properties.

Retail buildings are typically periodically refurbished either as part of a landlord's ongoing management of the property or at the point where there is a break in lease agreements (and the tenant moves out). Changes to heating systems are likely to be localised and small scale (particularly given the typical scale of demand), while ventilation requirements are typically minimal. Re-lamping of lighting to use LED or highly efficient fluorescent tube lighting will also offer some saving potential.

Larger supermarket buildings are also subject to periodic refresh. One area of innovation in this sector has been to look at using ground source heat pumps as a means of providing space heating and cooling. In particular, this is a means of using the large amounts of waste heat that are exhausted from fridges and freezers in order to maintain cooling for perishable produce.

6.3.4 Community Opportunities

There may be opportunities for energy generation via a number of different technologies and the present plan is not excluding any specific proposals as they arise.

Offshore energy generation, for example, may offer a future avenue of development for tidal, wave or offshore wind generation. Previous proposed schemes have not come to fruition and the present process of auction that such large scale developments are subject to in determining any level of market support makes their development highly marginal for investors. The technology continues to develop and this may mean that development costs come down in future.

At present the combination of grid capacity constraints and market challenges for the sale of generation make such development unlikely to occur in the near future. Given the size of any such development, any future benefits of this technology would be in supply to the wider electricity grid, rather than direct supply to Oban.

In terms of immediate opportunities for community involvement in local energy generation there are a number of areas for future exploration as summarised here.

Moleigh – The waste management site at Moleigh has existing capacity to export electricity from any on-site generation. An ongoing feasibility study is looking at the options as to how this could be used and best configured for the benefit of the community.

Proposed Action Point #7

Continue to explore energy generation potential at the Moleigh site and any potential community involvement in the development or operation of any installed generation.

Corran Esplanade – There is an early stage exploration of the potential to use heat from wastewater via a heat pump to serve the needs of the Corran Halls and (potentially) the neighbouring hotel. This would replace the present heating system in the Corran Halls.

Proposed Action Point #8

Maintain dialogue with relevant parties during any feasibility work to ensure that potential benefits for the local community are identified

Anaerobic Digestion – Ongoing waste management targets in Scotland seek to avoid biodegradable waste being landfilled, due to the associated greenhouse gases that arise as the waste decomposes. At present there are no direct collections of food waste from residential properties in Oban; catering facilities are obliged to arrange for collection of food waste if operating at an eligible scale. There is potential to use the food waste arisings from the Oban area in the process of anaerobic digestion, which produces a biogas that can be used as a heating fuel or in electricity generation.

The main initial costs associated with this proposal would be the logistics costs associated with the collection of food waste (both in terms of vehicles to collect waste from properties and the supply of individual bins to each household). A suitable site would also have to be found to store the waste and install the anaerobic digester tanks and biogas collector vessels.

While it is likely to be Argyll & Bute Council that would lead any food waste collection schemes, there is potential for community involvement in any subsequent anaerobic digestion facility.

Proposed Action Point #9

Explore viability to develop or support changes to local food waste collection and potential development of medium scale anaerobic digestion plant.

Hydrogen generation – There is limited scope for any medium to large scale onshore wind development in the surrounding areas beside Oban given the extent of development (actual and proposed). Given the existing grid capacity constraints it is possible that a number of existing wind farms are operating below their maximum potential output given an inability to export all of the electricity generated. One potential means of using this constrained capacity is to use battery storage. However, this is not feasible for remote wind farms since there will be no means of using the stored power within the vicinity of the wind turbines.

An alternative approach would be to use an electrolyser to generate hydrogen, which could then be used either as a fuel for fuel cell hybrid vehicles or as a storage medium to then be converted back into electricity for use in Oban. Ferries are another potential consumer of hydrogen in future.

There would be scope for community involvement in setting up a hydrogen production facility in partnership with an existing wind farm (in the first instance). This might lead to further facilities depending upon the scale of local demand.

Proposed Action Point #14

Carry out feasibility study looking at potential future demand for hydrogen within Oban and the scale of electricity generation required to generate bulk scale hydrogen.

6.4 Transport

Transport issues in Oban are already addressed by a number of local policies and plans as outlined in Section 5.

Given the traffic associated with ferry use, measures that potentially address a combination of the volume of traffic and the scale of associated exhaust pipe emissions are valuable to the community in creating a better local environment.

The phase out of sales of new conventional diesel and petrol vehicles by 2032 in Scotland means a growing uptake of either battery fed electric vehicles (EV) or hybrid vehicles using fuel cell technology (ULEV) and hydrogen as a fuel. There have been trials of electric buses already in Oban, while hydrogen buses are being used in Aberdeen and London among other locations in the UK and globally.

6.4.1 EV/ULEV Transport Pool or Smart Travel

At present, even with existing grant funding in place, the price of most EVs is much higher than conventional vehicles. One means of encouraging uptake would be to set up a EV vehicle pool within Oban, supported by multiple public agencies. This would offer a base demand to develop car sharing among staff travelling relatively short distances through work each day. This would immediately reduce transport emissions within the Oban area, displacing existing conventional vehicles (supporting ongoing Carbon Management Plans).

Depending upon the scale of the scheme this could be extended to offer public use of vehicles outwith office hours and during weekends. This potentially assists in reducing visitor related traffic, both from the mainland and the islands (short term hire would displace the need to bring vehicles over to the mainland).

Given existing charging points in Tweedale Car Park and at the ferry terminal these could be points to extend the number of charging points.

Alternatively, if hydrogen fuelled vehicles are adopted then this could provide a market for hydrogen produced locally.

An alternative to development of a vehicle pool would be to set up a small fleet of minibuses to provide transport for short routes. Smart technology would enable passengers to request collection from specific stops and the minibus could then devise the fastest route to collect passengers (using route finding software). This would reduce vehicle congestion within Oban and associated vehicle carbon emissions.

Proposed Action Point #10

Explore initial potential of setting up an inter-agency car pool of EVs or ULEVs, including role undertaken by existing local vehicle hire businesses

6.4.2 Promotion of electric vehicles

It is clear from the wider consultation survey that at least some residents in Oban are keen on adopting electric vehicles but feel that they are too expensive at present to appear affordable. The cost of vehicles is also prohibitive for local bus companies to immediately switch to using an all electric fleet.

From an ongoing maintenance view, electric vehicles offer advantages over conventional vehicles both in terms of general servicing requirements and the cost of fuel.

There may be scope to secure funding from Scottish or UK Government initiatives to support the roll out of EVs and/or ULEVs among the wider community of Oban. Ongoing awareness raising of existing support schemes and loans can encourage businesses as well as households to switch to ULEVs.

Local air quality will be enhanced by any significant shift away from conventional vehicles, supporting positive health among the community.

Proposed Action Point #11

Promote awareness of existing grant and loan schemes to support the increased uptake of electric vehicles in Oban. Explore funding opportunities to support capital investment in electric vehicles and leasing models that avoid costly expenditure for households.

6.4.3 Active Travel Plan

There is no straight forward means of tackling traffic flows in and through Oban. This makes extending dedicated cycle routes difficult, particularly given the existing national cycle route that follows the route of the main road both North and South of Oban.

Promotion of e-bikes and charging points, along with any traffic planning to route traffic flows away from certain areas, would potentially encourage greater cycling within Oban.

This would assist in reducing overall congestion and associated vehicle emissions.

Proposed Action Point #12

Continue to seek traffic management and overall flow reduction measures within Oban. Linked to this seek to develop safer cycle routes and promote use of e-bikes with associated charging points.

6.5 Smart meters and smart grid

The value of an electrical grid system is the ability to balance the supply of electricity with the demand (loads) placed upon the system. At sufficient scale this ensures that voltage and current levels remain within required limits for the safe operation of appliances and equipment.

Trials, such as those on Mull and in Fintry, have looked at the potential to use this approach at a more local scale. In the case of Mull, for example, a local hydro scheme output was matched to charging requirements for electric heaters in individual homes. The system was able to prioritise the heaters in order of those that needed to be charged most urgently.

These more localised systems offer the potential to enable more efficient use of local energy generation by avoiding periods where electricity is either purely exported to the wider grid or is curtailed due to lack of capacity on the grid.

To enable this system to operate the first step is to have smart meters installed in individual homes and at sites with electricity generation. These meters need to be capable of two-way communication so that demand can be signalled by individual buildings and these requests can be processed by the

supplying assets. There are also some issues that would need to be explored in terms of the ability of the local grid to cope with the anticipated power flows.

In a fully operational smart grid, local energy generation from wind turbines, solar PV and any other significant sources, as well as potential battery storage could be linked together to deliver electricity requirements in the local Oban area.

While there is an ongoing roll out of smart meters across the UK, led by the larger electricity suppliers, there is no standard design for all providers. This means that a dialogue with the local DNO would be required to understand the capacity of any smart meters presently being offered to householders would have in supporting any future smart grid.

Otherwise the benefit of the smart meters is limited to householders and businesses being able to see in real time how their energy consumption changes.

Proposed Action Point #13

Undertake discussions with DNO to determine most appropriate smart meter designs to be rolled out in Oban facilitating a future smart grid.

6.6 Initial Options Appraisal

An appraisal of the estimated benefits and limitations of the opportunities reviewed in the previous sections is provided in Appendix B. A summary of the opportunities, providing an initial assessment of the overall benefit of each option, is provided here.

Table 16 Description of measures summary

#	Measure	Description of measure	Overall rating
1	Replacement of incandescent lightbulbs with LED equivalent	Replacement of older style bulbs with LED equivalent	HIGH
2	Loft insulation top-up	Upgrade and top-up of existing loft insulation to at least 250 mm thickness	HIGH
3	Room in roof wall and sloping areas insulation	Upgrade and top up of room in roof insulation to at least 100 mm thickness	HIGH
4	Internal wall insulation	Installation of internal wall insulation (partition walls or battened)	MEDIUM
5	External wall insulation	Installation of external wall insulation as rendered surface	MEDIUM
6	Cavity wall insulation	In-fill or replacement of cavity wall insulation	HIGH
7	Underfloor insulation works	Installation of insulation material beneath existing suspended floorboards	MEDIUM
8	High efficiency storage heaters	Replacement of existing electric heaters with modern equivalent and additional controls	MEDIUM
9	Replacement of existing oil boilers	Replacement of existing oil boilers with condensing, high efficiency equivalent	LOW
10	Replace entry doors with modern insulated uPVC equivalent	Replacement of main entry doors with uPVC insulated equivalent	LOW
11	Install A-rated windows (uPVC frames)	Replacement of existing glazing with double glazing (uPVC frames)	LOW
12	Promotion of use of heat pumps (air or ground source) in new build properties	Promote use of heat pumps within new build development properties in the community	HIGH
13	Explore potential of Moleigh site to provide local energy generation	Continue feasibility work to understand potential options for on-site generation and contribution to local energy supply by using the Moleigh site	HIGH
14	Explore use of heat from wastewater (Corran Esplanade)	Maintain dialogue with relevant parties during any feasibility work to ensure that potential benefits for the local community are identified	HIGH
15	Anaerobic digestion facility	Investigate use of biodegradable waste to generate biogas, to be used as local fuel	MEDIUM
16	Explore hydrogen generation potential with local wind farms	Explore potential to use output from constrained local wind generation to feed an electrolyser generating hydrogen to be used as transport fuel or for electricity generation locally	HIGH

#	Measure	Description of measure	Overall rating
17	Inter-agency car pool	Seek to develop a pool of EVs to be used by local public agencies, and potentially general users outwith core working hours. Alternatively look at smart travel application using pool of minibuses	HIGH
18	Electric buses	Seek sources of investment to extend use of electric buses among local operators	HIGH
19	Electric vehicle promotion	Promote existing grant and loan support schemes for EVs and seek further funding opportunities to support uptake of EV/ULEV within Oban	HIGH
20	Active travel plan	Promote e-bikes, extend charging points within town and seek to develop safe cycle routes to promote greater cycling within Oban	HIGH
21	Uptake of smart meters and development of local smart grid	Roll out of smart meters and capacity to develop a local smart grid	HIGH

7. Summary of prioritised actions

A summary of proposed actions is provided here. A list of relevant parties that would need to be consulted in progressing these actions is given against each action point. This does not imply any scale of resourcing or financing that would be available in each case.

Table 17 Summary of action points

#	Action	Description	Relevant parties to be consulted	Timeframe (Short / Medium / Long)
1	Promote energy efficiency and opportunities for support in demand management and resource efficiency	Raise awareness among community in Oban of existing support services available to households Potentially use community day as a forum for this	Local Energy Scotland Home Energy Scotland Resource Efficient Scotland Energy Saving Trust ALIenergy Housing Associations Argyll TSI	Short
2	Promote support for energy efficiency and transport measures available to non-domestic organisations	Community to work with relevant agencies to promote energy efficiency and transport action among non-domestic organisations. To include promotion support offered via Resource Efficient Scotland and Energy Saving Trust	Resource Efficient Scotland Energy Saving Trust ALIenergy Argyll & Bute Council Bid4Oban Argyll TSI	Short
3	Provide support and advice around tariff switching	Offer support and advice to households and businesses regarding electricity tariff switching and maintaining awareness of changes to tariffs in the market. Promote potential for heating oil club within Oban.	Citizens Advice Scotland Argyll & Bute Council Housing Associations ALIenergy Bid4Oban	Short
4	Continue programmes of fabric improvements and insulation within residential property	Seek support, advice and funding (where available) for ongoing improvement works to insulation and building fabric	Argyll & Bute Council Home Energy Scotland Warmworks Scotland Housing Associations	Medium
5	Encourage development of solar photovoltaic (PV) on existing properties	Conduct feasibility study to look at a potential solar PV installation programme and models for community involvement or investment	Argyll & Bute Council Housing Associations ALIenergy Local Energy Scotland	Short

#	Action	Description	Relevant parties to be consulted	Timeframe (Short / Medium / Long)
6	Promotion of use of heat pumps and other renewable options in new build properties	Seek designs for new build dwellings that use heat pumps (air or ground source) and other renewable options where appropriate as the primary heat source alongside high levels of insulation and fabric	Argyll & Bute Council Private Developers Housing Associations	Short / Medium
7	Moleigh site energy development	Continue to explore the viability of energy generation potential at the Moleigh site and any potential community involvement in the development or operation of any installed generation.	ALIenergy Argyll & Bute Council SSEN Renewi	Short / Medium
8	Heat from wastewater (Corran Esplanade)	Maintain dialogue with relevant parties during any feasibility work to ensure that potential benefits for the local community are identified	Argyll & Bute Council Scottish Water	Short
9	Anaerobic digestion	Explore viability to develop or support changes to local food waste collection and potential development of medium scale anaerobic digestion plant	Argyll & Bute Council Bid4Oban ALIenergy Renewi/Waste Contractors	Short / Medium
10	Inter-agency car pool (ULEV/EV)	Explore initial potential of setting up an inter-agency car pool of EVs or ULEVs, including role undertaken by existing local vehicle hire businesses	Argyll & Bute Council NHS Highland Housing Associations Police Scotland Scottish Fire & Rescue Service	Short
11	Promote uptake of electric vehicles	Promote awareness of existing grant and loan schemes to support the increased uptake of electric vehicles in Oban. Explore funding opportunities to support capital investment in electric vehicles and leasing models that avoid costly expenditure for households	Energy Saving Trust Argyll & Bute Council ALIenergy HITRANS Local taxi services	Short

#	Action	Description	Relevant parties to be consulted	Timeframe (Short / Medium / Long)
12	Active Travel Plan	Continue to seek traffic management and overall flow reduction measures within Oban. Linked to this seek to develop safer cycle routes and promote use of e-bikes with associated charging points.	Argyll & Bute Council HITRANS SUSTRANS Bus Operators	Short
13	Smart grid development	Seek understanding of potential development of localised grid management system. Initial exploratory talks with Scottish & Southern Electricity Networks (SSEN) regarding appropriate smart meter designs to be rolled out	SSEN Argyll & Bute Council Housing Associations Bid4Oban	Medium
14	Hydrogen production	Explore potential local market for hydrogen and scale of energy required to produce it via electrolysis. This to inform view of potential community hydrogen production	Argyll & Bute Council CMAL/Cal Mac Bus Operators Hauliers / Logistics firms	Short / Medium

Appendix A Community Consultation Data

At the heart of this Local Energy Plan are the thoughts of the community in Oban.

In capturing the initial thoughts from the community an information event was held on March 6th. Any members of the public that attended were able to note their priorities for what might be tackled by the Local Energy Plan by using coloured stickers to mark on a notice board. Each respondent was asked to rank their top three priorities.

Notice boards were also set up in Oban Library and the Atlantis Leisure building where anyone could carry out the same exercise in order to express an opinion.

Subsequent to the original event and notice boards there was an online survey made available and publicised throughout Oban.

Details collated from these engagement activities are summarised here.

Table A.1 Library Stand – Prioritisation Votes

Priority	Most Important Priority	Second Most Important Priority	Third Most Important Priority	Total Priority Votes
Improved Air Quality	8	2	1	11
Increase in Community Owned Energy	9	3	6	18
Warmer homes that are better insulated	10	0	6	16
Increased local energy generation	7	7	6	20
More efficient heating systems	4	1	3	8
Mitigating for climate change	3	1	1	5
More efficient transport systems	2	1	3	6
Lower Carbon footprint	2	2	0	4
Increased renewable energy	2	5	1	8
Cheaper Energy bills	12	3	4	19
Less imported electricity	2	1	0	3
Less Fuel coming into Oban	0	2	1	3

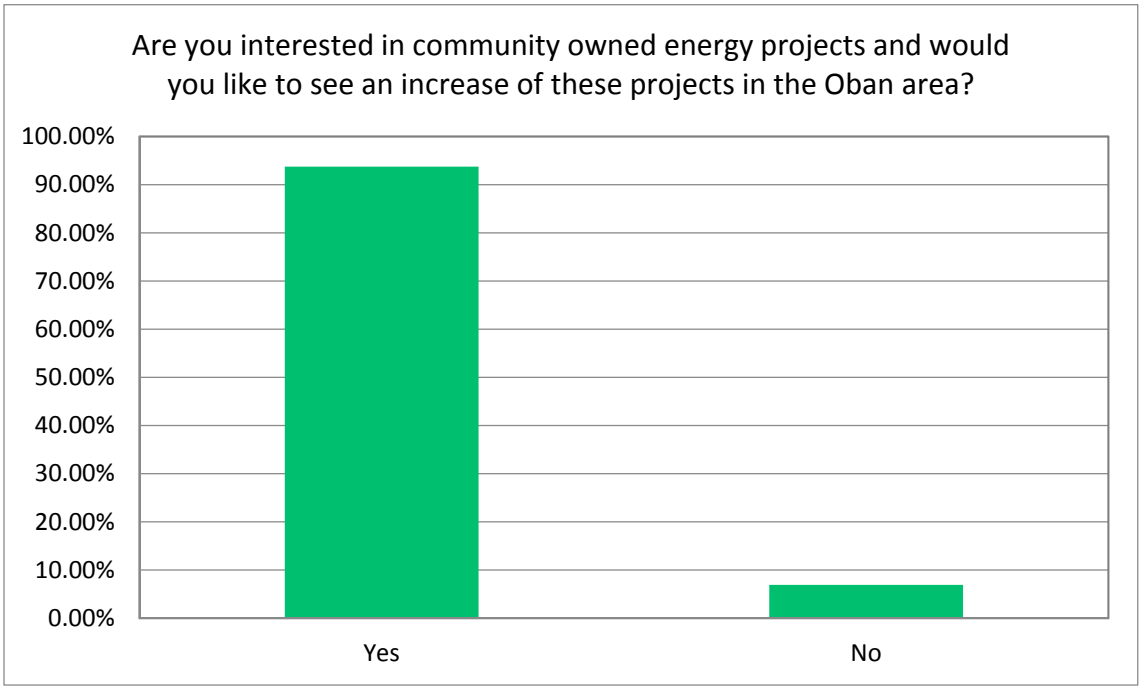
Table A.2 March Open Event – Prioritisation Votes

Priority	Most Important Priority	Second Most Important Priority	Third Most Important Priority	Total Priority Votes
Improved Air Quality	1		1	2
Increase in Community Owned Energy	1	3	3	7
Warmer homes that are better insulated	7	1	1	9
Increased local energy generation	3	2	5	10
More efficient heating systems	4	2	4	10
Mitigating for climate change	3	0	1	4
More efficient transport systems	4	1	0	5
Lower Carbon footprint	1	2	3	6
Increased renewable energy	2	3	5	10
Cheaper Energy bills	6	5	2	13
Less imported electricity	1	1	2	4
Less Fuel coming into Oban	1	1	1	3

Online Survey – Summary of Responses

Q1. Are you interested in community owned energy projects and would you like to see an increase of these projects in the Oban area?

Total number of responses: 144



Other Comments

- very interested but I don't see this as first priority
- yes if it had benefits for households
- I am interested but I think there are more important issues in Oban to concentrate on
- Cannot answer this as a first question! Need further information, continuing from introduction.
- AD
- Not sure
- community generation

Q2. What benefits would you most like to see come from energy projects in Oban? Please outline how important these are to you (1 being the most important)

	1		2		3		4		5		Total
Lower fuel poverty	51.77%	73	26.95%	38	16.31%	23	0.71%	1	4.26%	6	141
Lowering Oban's carbon footprint (more environmentally friendly)	44.37%	63	28.87%	41	17.61%	25	3.52%	5	5.63%	8	142
More local jobs	44.53%	61	35.04%	48	13.87%	19	3.65%	5	2.92%	4	137
Increased local energy generation	49.29%	69	24.29%	34	15.00%	21	3.57%	5	7.86%	11	140
Reduction in electricity prices	51.45%	71	26.81%	37	10.14%	14	5.07%	7	6.52%	9	138

Improved Air Quality	33.58%	46	21.17%	29	18.98%	26	13.14%	18	13.14%	18	137
Increase in the young skilled work force	37.68%	52	42.75%	59	15.22%	21	0.72%	1	3.62%	5	138
More sustainable local businesses through lower fuel and electricity costs	37.96%	52	43.07%	59	10.22%	14	2.92%	4	5.84%	8	137
Other (please specify)											14
							Answered				**145**

Other

- Retention of more energy-related revenue generation within local economy and increased full time employment (5 responses)
- Transport infrastructure improvements (2 responses)
- Increased community awareness of energy issues and enhanced impetus to take action (3 responses)
- Improved energy infrastructure (3 responses)
- Local food production (1 response)

Q3. The Local Energy Plan will propose new projects to take forward in Oban. Which energy projects would you like included in your Local Energy Plan? Please outline how important these are to you (1 being the most important)

	1		2		3		4		5		Total
District heating for nearby houses/businesses	22.46%	31	34.06%	47	21.74%	30	10.14%	14	11.59%	16	138
Installation of renewable energy to supply homes and businesses	55.71%	78	25.71%	36	12.14%	17	2.14%	3	4.29%	6	140
Larger scale renewable projects	38.30%	54	32.62%	46	17.02%	24	6.38%	9	5.67%	8	141
Renewable projects linked to storage options	42.34%	58	29.20%	40	16.79%	23	4.38%	6	7.30%	10	137
Support for more local food production	40.56%	58	29.37%	42	18.88%	27	6.29%	9	4.90%	7	143
Solar lighting installed for walkways and populated areas	35.04%	48	29.20%	40	18.98%	26	8.76%	12	8.03%	11	137
Other (please specify)											11
									Answered		**144**

Other

- Specific financial support schemes for renewable energy and insulation works in homes or businesses (2 responses)
- Financial incentives via changes to energy tariffs or Council tax to reward energy/waste efficiency (3 responses)
- Use of rainwater, hydro, wave or tidal power (3 responses)
- Development of smart local grid for Oban (2 responses)
- Broader remit to benefit wider surrounding area (2 responses)
- Wider innovation (2 responses)

Q4. What barriers do you think Oban may face in carrying out any of the suggestions above?

- Cost of measures and source of funding (49 responses)
- Local community support for change (43 responses)
- Insufficient local or national political support (19 responses)
- Insufficient renewable resource or access to suitable land for renewable energy generation (19 responses)
- Poor supporting energy and transport infrastructure (13 responses)
- Limited local skills and knowledge (8 responses)
- Geographical location (6 responses)
- Negative impact on visual landscape and local environment (6 responses)
- Resistance from large energy suppliers (2 responses)
- Benefits limited to only small section of Oban community (2 responses)
- Long term maintenance of larger renewable energy generation projects (2 responses)
- None (1 response)

Q5. Please tick all of the actions you regularly take in your home:

Answer Choices	Responses	
Switch off the light when leaving a room	92.70%	127
Consider the energy rating when buying appliances	78.10%	107
Buy local food when available	70.07%	96
Turn off appliances when you aren't using them	86.13%	118
Only heat the house and hot water when you need it	70.80%	97
Only fill the kettle with the amount of water you need	74.45%	102
Opt for LED lighting when changing a bulb	81.75%	112
None of the above	0.00%	0
	Answered	**137**

Q6. What is your main motivation for carrying out these actions above? Please outline how important these are to you (1 being the most important)

	1		2		3		4		5		Total	Weighted Average
Lower electricity and heating bills	70.07%	96	16.79%	23	10.95%	15	0.73%	1	1.46%	2	137	1.47
A warmer home	43.61%	58	29.32%	39	18.80%	25	3.76%	5	4.51%	6	133	1.96
Being more environmentally-friendly	52.24%	70	31.34%	42	12.69%	17	0.75%	1	2.99%	4	134	1.71
Supporting local food producers	35.34%	47	29.32%	39	24.81%	33	6.77%	9	3.76%	5	133	2.14
Less miles travelled for food deliveries	30.30%	40	26.52%	35	26.52%	35	5.30%	7	11.36%	15	132	2.41
Other (please specify)											10	
										Answered		**137**

Other

Respondents	Other (please specify)
1	Reversing decades of convent life style damaging the natural world.
2	Had to put a wood burner in, as night storage heaters are not sufficient,
	Would like to have some help, to make my home energy sufficient. Pensioners with less than £25000 Annual income should get grants.
3	Should read 'fewer' miles!
4	We have very few Local food producers who grow veg and a few local meat producers who sell their produce locally
5	I find waste (of any resource) irresponsible, if we all try to use only what we need then we are helping the environment.
6	I grow much of our food including eggs and meat. I do not eat processed foods for the above reason but also for my own health benefit.
7	Not really aware enough about the local food movement - other than the obvious re meat and fish.
8	I have Ground source heating already.
9	Making sure my carbon footprint is only as high as it needs to be.
10	Limited as we live on an island

Q7. What actions would you like to take in your home but are currently unable to do so? Please tick all of those that apply to you.

Answer Choices	Responses	
Consider the energy efficiency rating of appliances before purchasing	12.40%	16
Buy mostly locally produced food	45.74%	59
Switch to an electric vehicle	54.26%	70
Change all home lighting to LED bulbs	20.93%	27
Upgrade to a more efficient heating system	64.34%	83
Not live in fuel poverty	19.38%	25
Other (please specify)		16
	Answered	**129**

Other

Respondents	Other (please specify)
1	Better insulation would be good.
2	I would like to install a shower in my local authority home but the cost is prohibitive. I have asked acha to consider improving the energy efficiency of its older stock by installing showers but they have refused.
3	solar generation storage
4	Recycle food waste. Buy groceries with little or no unnecessary packaging. Recycling all metals, plastics. Provide excess food stuffs to a free community fridge ie take something bring something exchange.

5	Make my house more energy sufficient!
6	Electric vehicles are so expensive - better government funding to make them more affordable.
7	Store the power we generate from solar panels
8	We would also like to renew our windows to reduce heat loss through double-glazing units that are compromised.
9	generate own electricity via solar panels, heat source pumps etc.
10	Locally produced food difficult to come by. Cost of purchasing electric vehicle currently unattainable.
11	install solar PV to reduce grid reliance.
12	We already do all the other things but cannot yet have an electric car due to the cost, the fact that they aren't 4 wheel drive (live remote) and battery life too short to get us where we want to go. Though it would be amazing to have a small fleet of these for local travel on the island that I live on.
13	Comfortable that I have taken the actions I need to.
14	Build an energy-efficient home e.g. to Passivhaus standards.
15	We have invested in a hybrid car rather than an electric one because of limited charging stations and range but would love to go fully electric in the future if the infrastructure is developed.
16	There is a danger for those on lower and fixed incomes (benefits, pension, low paid & part time work) will slip into fuel poverty - that's one of my main concerns for the future

Q8. What are the current challenges that are preventing you from carrying out these actions that you would like to take in your home? Please tick all of those that apply to you.

Answer Choices	Responses	
I cannot afford to make these changes	79.82%	91
I don't know where to go to get advice	23.68%	27
I do not own the property in which I live and so I cannot make these changes/upgrades	27.19%	31
I am not sure how these actions would benefit me	10.53%	12
Other (please specify)		26
	Answered	**114**

Other

- Don't consider electric vehicles suitable for present use (9 responses)
- Lack of access to locally produced food (8 responses)
- Difficult to make change given existing technology in home (6 responses)
- Have already carried out energy efficiency improvements (2 responses)
- None (2 responses)
- Unable to get communal agreement for change (1 response)
- Would like community electricity generation system (1 response)
- Land value is a major impediment (1 response)

Q9. The Local Energy Plan will recommend projects to take forward in Oban. Which home energy projects would you like included in your Local Energy Plan? Pick three and rank them; 1 being the most important.

	1		2		3		Total	Weighted Average
A home insulation and draught-proofing project	49.47%	47	27.37%	26	23.16%	22	95	1.74
A support and advice service helping you to reduce how much energy you use in your home	45.00%	36	22.50%	18	32.50%	26	80	1.88
An LED light bulb replacement scheme in Oban	35.29%	30	40.00%	34	24.71%	21	85	1.89
A home heating upgrade project (e.g. replacing old boilers, installing more efficient heating, improved control systems)	61.54%	72	22.22%	26	16.24%	19	117	1.55
A lower energy tariff for Oban residents (pay less for the energy you use)	69.81%	74	19.81%	21	10.38%	11	106	1.41
A local food produce growing and selling scheme	48.18%	53	31.82%	35	20.00%	22	110	1.72
Other (please specify)							8	
						Answered		**135**

Other

- Need lower cost energy tariffs and/or shift to time of day pricing (3 responses)
- Replace old meters (1 response)
- Use district heating via energy from the sea (1 response)
- Most of these already available locally or nationally (1 response)
- Ensure new build properties are highly energy efficient (1 response)
- Provide finance for energy efficient roofs (1 response)

Q10. What barriers do you face in carrying out any of the suggestions above?

Total responses – 84 (including multiple topics in single answers)

- Cost and scale of investment required (51 responses)
- Lack of supply or availability of locally produced food (7 responses)
- Ability to agree action with landlord or neighbours (10 responses)
- Lack of knowledge or awareness of where to find reliable independent advice (11 responses)
- Local or national government support (3 responses)
- Existing infrastructure prevents significant change (6 responses)
- None (5 responses)
- Availability of products/services to enable change (3 responses)
- Insufficient support within community (4 responses)
- Travel behaviour doesn't suit electric vehicle (1 response)
- Don't know (3 responses)

Q11. Research shows that 55% of those people travelling to work in and around Oban use a car. Please tick all of the actions you regularly take when travelling in to or around Oban:

Answer Choices	Responses	
Walk instead of driving	46.62%	62
Cycle instead of driving	16.54%	22
Take the bus	23.31%	31
Car share	9.77%	13
Use an electric vehicle	1.50%	2
Use a low-emissions vehicle	13.53%	18
Choose to take the ferry rather than fly	11.28%	15
None of the above	27.07%	36
	Answered	**133**

Q12. What is your main motivation for the actions you ticked above?

Answer Choices	Responses	
Lower travel costs	26.60%	25
Being environmentally-friendly	23.40%	22
Healthier lifestyle	46.81%	44
Less reliance on imported petrol/diesel	3.19%	3
Other (please specify)		39
	Answered	**94**

Other

- No option but to use my car – public transport and active travel options too limited or non-existent (21 responses)
- Live in town and travel other than by car is faster (4 responses)
- Motivated by environmentally friendly choices, None (3 responses each)
- Don't own a car, all of the above (2 responses each)
- Public transport key to enabling integrated community; don't like flying; electric vehicles impractical due to distance of travel; using biodiesel; personal choice (1 response each)

Q13. What actions would you like to take when travelling in and around Oban but are currently unable to do so?

Answer Choices	Responses	
Walk instead of driving	13.71%	17
Cycle instead of driving	28.23%	35
Take the bus	25.81%	32
Car share	13.71%	17
Use an electric vehicle	48.39%	60
Use a low-emissions vehicle	19.35%	24
Choose to take the ferry rather than fly	4.03%	5
None of the above	21.77%	27
Other (please specify)		23
	Answered	**124**

Other

- Use the train (8 responses)
- Public transport timetabling is too infrequent or not at a time I can travel (4 responses)
- No other option than to use the car to travel; Oban not cycle friendly and cycle routes too limited (3 responses each)
- I feel safe in the car and can get where I want on time; Public transport is too expensive (2 responses each)
- Access to a work vehicle is financially beneficial to me; Access for people with reduced mobility needs to improve; Support day time bus service with night time mini buses as taxis; Need bike share schemes or a car club; Need a bypass road (1 response each)

Q14. What are the current challenges that are preventing you from carrying out these actions when travelling in and around Oban?

Answer Choices	Responses	
I cannot afford to make these changes	38.39%	43
I don't know where to go to get advice	9.82%	11
My place of work is too far from my home and so I cannot cycle	33.93%	38
My daily commitments e.g. picking children up from after school clubs mean I cannot cycle and must drive my own car	28.57%	32
I am not sure how these actions would benefit me	3.57%	4
I rely on the use of my own vehicle for my job	41.96%	47
A lack of cycle paths make me feel unsafe on the busy roads and therefore I drive my car	42.86%	48
Other (please specify)		25
	Answered	**112**

Other

- Cycling is too unsafe / impractical (8 responses)
- Travel infrastructure is too limited (6 responses)
- None – I use public transport or active travel; Bus service is too infrequent/unreliable; My lifestyle means using the car is most efficient and convenient travel mode (4 responses each)
- Electric vehicles don't suit my travel needs (3 responses)
- Weather (2 responses)

Q15. The Local Energy Plan will propose travel projects to take forward in Oban. Which travel projects would you like included in your Local Energy Plan? Please outline how important these are to you (1 being the most important)

	1		2		3		4		5		Total	Weighted Average
Car clubs/shared vehicles	18.26%	21	18.26%	21	23.48%	27	17.39%	20	22.61%	26	115	3.08
Support to individuals to own Electric vehicles	50.00%	2	50.00%	2	0.00%	0	0.00%	0	0.00%	0	4	1.5
Low emissions ferries (e.g. electric or hydrogen powered ferries)	26.09%	30	29.57%	34	28.70%	33	8.70%	10	6.96%	8	115	2.41
Support to individuals to own Electric vehicles	44.00%	55	23.20%	29	19.20%	24	6.40%	8	7.20%	9	125	2.1
Electric bikes for hire	22.69%	27	30.25%	36	23.53%	28	11.76%	14	11.76%	14	119	2.6
Community minibus	28.33%	34	25.00%	30	23.33%	28	15.00%	18	8.33%	10	120	2.5
Low emissions buses (e.g. electric or hydrogen powered buses)	50.00%	1	0.00%	0	50.00%	1	0.00%	0	0.00%	0	2	2
Walking and cycling paths	59.84%	76	22.83%	29	5.51%	7	4.72%	6	7.09%	9	127	1.76
Other (please specify)											10	
										Answered		**134**

Other

Respondents	Other (please specify)
1	We already have a good network of paths in place that are under used. Mini bus would be great for outlying communitys that have a poor or no bus service ruling it out for getting to and from work
2	upgrading the road network

3	better train service connecting more rural places
4	Train investment
5	improved road network, route bypassing town?
6	Less buses with Diesel engines . Smaller electric buses as the big buses are under used.
7	Re electric vehicles: unlikely to make economic sense owing to the no. of charging stations required, especially by tourists.
8	I'm required to drive as work takes me across Argyll & Bute & further afield.
9	Support to individuals to own hybrid vehicles, more practical in an area like this. A bike scheme - not just electric!
10	Specifically, better cycle paths THROUGH town, and maintenance of the existing cycle routes.

Q16. What barriers do you think Oban may face in carrying out any of the suggestions above?

- Cost and scale of investment (44 responses)
- Insufficient land area or lack of access to suitable land (17 responses)
- No coherent community ambition for change (17 responses)
- Lack of local or national Government support (9 responses)
- Changing a car-centric culture (9 responses)
- General poor state of existing infrastructure (8 responses)
- Geography and weather (6 responses)
- Public transport timetabling flexibility to meet local needs (5 responses)
- Difficulty in locations for electric car/bike charging and hire (4 responses)
- Availability of electric vehicles on the market; Lack of knowledge; None (1 response each)

Q17. Please tick which age bracket you are in

Answer Choices	Responses	
Under 16	0.00%	0
16-29	9.77%	13
30-44	27.07%	36
45-59	42.86%	57
60-74	20.30%	27
75+	0.00%	0
	Answered	**133**
	Skipped	**13**

Q18. What is your ethnic group? Choose one section from A to E, then tick the appropriate box to indicate your ethnic group.

Answer Choices	Responses	
A. White British, English, Northern Irish, Scottish or Welsh Irish Gypsy or Irish traveller Any other white background, please specify	95.35%	123
B. Mixed or multiple ethnic groups White and Black Caribbean White and Black African White and Asian Any other mixed or multiple ethnic background, please specify	0.00%	0
C. Asian or Asian British Indian Pakistani Bangladeshi Chinese Any other Asian background, please specify	0.00%	0
D. Black, African, Caribbean or black British Caribbean African Any other black British, African or Caribbean background, please specify	0.00%	0
E.Other ethnic group	0.78%	1
F. Would prefer not to say	4.65%	6
Other (please specify)		7
Answered		**129**
Skipped		**17**

Other

- Hungarian
- Spanish
- German
- Not a question that should be asked.
- Born and grew up in Scandinavia
- German
- European

Q19. Please tick which area best describes where you live

Answer Choices	Responses	
Oban	50.38%	66
Near Oban - please specify	49.62%	65
If you live near Oban, please tell us how often you use the facilities in Oban e.g. Daily, weekly, monthly, never		64
Answered		**131**

Comments

Locations of respondents:

- Taynuilt (6 responses)
- Connel / North Connel (5 responses)
- Benderloch (3 responses)
- Lerags (2 responses)
- Kilmore, Barcaldine, Oban, Ardrishaig, Dalavich, Isle of Islay, Iona, Arduaine, Along the Musdale road, Achnacloich, Glencoe, Bonawe, Achnacree, Tiree, Scammadale Glen, Lismore, Seil, 12 miles from Oban (1 response each)

Frequency of travel into Oban

- Daily (16 responses)
- Three/four or most days a week (5 responses)
- One/two, several or every other day (7 responses)
- Weekly (18 responses)
- Fortnightly, monthly or less frequently (5 responses)

Q20. Which Housing tenure applies to you?

Answer Choices	Responses	
Owner Occupier	66.41%	87
Private Tenant	24.43%	32
Housing Association Tenant	9.16%	12
Other (please specify)		2
Answered		**131**

Other

- None of the above; home owner (1 response each)

Q21. Research shows that electric heating dominates fuel use in Oban, currently used by 55% of households. What heating system applies to you?

Answer Choices	Responses	
Electric	46.15%	60
Gas	23.08%	30
Solid fuel	20.00%	26
Oil	15.38%	20
Renewable technologies	10.77%	14
Other (please specify)		16
Answered		**130**

Other

- Open fire / log burner / wood burning stove (9 responses)
- Calor gas / LPG (4 responses)
- GSHP; in process of moving to heat pump system (1 response each)
- Ancient Aga in the kitchen; 1 absolutely ancient storage heater (1 response)
- Thermal store powered by combination of oil fuel and wood fuel (1 response)
- Our central heating and hot water system is fuelled by a combination of solar thermal panels, a wood burning stove and electric immersion. We also have PV panels (1 response)

Q22. Additional Comments

Respondents	Responses
1	It's brilliant this is being given a chance - good luck!
2	More support needed for households who do not have access to a car
3	Band D home should be included for free insulation und help regardless the income. Or below £ 25 000.
4	So happy to see this sort of project in Oban - thank you
5	Good luck.
6	None
7	None
8	Realistic and achievable goals should be set; despite huge investment in cycle paths - little used while roads are now almost impassable with potholes.
9	None
10	Cheaper fuel to ensure houses are heated and free upgrading of insulation in older properties.
11	the cost of Electricity is huge. Can this be looked at. Also financial assistance for putting in solar power
12	Please take into account the current crisis in woodfuel industry due to timber shortages
13	None
14	Local food production particularly local slaughterhouse.
15	I think community-led projects to advise on solar panels; wind turbines; mini hydros etc - even just open sessions would be very useful.
16	none
17	We as a community need this project, and we need it to suceed for all generations current and in the future. We also need to be 'kept in the loop' and asked for feedback in all stages and for our own involvement in schemes - like cleaning paths, vegitation, making refresments etc - to feel included.

Appendix B Supporting Information

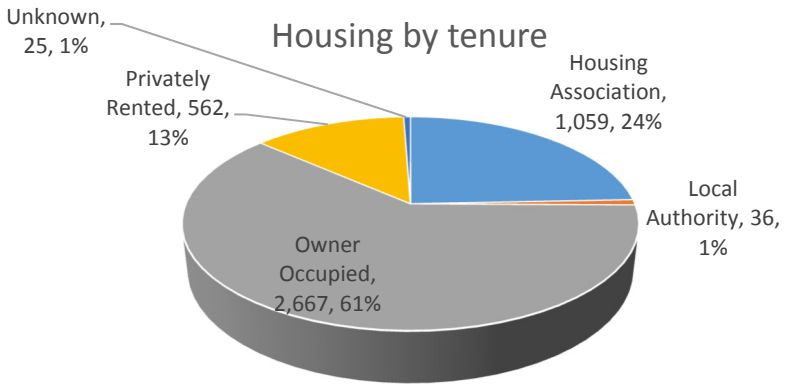
B.1 Residential

Data for the domestic building stock is available via the Energy Saving Trust. This collates details from Energy Performance Certificates (EPC) calculated for individual dwellings as well as home inspections carried out via assessors from both local authorities and Home Energy Scotland.

B.1.1 Property Tenure

There are a total of 4,349 domestic properties in the present LEP area for Oban. Two thirds of these properties are owner occupied; a further 24% are owned by Housing Associations.

Figure B.1 Housing tenure – Oban



B.1.2 Building form and age

In terms of the building form of property and age, these details are summarised here.

Table B.1 Property type and age (Oban)

Property Type	Pre-1919	1919 - 1949	1950 - 1983	1984 - 1991	1992 - 2002	Post 2002	Sub-Total
All flats, *of which*:	764	269	765	175	242	114	
Block of flats	263	6	628	38	98	9	1,042
Flat in mixed use building	376	2	50	32	19	27	506
Small block of flats/dwelling converted in to flats	125	261	87	30	70	78	651
Large block of flats	0	0	0	75	55	0	130
All houses, *of which*:	279	127	935	168	204	282	
Detached house	154	77	317	46	72	102	768
Semi-detached house	57	45	309	97	128	132	768
End-terraced house	41	3	130	16	2	24	216
Mid-terraced house	27	2	179	9	2	24	243
Unknown							25
Sub-Total (by age)	1,043	396	1,700	343	446	396	
% of Total Stock (by age)	24%	9%	39%	8%	11%	9%	

Around 75% of the housing stock is at least 35 years old; 25% alone were built in the pre-1919 era. The largest proportion of housing stock was built during the period 1950 – 1983 (39%).

In terms of the build type, there is a roughly 50:50 split between dwellings that are flats (54%) of the total stock and those that are houses (46%). The predominant building types in each age bracket are highlighted in the table.

B.1.3 Principal wall construction type and age

In providing sufficient quality of insulation to minimise heating requirements in a building, different methods are used depending upon the wall construction type. Cavity walls, for example, contain insulation between two courses of brickwork. Solid wall construction, by contrast, would require either external insulation or additional internal works to insert insulation. The typical construction type for each age band of dwellings is provided here.

Table B.2 Wall construction type and age (residential buildings)

Age	Cavity	Solid Wall	System Built	Timber Frame	Unknown	Sub-Total
Pre-1919	108	803	0	132		1,043
1919 - 1949	319	73	1	3		396
1950 - 1983	1,248	172	37	243		1700
1984 - 1991	203	19	1	120		343
1992 - 2002	114	22	0	310		446
Post 2002	11	13	1	371		396
Unknown					25	25

B.1.4 Property age and primary fuel type

The primary fuel used in each property form is shown here.

Table B.3 Property age and primary fuel

Age	Biomass/Solid	Communal	Electricity	LPG	Mains Gas	Oil	No Heating System
Pre-1919	85	0	602	0	331	18	7
1919 - 1949	10	0	143	10	225	6	2
1950 - 1983	126	0	1,178	8	300	83	5
1984 - 1991	6	0	298	5	24	10	0
1992 - 2002	2	24	387	3	20	10	0
Post 2002	20	58	246	0	31	41	0
Unknown							25

Note: Mains gas in this instance refers to supply from the Oban SIN

Electricity is the dominant primary heating fuel with around two thirds of properties using electric heating systems. Just over 20% of households are served by the Oban SIN gas network.

The majority of properties are served by stand-alone heating systems, rather than a communal or district heating system.

B.1.5 Energy Efficiency

The energy efficiency of a property depends on its physical characteristics. Factors such as the age of construction, the dwelling type, the heating and hot water systems in use and the extent to which the building fabric is insulated, all affect energy efficiency. Domestic energy efficiency ratings in Oban vary greatly depending on building type and age. While it is not entirely unexpected that a significant number of pre-1919 solid wall construction properties have an energy efficiency rating between E – G, it is also of note that there are a large number of properties in the 1950 – 1983 age band with F-G rating (1 in 5 of that age band). The majority of properties built post 2002 have an energy efficiency rating of C.

Table B.4 EPC Rating (Residential Property)

Age/ EPC	A – B	C	D	E	F – G	Unknown	Sub-Total
Pre-1919	71	89	295	296	292		1,043
1919 - 1949	0	29	156	136	75		396
1950 - 1983	14	210	618	477	381		1,700
1984 - 1991	3	108	144	35	53		343
1992 - 2002	20	154	215	17	40		446
Post 2002	12	327	36	20	1		396
Unknown						25	25
% of Total	3%	21%	34%	23%	19%	1%	

An overview summary of the domestic dwellings in the LEP area is shown here (Figure B.2 – Figure B.7).

Figure B.2 Housing stock by tenure

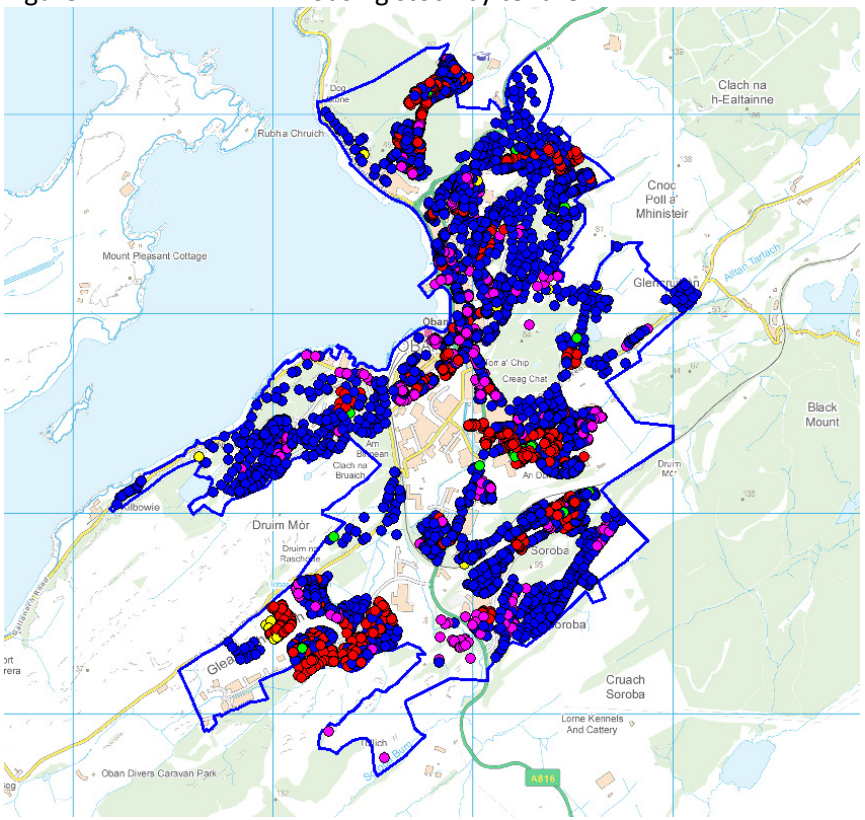


Figure B.3 Residential Property by Build Type

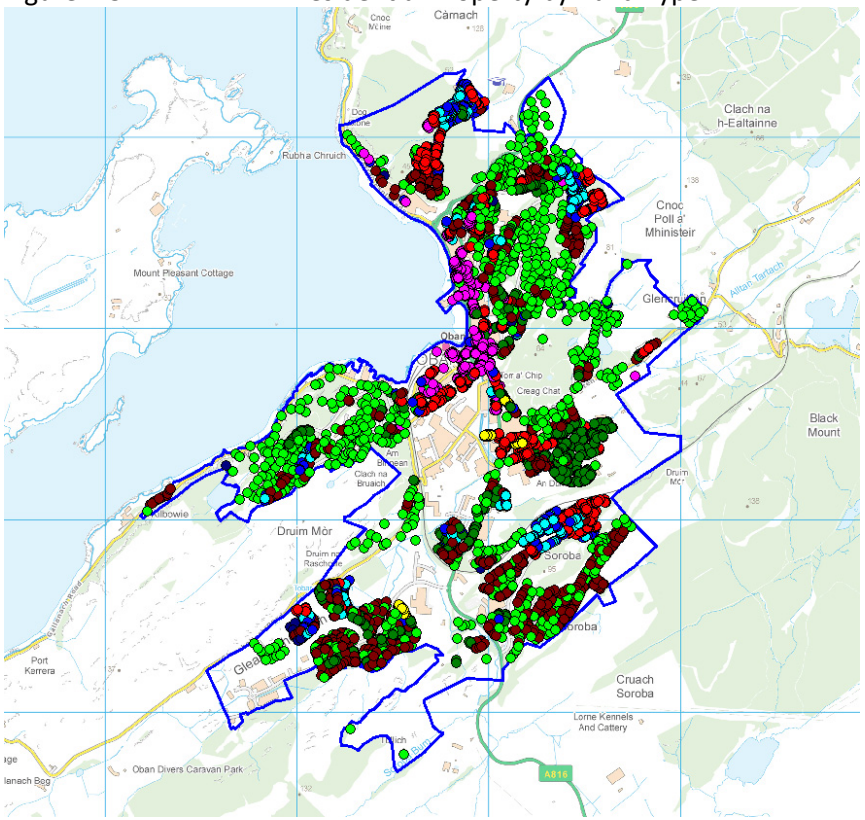


Figure B.4 Property Type by Age

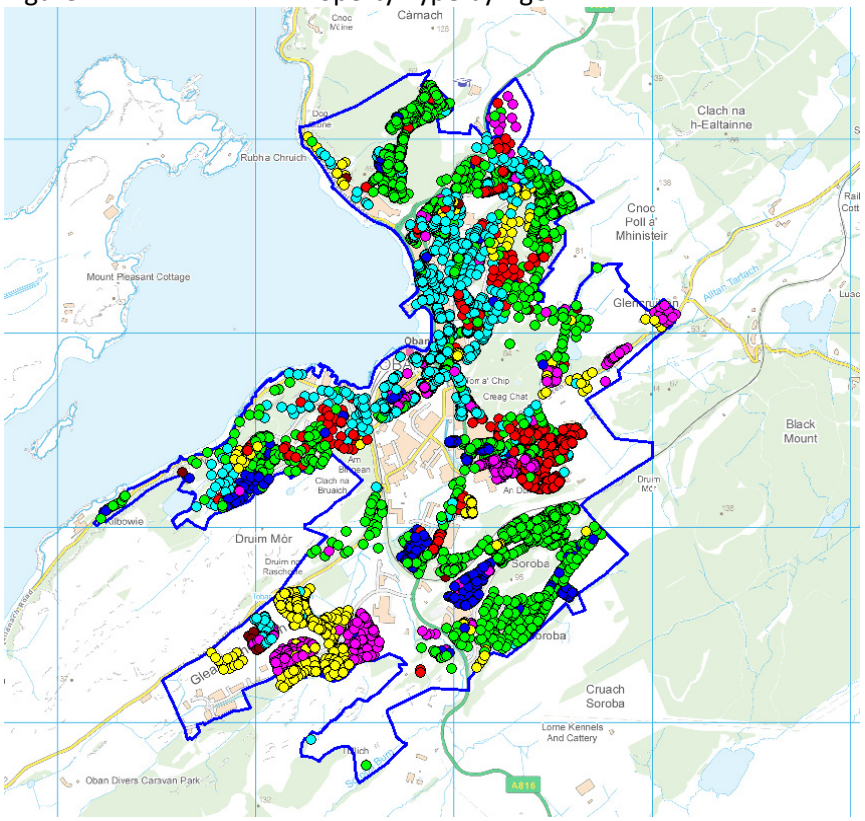


Figure B.5 Residential Property by energy efficiency rating

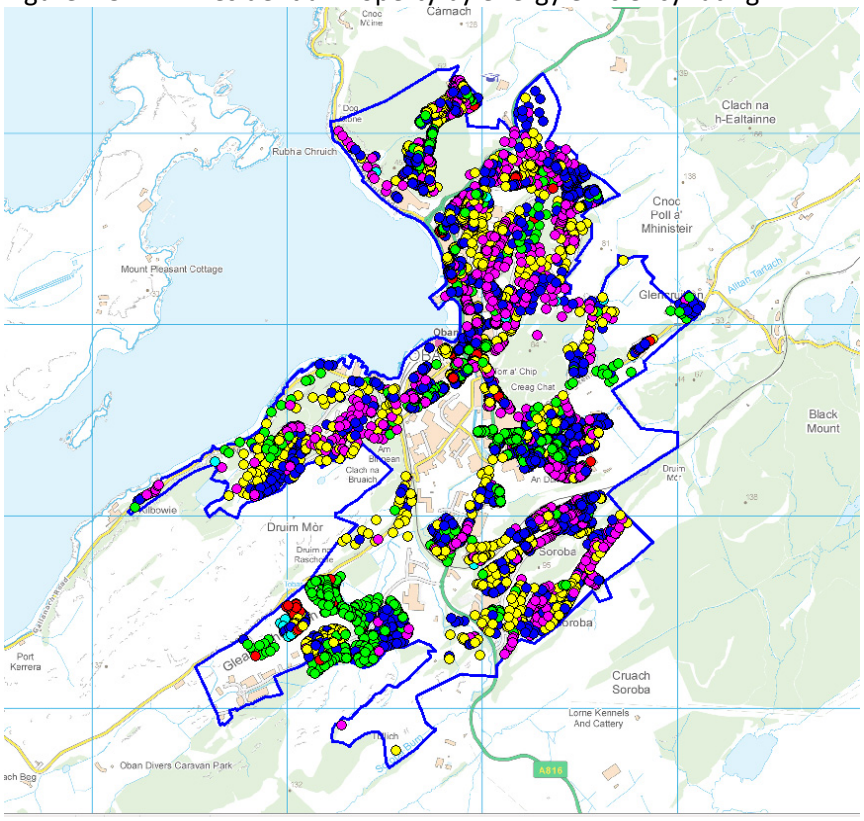
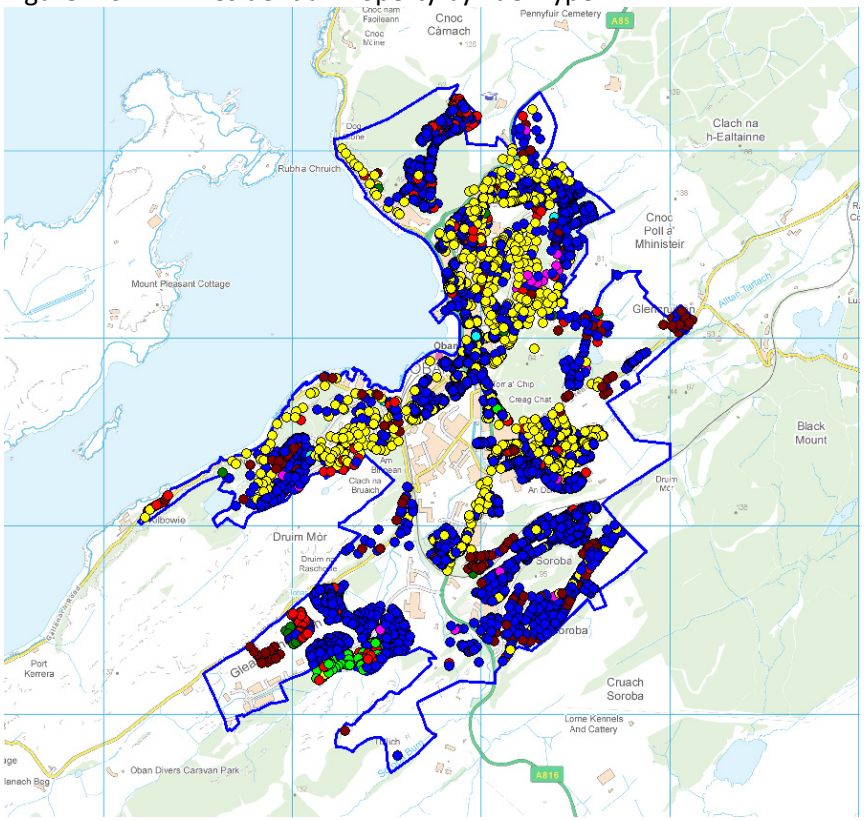
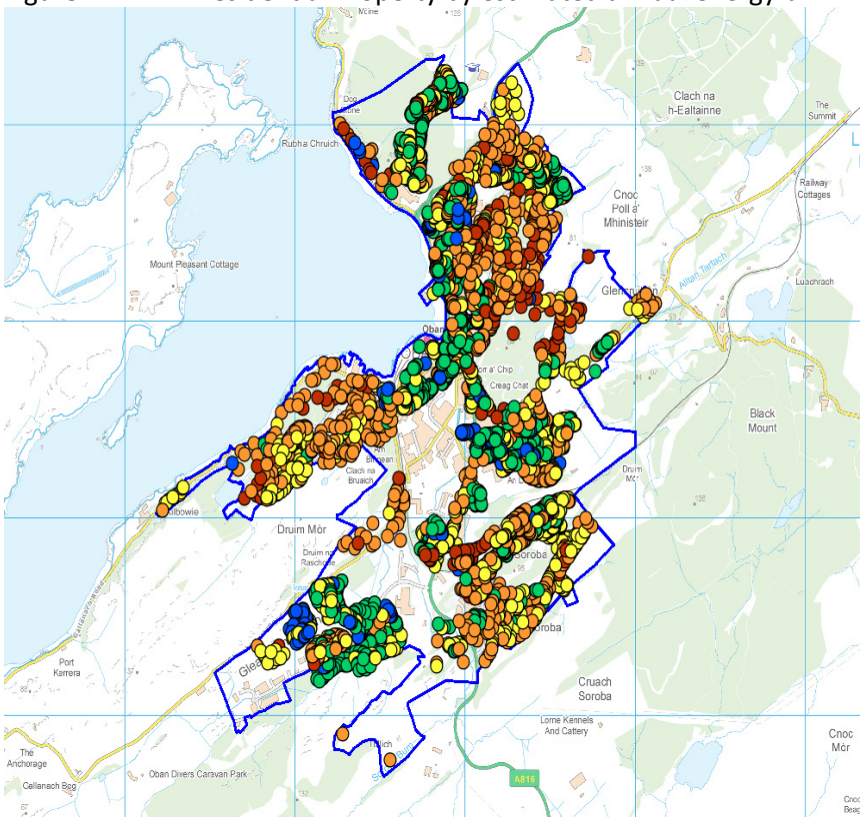


Figure B.6 Residential Property by Fuel Type



- Biomass/Solid
- Communal
- Electricity
- LPG
- Mains Gas
- No heating/hot water system
- Oil
- all others

Figure B.7 Residential Property by estimated annual energy bill



- 1,710 to 2,130
- 1,280 to 1,710
- 850 to 1,280
- 420 to 850
- -10 to 420

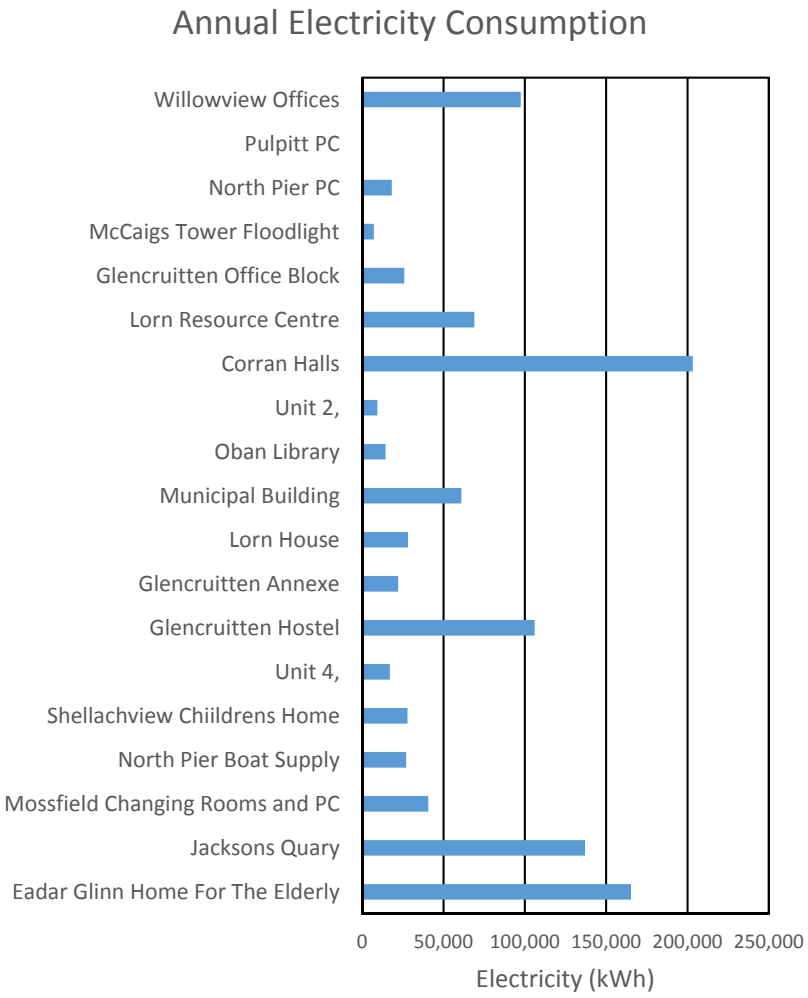
B.2 Non-residential

In looking at non-residential energy use in Oban it is useful to consider energy use by some of the larger public sector organisations within the study area, as well as what type of end users operate in different areas of the town.

B.2.1 Local Authority Buildings

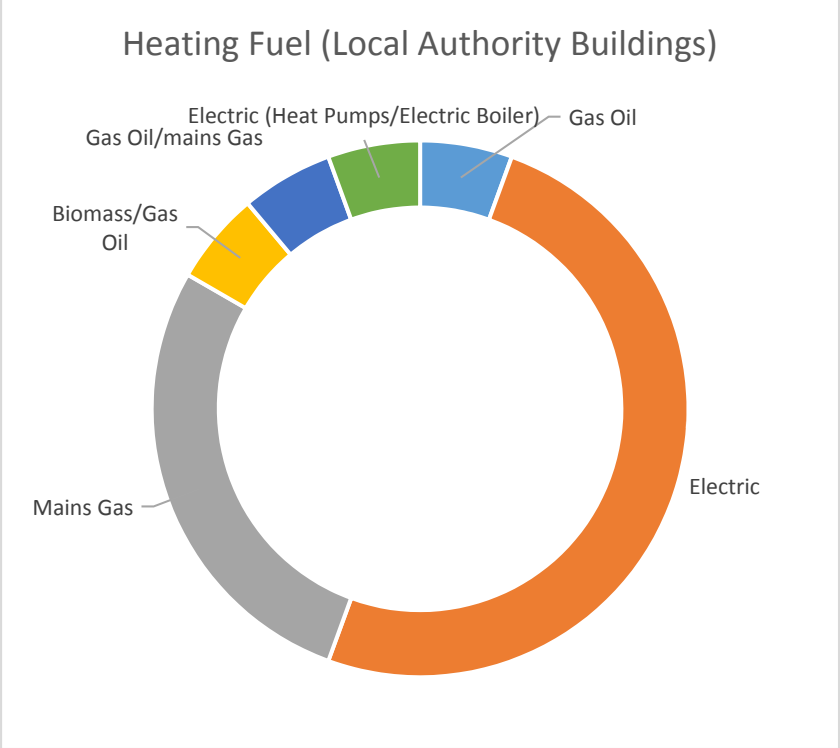
Argyll & Bute Council operate a number of offices and facilities within Oban. In terms of electricity use the total annual energy consumption for each site is shown here.

Figure B.8 Local authority building (12-month electricity use)



The majority of the buildings are electrically heated, while some of the smaller buildings with lower demand are heated from the SIN gas network. The remaining buildings are heated using gas oil or biomass.

Figure B.9 Primary Heating Fuel (Local Authority Buildings)



A summary commentary on some of the buildings presently under operation is shown here.

Table B.5 Local authority building commentary

Site	Primary Heating Fuel	Commentary
Eadar Glynn Home for the Elderly	Oil	Older building so high all year round heat demand to sustain residents
Depots (one at Millpark Road; other adjacent site fire damaged)	Oil	Depot functions and location under review. Fire damaged site has temporary portacabins
Jacksons Quarry	Electric	Vehicle storage yard with small office
Social Work Office	Oil/Mains Gas	2-storey day centre with offices on upper floor
Glencruitten Hostel	Biomass/oil	Residential hostel for HS pupils. Biomass system installed in 2016 (200 kW)
Lorn House/Municipal Office	Mains Gas	Office sites on Albany Street
Corran Halls	Electric Boiler / Heat Pump	94 kW air source heat pump installed in 2014
Oban Library	Mains Gas	Modern building
Shellachview Children's Home	Mains Gas	Accommodation for up to 6 children
Willow View	Electric	Small office accommodation

Schools

There are three primary schools in Oban and one High School.

- Park Primary School has capacity for 240 pupils. Its building dates from 1973. The primary heat source is biomass with a new 201 kW boiler installed in 2016. The school also benefits from 36 kW of solar PV electricity generating capacity installed in 2014.
- Rockfield Primary School and St Columba's Primary School share a school campus at Lower Soroba. The campus was built via a PFI contract and opened in 2007. Mitie operate and maintain the school campus on behalf of the local authority. Its primary heating fuel is natural gas supplied via the SGN network. There is also 50 kW of installed Solar PV on the site
- Oban High School has a new building that was funded via the Scottish Government's Schools for the Future programme. It opened in April 2018. The heating for the building is supplied using a combination of LPG boilers and CHP gas engines fed via the SGN network. The building design incorporates a number of energy efficiency features, including:
    - High standards of insulation and air permeability to reduce the overall heating and ventilation energy requirements within the building
    - Low energy artificial lighting supplemented by presence detection and daylight controls
    - Reduced fan powers on mechanical ventilation plant (reducing overall energy demand)
    - High efficiency recuperators on mechanical ventilation plant
    - Windows optimised for daylight and natural ventilation
    - High efficiency VRF comfort cooling systems in localised rooms
    - Small scale multiple modulating CHP engines

The focus of recent efforts across the Council's portfolio of sites has been capital investment in energy supply assets, taking advantage of potential revenue available via the FiT and RHI schemes where possible. In the short term, given lower access to capital funding, the focus is likely to switch back to aspects of energy efficiency and operating efficiencies across all buildings.

Depots

A review of depot sites and how best to utilise them is ongoing. Within Oban the Millpark Road sites are two areas adjacent to one another. One part of this site suffered fire damage and is presently operating with temporary modular cabins on site.

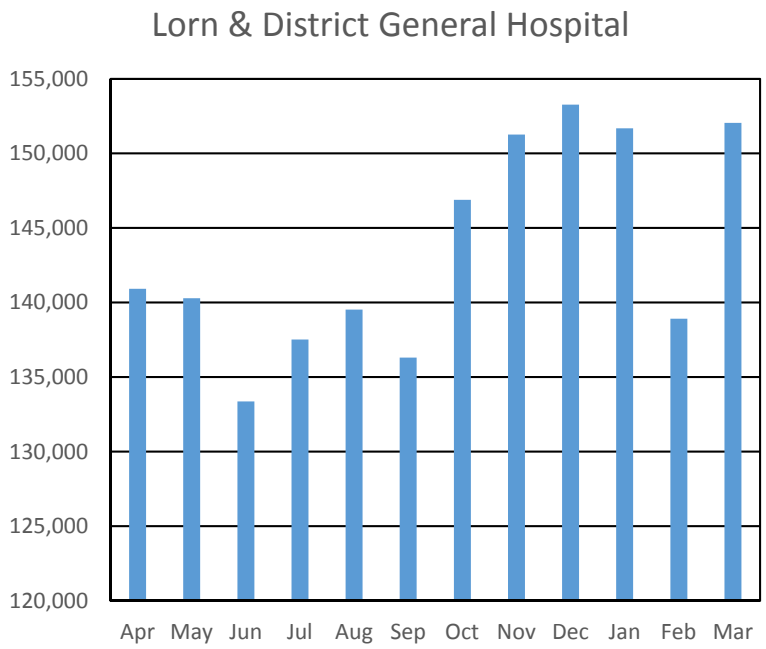
Jacksons Quarry is presently used predominantly as a vehicle storage yard.

Present plans are looking at the potential to rationalise services and operate from a single depot site at Jacksons Quarry. This is at an early stage of development. This would release the land at Millpark Road for a different purpose.

B.2.2 NHS

The main hospital in Oban, Lorn & District Hospital is on the Southern edge of the study area. The main buildings were built in 1995. A snapshot of energy use for the site is shown here.

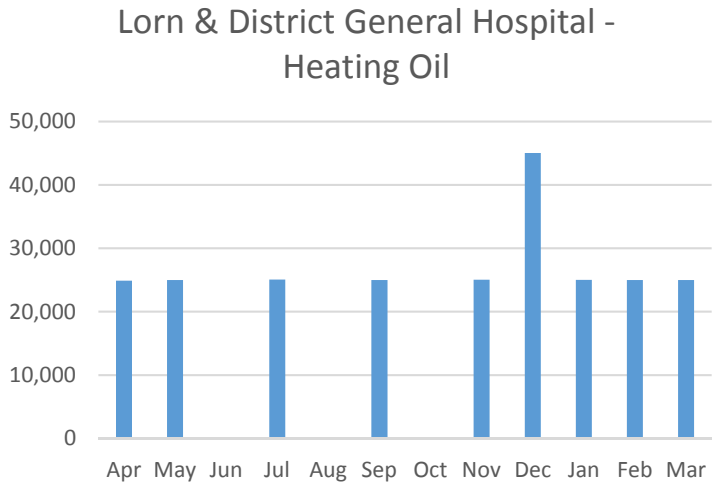
Figure B.10 Electricity Consumption (Lorn & District Hospital)



Baseload electricity consumption is relatively unchanging across each month. The impact of higher heating and lighting requirements in late autumn and winter periods can be seen.

Heating across the site uses oil as its primary fuel. The scale of deliveries of oil over the same 12-month period is shown here.

Figure B.11 Heating oil requirements (Lorn & District Hospital)



B.3 Transport

B.3.1 Annual Traffic Movements

Traffic count and flow data is collated by the UK Government Department for Transport (DfT) for three locations within Oban as shown here.

Figure B.12 DfT Traffic Count Spot (Oban)

Average daily vehicle flow details are available for each of the count points.

The raw data showing hourly vehicle counts is also shown for Dunollie Road and the A85 North Pier stations (Figure 22). In the case of Dunollie Road this shows a peak in traffic at 08:00 and relatively constant flows otherwise. The extent of LGV traffic is fairly constant all day.

In the case of the A85 data, again there is a relatively constant LGV traffic count throughout the day. Overall traffic seems to rise during the afternoon period.

Figure B.13 Average daily traffic flows by vehicle type (2016)

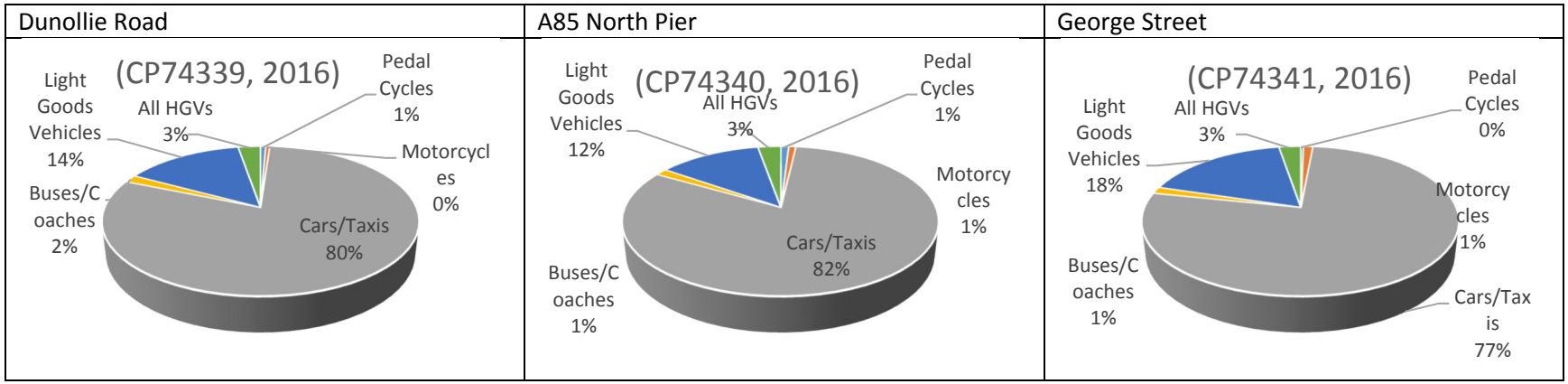
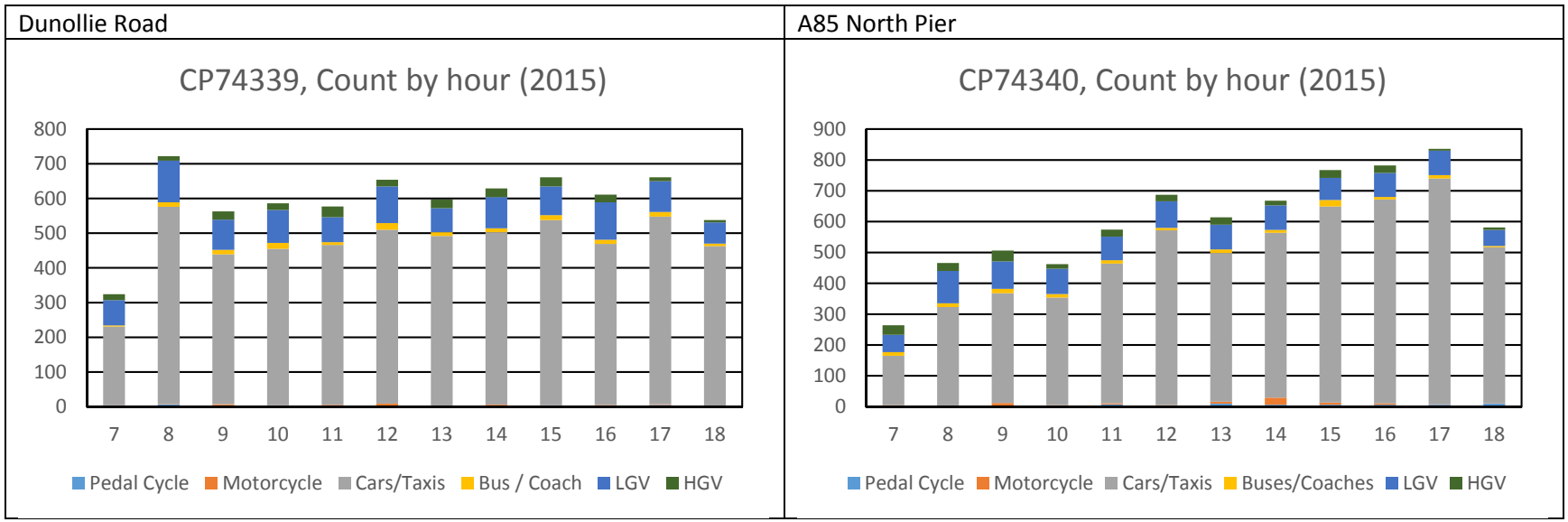


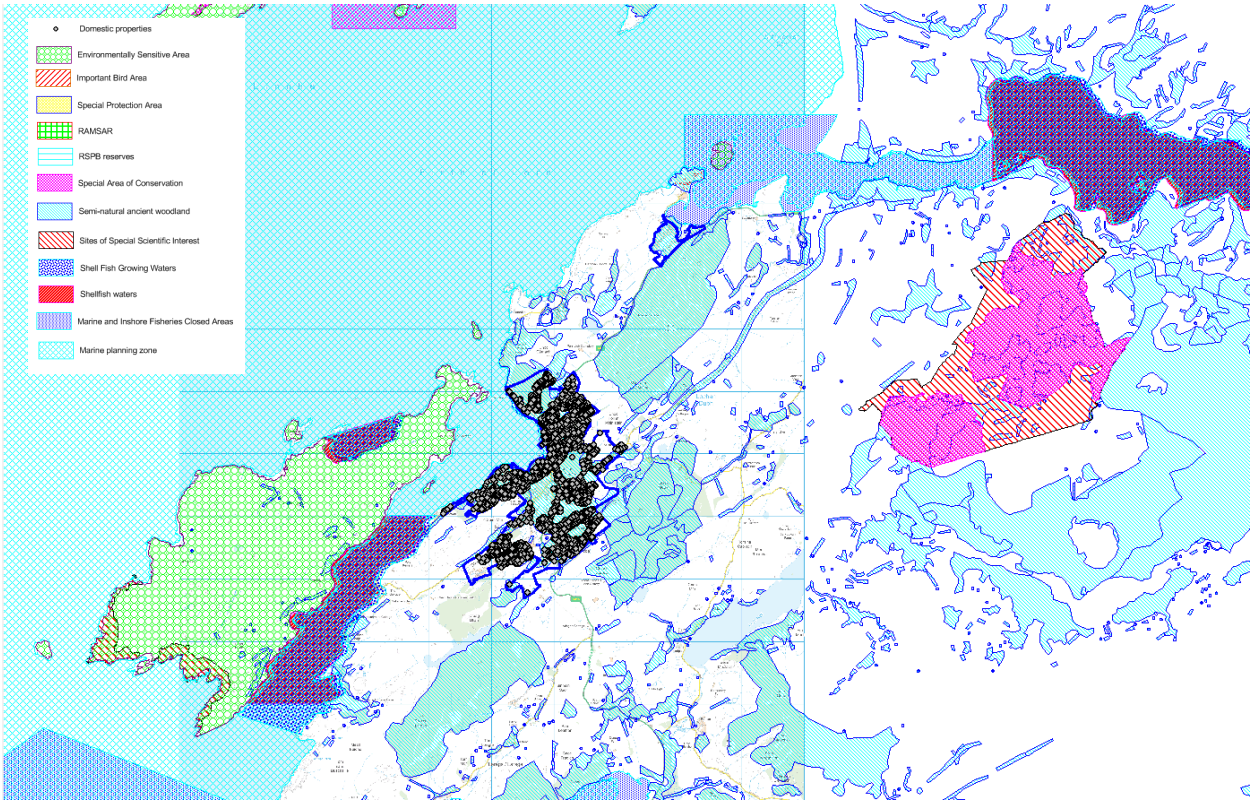
Figure B.14 Hourly Traffic Counts (2015 data)



B.4 Environment

B.4.1 Summary of environmental designations

Figure B.15 Oban Environmental Designations



Site of Special Scientific Interest (SSSI) - SSSIs are those areas of land and water that are considered best represent our natural heritage in terms of their; flora – i.e. plants; fauna – i.e. animals; geology – i.e. rocks; geomorphology – i.e. landforms; a mixture of these natural features. There are four SSSI areas (three areas of the same SSSI) within 5 km of the LEP area. They are:

- Clais Dhearg – it is designated due to its biological interest; key features it is designated for are: its assemblage of dragon flies (15 species); its population of marsh fritillary (butterfly); its oligotrophic loch; its open water transition fen; and its upland oak woodland.
- South Kerrera and Gallanach - it is designated due to its geological interest; Igneous petrology (Old Red Sandstone Igneous), Palaeontology (Silurian - Devonian Chordata), Quaternary geology and geomorphology of Scotland

Special Area of Conservation (SAC) – A SAC protects one or more special habitats and/or species – terrestrial or marine – listed in the Habitats Directive. There is one SAC within 5 km of the LEP area:

- Loch Etive Woods – This is designated due to its otter population; alder woodland on floodplains; western acidic oak woodland; and mixed woodland on base-rich soils associated with rocky slopes.

Marine and Inshore Fisheries Closed Areas (MCA) - Marine and inshore areas closed to fisheries or exempt from closure and their timing, as defined by EC, EU and Scottish Statutory Instrument (SSI) regulatory legislation between 1997 and 2010. Legislation relates to the EU Common Fisheries Policy which is currently under review (http://www.scotland.gov.uk/Topics/marine/Sea-Fisheries/common-fisheries-policy). The areas relate to several marine species including Anchovy, Cockle, Cod, Haddock, Hake, Herring, Mackerel, Norway Pout, Plaice, Salmon, Sea Trout, Sandeel, Scallops, Sprat and Orange Roughy; and several fishing methods including Beam trawl, Bottom trawl, Creel, Dredging, Otter trawl, Gill nets and Towed nets. There are two within 5 km of the LEP area covering Loch Etive and another covering the Firth of Lorn.

Shell Fish Growing Areas and Shellfish Water Protected Areas - The Shellfish Waters Directive (2006/113/EC) ('SWD') was introduced to protect designated waters from pollution in order to support shellfish life and growth. There are two designations one that is set in the Sound of Kerrera and another on the north side of the island of Kerrera.

Semi Natural Ancient Woodland - There are 457 areas of Semi-natural and planted woodland within 5 km of the study area, and tree type and coverage is as follows:

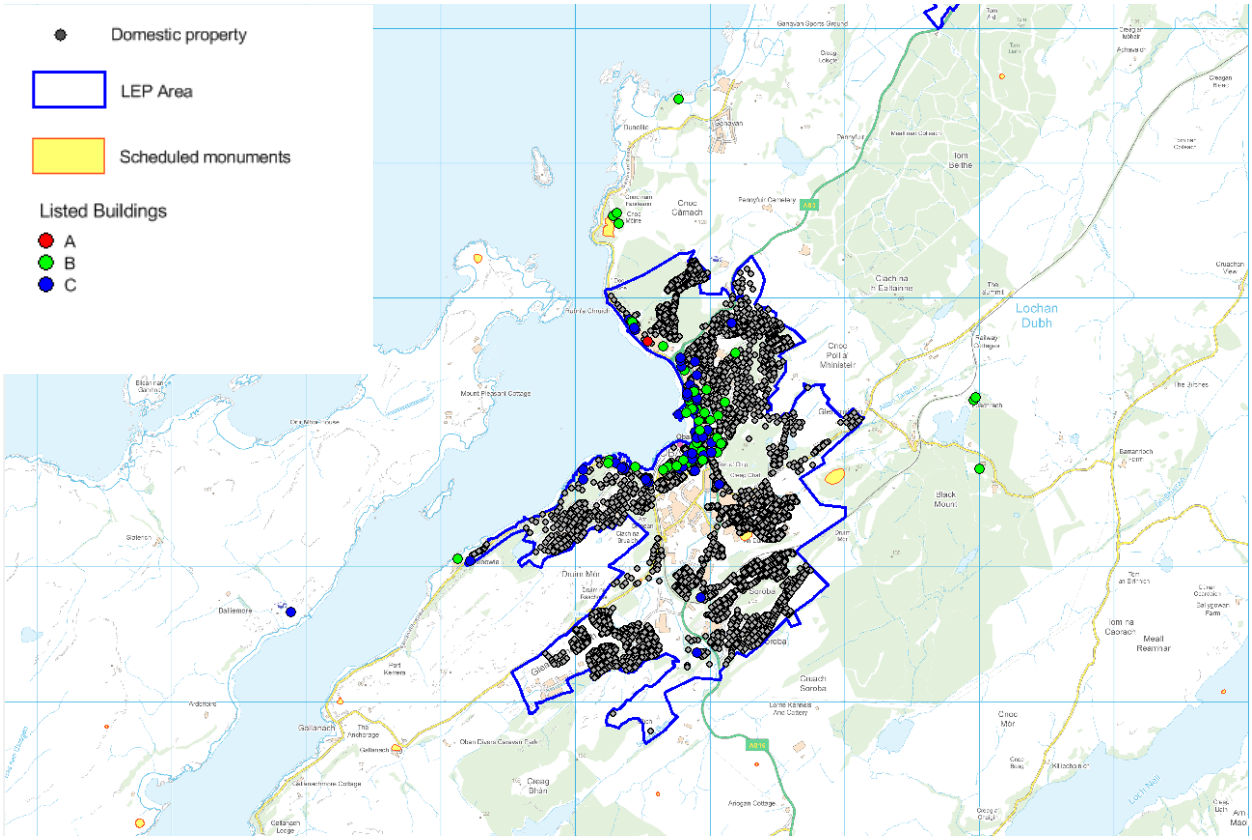
Tree type	Hectares
80-90% Conifer	8.4
Broadleaf	1,108.7
Conifer	2,641.3
Mixed Broadleaf/Conifer	532.5
Scrub	2.5
Grand Total	4,293.4

Environmentally Sensitive Areas (ESA) – the ESA aims to conserve specially designated areas of the countryside where the landscape, wildlife or historic interest is of particular importance and where these environmental features can be affected by farming operations. There are three within 5 km of the LEP area; these cover the islands of Kerrera, Eileen Mor and Maiden Island.

B.4.2 Cultural Heritage Designations

A summary overview of existing cultural heritage designations is provided here.

Figure B.16 Oban Cultural Heritage Designations



Schedule Monuments – There are 21 scheduled monuments within 3 km of the LEP area.

Kerrera, Cladh a Bhearnaig, cashel
Carn Breugach, cairn
Dun an Fheurain,dun 700 m NW of Gallanach
Mount Stewart, fort 240 m WNW of
Upper Gylen, fort 700 m ENE of, Kerrera
An Dunan, dun 50 m SE of 10 Campbell Crescent, Oban
Cologin, fort 650 m NE of
Ariogan, cairn 400 m NNE of
Ariogan, cairn 950 m W of
Glencruitten Golf Course, fort
Gallanach Beg, dun 30 m N of
Dunollie Castle
Campbell of Lerags' Cross, Kilbride
Kilbride Chapel
Dalineun, chambered cairn 265 m S of Dalaneas
Dalaneas, chambered cairn 90 m SSE of, & cairns 30 m SW of & 100 m SSW of
Dun Ormidale, fort 345 m NNE of Gallanach
Cladh Uaine, chapel and burial ground 560 m SE of Pennyfuir Cottage
Dalnaneun, cairns 240 m and 275 m WNW of
Kilmore, cairns and enclosure 345 m NNE of Cleigh House
Raschoille, cave 40 m ENE of, Oban

Listed buildings – there are 115 category A, B and C listing buildings within 3 km of the LEP area:

Category A

- Oban, Corran Esplanade, St Columba's Roman Catholic Cathedral

Category B

21, 22 Argyll Square

Albany Street, Municipal Offices and Lamp Standards

Albany Street, Post Office

Dunollie House

Dunollie House, Former Stables and Ard Sabhal

Dunollie House, Gardener's Cottage

Dunstaffnage Mains Farm

Gallanach House

Luachrach Cottage

Luachrach Cottage, Garage

Oban Distillery

Oban, 1 High Street and Standard Lamp

Oban, 1 Stafford Street, Public House

Oban, 1, 3 Charles Street

Oban, 120 George Street

Oban, 2 Argyll Square, Royal Hotel

Oban, 2, 5 Charles Street

Oban, 20 - 26 George Street, Royal Bank of Scotland

Oban, 28 George Street, King's Arms Flats

Oban, 3 Tweedale Street, Woodside Hotel

Oban, 4 To 6 Argyll Square, Commercial Bank

Oban, 42 - 46 George Street, Argyll Mansions

Oban, 7, 8, 9 Albany Street, Masonic Hall

Oban, 70 George Street

Oban, 8 - 16 George Street

Oban, Albany Street, Sheriff Court-House

Oban, Ardconnel Road, Craigvarren House

Oban, Benvoulin Road, Manderley

Oban, Corran Esplanade, Christ Church Dunollie

Oban, Corran Esplanade, Glenrigh Hotel

Oban, Corran Esplanade, Great Western Hotel

Oban, Corran Esplanade, Regent Hotel

Oban, Corran Esplanade, The Oban Times Offices

Oban, Corran Esplanade, Wellpark Hotel

Oban, Dalriach Road, Hotel

Oban, Gallanach Road, The Manor House

Oban, Gallanach Road, The Manor House, Ice House

Oban, Ganavan

Oban, George Street, Caledonian Hotel

Oban, Glencruitten House

Oban, Hill Street, The Mains

Oban, Kilbowie House

Oban, Mccaig's Tower

Oban, North Pier and Corran Esplanade, Columba Hotel

Oban, Rockfield Road, Oban Free High Church

Oban, Rockfield Road, Primary School with Boundary Walls and Play Shelter

Oban, Shore Street, 1 - 3 Cawdor Place, The Kelvin Hotel

Oban, Shore Street, 4 - 6 Cawdor Place

Oban, Shore Street, 7 Cawdor Place

Oban, South Pier, Piermaster's House

Oban, Station Road, British Linen Bank

Oban, Tweeddale Street, Congregational Church

Old Kilbride Kirk and Kirkyard, Macdougall Burial Enclosure

Category C

Kerrera, Ferry House

Oban, 1 Queen's Park Place

Oban, 1 Shore Street, Claredon Hotel

Oban, 10 Alma Crescent

Oban, 10, 11, 12 Argyll Square

Oban, 102, 104, 106 George Street

Oban, 108, 110, 112, 114, 116 George Street

Oban, 12 Alma Crescent

Oban, 1-2 Victoria Crescent, Corran House Hotel

Oban, 122, 124 George Street

Oban, 14 Alma Crescent

Oban, 15 - 19 Stafford Street, Oban Hotel

Oban, 1-5 Albany Street

Oban, 15 George Street

Oban, 16 George Street

Oban, 17 George Street

Oban, 17, 19 Argyll Square

Oban, 18 George Street, Palace Hotel

Oban, 19 Stevenson Street, Lindhu House, Gatepier and Railings

Oban, 2 Queen's Park Place

Oban, 23 - 25 Argyll Square

Oban, 29 Albany Street

Oban, 3 Victoria Crescent, Ayres Hotel

Oban, 33 High Street

Oban, 37, 39 Stevenson Street and Lamp Post

Oban, 4 Victoria Crescent, Sutherland Hotel

Oban, 5, 7, 9, 11 Stevenson Street

Oban, 5-6 Albany Street

Oban, 6 Alma Crescent

Oban, 7, 8, 9 Argyll Square

Oban, 8 Alma Crescent

Oban, 9 Tweedale Street

Oban, 94 - 96 George Street, Balmoral Hotel

Oban, 98 - 100 George Street, Balmoral Hotel

Oban, Albany Street, Police Station

Oban, Alexandra Place, 22 Corran Esplanade

Oban, Alexandra Place, 24 Corran Esplanade

Oban, Alexandra Place, 26 Corran Esplanade

Oban, Argyll Square, Former Clydesdale Bank

Oban, Argyll Square, Tourist Information Centre

Oban, Breadalbane Street, The Argyllshire Gathering Halls

Oban, Corran Esplanade, Glencairn Hotel

Oban, Corran Esplanade, Kilchrenan Hotel

Oban, Corran Esplanade, Queens Hotel

Oban, Corran Esplanade, Westbay Hotel

Oban, Croft Road, St John's School

Oban, Crombie Street, Old Parish Church

Oban, Drummore Road, Eadar Glinn Eventide Home

Oban, Gallanach Road, Dungallan House Hotel

Oban, Gallanach Road, Dungallan Parks, Public Conveniences

Oban, George Street, Harbour Walls

Oban, George Street, St John's Episcopal Cathedral

Oban, Kilbowie House, Stables

Oban, Lighthouse Depot, Managers House

Oban, Lighthouse Depot, Managers House, East Outbuilding

Oban, Lighthouse Depot, Managers House, West Outbuilding

Oban, Lighthouse Depot, Workshop, Warehouse and Office

Oban, North Pier, Piermaster's Offices and Lamp Standards

Oban, Nursery Lane, Hamilton Park Terrace

Oban, Soroba Road, Soroba House Hotel

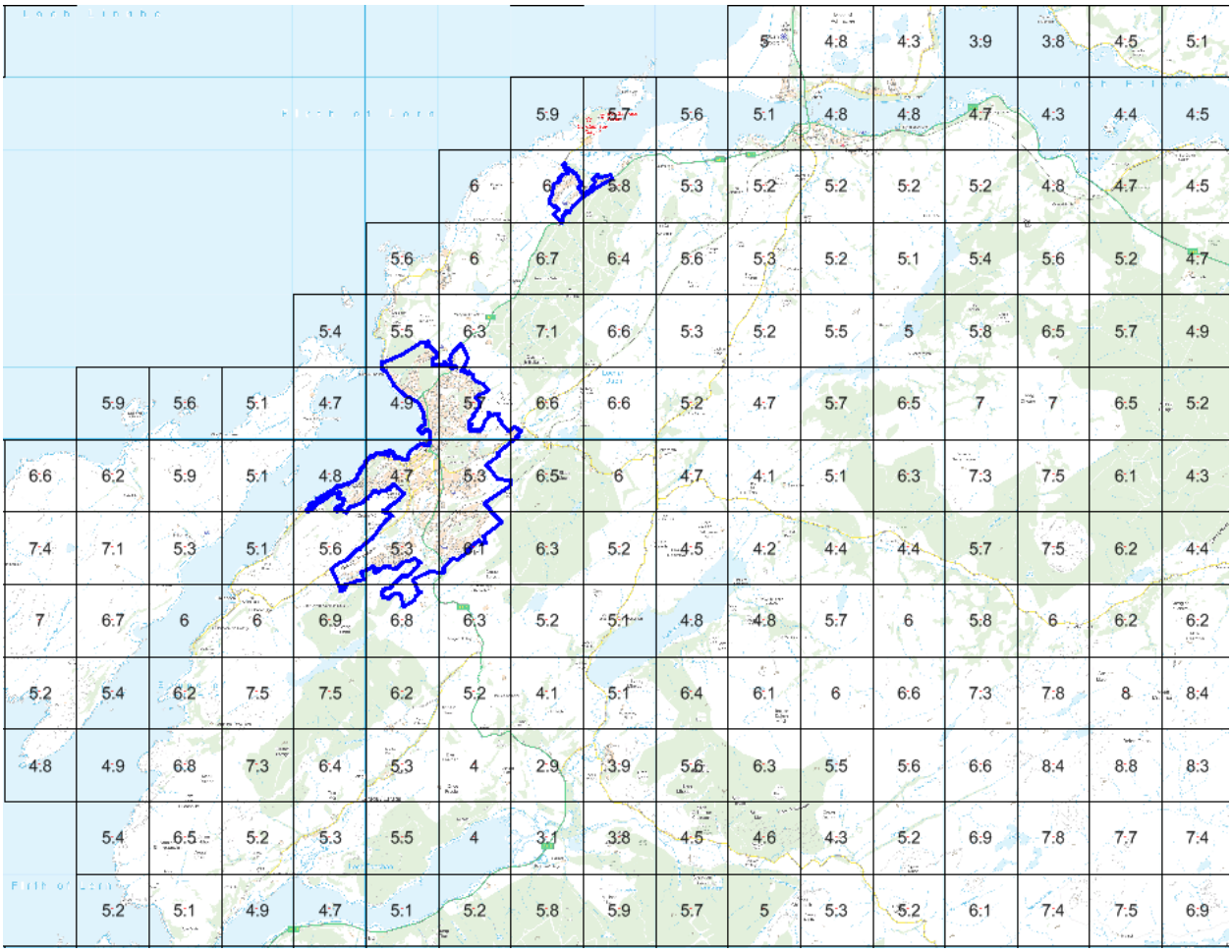
Old Kilbride Kirk and Kirkyard

B.4.3 Estimated wind resource

The wind resource in the area is good with an available average wind speed of around 5.5 m/s at 10 m a.g.l., see Figure B.17.

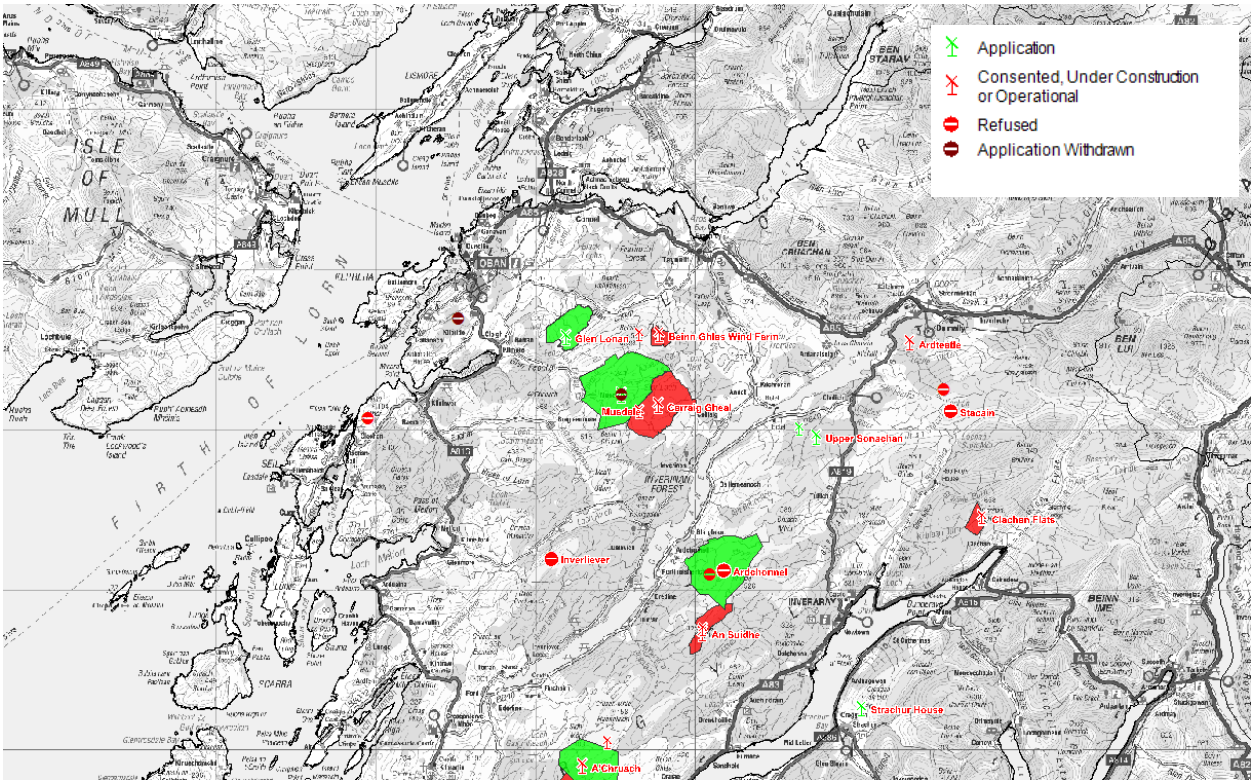
This means that medium or large-scale wind development will have limited feasibility across large areas of the study area. Smaller wind turbines, below 30 m to tip, are more likely to be less constrained; however, careful consideration would need to be made in terms of available resource.

Figure B.17 NOABL[20] Wind Speed at 10 m above ground level



[20] Source: http://webarchive.nationalarchives.gov.uk/20121217154048/http://www.decc.gov.uk/en/content/cms/meeting_energy/wind/onshore/deploy_data/windsp_databas/windsp_databas.aspx

Figure B.18 Map of wind farm development[21]



B.4.4 Estimated hydro resource

There are a number of watercourses, burns and rivers within 3 km of the Oban LEP area, details of these rivers can be found in Table B.6.

Table B.6 Rivers and burns within Oban study area

Name of Burn / River	Length (m)	Height Max (m)	Height Min (m)
Allt Criche	3,500	70	1
Alltan Tartach	2,000	52	7
Feochan Mhòr / River Nell	4,010	20	0
Soroba Burn	3,820	124	3

[21] Source: https://www.gov.uk/government/publications/renewable-energy-planning-database-monthly-extract; accessed December 2017

B.4.5 Estimated biomass resource

There are a few available biomass suppliers within the greater Oban area, as shown in Figure B.19 and detailed in Table B.6, supplying a range of biomass products.

Figure B.19 Top 10 nearest biomass suppliers[22]

Table B.6 Details of biomass suppliers

Supplier	Postcode	Website	Fuels supplied
Ferguson Energy	PA34 4HU	http://www.ferguson-energy-oban.co.uk/	Pellets
West Highland Gas Limited	PA34 4PL	www.argyllresources.co.uk	Pellets, Briquettes
Argyll Woodfuels	PA34 4SE	http://www.argyllwoodfuels.com/	Pellets
Corachie Clematis	PA35 1HY	www.corachiecclematis.co.uk	Pellets, Firewood, Briquettes
Argyll Estates	PA32 8XE	www.inveraray-castle.com	Chip
NWMCW Trading Company Limited	PA72 6JP	www.islandwoodfuels.com	Chip
Highland Wood Energy Ltd	PH33 6SA	www.hwenergy.co.uk	Chip
Our Power (Cairndow) CIC	PA26 8BL	www.ourpowercairndow.co.uk	Chip
Peter McKerral and Co Ltd	PA27 8DN		Chip
The West Highland Woodlands	PH33 7NP		Chip

[22] Source: https://biomass-suppliers-list.service.gov.uk

It is noted that the majority of these fuel supplies, including all of the pellet supplies, are imported into the local area having been processed elsewhere. There is very limited use of timber from the Argyll area within the biomass fuel supply chain.

B.5 Options Appraisal: Scottish context

Scotland's Energy Strategy was published in December 2017[23]. It provides a route map that outlines the vision that the Scottish Government has of what our future energy systems and needs might look like from now out to 2050.

The overall vision is set out in the introduction to the document:

This vision is guided by three core principles:

A Whole-System Approach – Work to date has focused heavily on the production of electricity using low carbon sources and improvements to the efficiency with which we use our energy. The strategy recognises that these are important areas of action but need to be worked on alongside heat and transport. All of these elements influence each other in the energy systems that we need to create in future.

An Inclusive Energy Transition – Changes to the whole energy system are driven by a need to decarbonise our energy use in line with targets set out within the Climate Change (Scotland) Act. While this will show Scotland's contribution to global action on climate change, this needs to be done in a manner that is fair to everyone. This means ensuring that inequality and poverty are addressed as well as promoting a fair and inclusive jobs market. Greater efficiency in energy use by businesses and householders offers the opportunity to reduce bills (and associated carbon emissions) leading to lower fuel poverty levels and enhanced competitiveness for business. As part of efforts to ensure that benefits from the low carbon energy transition are enjoyed by all, the Scottish Government intends to create a new energy company. This will be publicly owned and run on a not-for-profit basis.

A Smarter Local Energy Model – Local energy economies are at the core of the transformation of Scotland's Energy Systems. Local solutions for local energy needs, linking local generation and use, provide a platform for vibrant local rural and urban communities. Local Heat & Energy Efficiency

[23] http://www.gov.scot/Resource/0052/00529523.pdf

Strategies (LHEES) will provide prospectus for local area in terms of investment in energy efficiency, district heating and other heat decarbonisation opportunities.

These in turn are built on six priorities:

Scotland's Energy Priorities

Consumer engagement and protection

We will work hard to protect consumers from excessive or avoidable costs, and promote the benefits of smarter domestic energy applications and systems

Energy efficiency

We will continue to take direct and supporting actions to improve the use and management of energy in Scotland's homes, buildings, industrial processes and manufacturing

System security and flexibility

Scotland should have the capacity, the connections, the flexibility and resilience necessary to maintain secure and reliable supplies of energy to all of our homes and businesses as our energy transition takes place.

Innovative local energy Systems

We will empower our communities by supporting the development of innovative and integrated local energy systems and networks

Renewable and low carbon Solutions

We will continue to champion and explore the potential of Scotland's huge renewable energy resource, and its ability to meet our local and national heat, transport and electricity needs – helping to achieve our ambitious emissions reduction targets

Oil and gas industry strengths

We will support investment, innovation and diversification across our oil and gas sector, working with industry to advance key priorities such as maximising the recovery of remaining resources, subsea engineering, decommissioning and carbon capture and storage – collaboratively addressing the challenges of today and preparing the sector and its workforce for a positive role in Scotland's future energy system

In Scotland at present 51% of the energy we consume is used to heat homes and businesses; around 79% of homes use natural gas as their heating fuel. Transport energy use accounts for another 25%, predominantly via road vehicles. The final 24% is electricity use. While just over 75% of electricity generation in Scotland came from low/zero carbon sources in 2015, there is work needed in the areas of heat and transport in order to deliver sufficient carbon emissions reduction to meet Scotland's climate change targets.

There is no single vision for the long term changes we will see in the generation, supply and use of electricity, heat and transport systems.

There is potential for greater use of electricity in heating homes and businesses as well as powering electric vehicles. However, this also requires changes to the way in which we manage demand for electricity and the control systems we use to match supply and demand.

In an electricity led world:

- Heat pumps and smart storage heaters are used to heat homes and businesses
- Demand management and smart meters enable an efficient electricity supply network
- Cars and vans are electrically powered and a national network of public charging points operate alongside those in our homes
- HGVs and ferries are operated using hydrogen fuel (or as electric/hydrogen hybrids)
- There is limited use of bioenergy and natural gas by businesses
- UK wide management of electricity transmission networks includes interconnectors with Europe and a smart grid approach is required to manage the demands in distribution

An alternative approach is to use greater amounts of low carbon gas – sources can include biogas (from anaerobic digestion) and hydrogen (potentially produced from electrolysis or via steam methane reforming in combination with carbon capture storage).

In a hydrogen led world:

- Hydrogen boilers and fuel cells replace natural gas and fossil fuel boilers in heating within homes
- Hydrogen fuel and fuel cell technology is used in cars, vans, and larger vehicles. Fuel cells have helped shift freight from road to rail and ferries are also predominantly hydrogen fuelled
- Hydrogen replaces natural gas in commercial use and off grid businesses use heat pumps and district heating systems
- Gas demand is met from a variety of sources; this includes import of natural gas from Europe and globally
- Carbon capture storage is used at large industrial facilities

In reality it is likely that elements of both these scenarios will be implemented depending upon local needs. What these scenarios show is that there will be significant change in the way our energy systems work and extensive investment required to enable these changes.

An important aspect of these changes is the role of local energy solutions, as the increase in low/zero carbon energy generation means more distribution of generation away from traditional large scale power stations. The benefits of local solutions, particularly in areas where access to national infrastructure is limited, can be multiple in terms of consumers and local economies.

Local Heat and Energy Efficiency Strategies (LHEES) will be a mandatory requirement of local authorities. Led by local authorities, working with communities, these will set out long term priorities (15 – 20 years) within an area in terms of energy efficiency, decarbonisation of heat and district heating opportunities.

Communities will be empowered wherever possible to develop and commission local energy system plans where they are the full or part owners of the final scheme. Local projects will seek, as far as possible, to use existing energy infrastructure before seeking new transmission or distribution requirements. This aims to make best use of available investment and ultimately maintain affordable energy costs for end users.

At the heart of this process is the 'whole system' approach and inclusivity:

- Systems designed and developed in line with local need;
- Active, energy efficient consumers (both residential and non-residential);
- Lower annual energy bills; and
- Opportunities for local supply chains and investment in local businesses.

Support for local energy systems will continue via Scottish Government investment streams such as Community and Renewable Energy Scotland (CARES), the Low Carbon Infrastructure Transition Programme (LCITP) and the Energy Investment Fund (EIF).

Community-owned renewables projects generate income, which communities can reinvest. This has the potential to create jobs, deliver local services and increase population as a result. Increasing the level of shared ownership of energy projects can play a big role in this process.

In summary, the Scottish Government sees local energy solutions as a vital element of the wider transition taking place across Scotland in the way our energy systems operate. Encouraging a greater sense of ownership and control among all communities is seen as beneficial, not only in terms of security of supply but also in realising the wider benefits of sustainable, affordable energy among homes and businesses.

B.6 Options Appraisal: Local context

Any changes to the way in which energy is used and generated within Oban won't happen in isolation. It needs to be consistent with local planning requirements and, ideally, support and complement ongoing initiatives and programmes of work already supported by the various organisations and agencies operating in Oban and Argyll & Bute more widely.

An introduction to relevant local plans, strategies and policies was provided in Section 5.2. Some further details are provided here.

B.6.1 Argyll and Bute Outcome Improvement Plan (previously the Community Plan and Single Outcome Agreement)

The Argyll and Bute Outcome Improvement Plan (ABOIP) sets out the Community Planning Partnership's (CPP) vision for achieving long term outcomes for communities in Argyll and Bute. The Planning Partners constitute a range of organisations that support the delivery of services to the people of Argyll & Bute, including Argyll & Bute Council, Police Scotland, NHS Highland, Scottish Fire & Rescue Service, HIE, Scottish Enterprise and University of the Highlands & Islands.

This document therefore provides the overall view of how organisations within the Argyll & Bute region intend to manage service delivery to the benefit of all in the community.

The overall objective of the ABOIP for the 10 years to 2023 is that ***"Argyll and Bute's economic success is built on a growing population."***

There are six long term outcomes that sit beneath this overall objective:

In Argyll and Bute:

1. The economy is diverse and thriving.
2. We have infrastructure that supports sustainable growth.
3. Education, skills and training maximises opportunities for all.
4. Children and young people have the best possible start.
5. People live active, healthier and independent lives.
6. People live in safer and stronger communities.

There are three areas of development most relevant to the present Local Energy Plan.

Infrastructure to support growth

One of the outcomes of this Plan is to have infrastructure that supports sustainable growth. One area of focus is therefore improved rail connectivity from Oban, Bute & Cowal and Helensburgh and Lomond to Glasgow and Edinburgh with the six Glasgow-Oban services and continued sleeper connectivity.

More broadly, it is intended to improve all aspects of Argyll & Bute's road, rail, ferry, air and wider transportation infrastructure to support the growth of the local economy and the sustainability of their communities. It is recognised that this will be achieved in partnership with the Scottish Government and the private sector.

Electrical Transmission & Distribution System

Ongoing work will seek to take forward the development of the electrical transmission and distribution grid to support the continued development of renewable technology and to provide additional community resilience.

Water Infrastructure

The water utility infrastructure should continue to be developed in both town and rural areas to support economic development and housing.

B.6.2 Argyll and Bute Local Development Plan

The Council formally adopted the Argyll and Bute Local Development Plan March 2015 and it provides the local planning framework for the Council area (excluding the Loch Lomond and Trossachs National Park area). The next plan (LDP2) is currently being prepared and due for adoption in 2020.

A key area for development in Oban by 2024 is to ensure it is a greener place with community led smaller scale renewable energy projects and larger scale commercial off shore wind, wave and tidal projects that have helped grow the local and national economy.

The LDP also needs to ensure that for the potential for growth to be fully realised through a planned expansion of Oban, including the Dunbeg Corridor, that at the same time addresses known infrastructure constraints, including the need for high quality affordable housing.

A Main Issues report formed the basis of a consultation on LDP2 that ran in late 2017[24]. This proposes retaining its overall vision and setting out a simplified set of objectives, aligned with the ABOIP:

- Support the sustainable growth of Argyll and Bute's economy.
- Develop a spatial strategy that is deliverable and makes Argyll and Bute a low carbon place.
- Work with Community Planning to ensure the integration of land use and community objectives.
- Identify land for homes that meet the needs of future generations.
- Protect, conserve and enhance the outstanding natural and built environment.
- Create places people want to live, work and play in.

A key aspect of the LDP2 is to set out allocations for development, linked to an assessment of the likely demand for housing and commercial development over the period 2020 – 2030.

The present proposal is to reduce the number of allocated housing units across Argyll & Bute from 7,450 in the present LDP to 3,000; this is an average of 300 units a year which more closely matches actual development rates of around 257 units per year in recent times.

This means a reduction in the scale of allocation within both Oban East and Oban South. As noted in Section 4, a large area of development anticipated to come forward within the lifetime of LDP2 is the masterplan at Dunbeg.

The LDP2 also sets out requirements for new developments, which include the consideration of on-site renewable energy generation in order to support or meet the energy needs of any such developments.

B.6.3 Argyll & Bute Renewable Energy Action Plan

Argyll and Bute's Renewable Energy Action Plan has been developed to assist in realising a vision for the development of renewable energy:

"Argyll and the Islands will be at the heart of renewable energy development in Scotland by taking full advantage of its unique and significant mix of indigenous renewable resources and maximising the opportunities for sustainable economic growth for the benefits of its communities and Scotland."

In order to support this vision, the Council has recognised the need for continual improvement of infrastructure and a growing skills base in renewables.

It is recognised that part of this is also supporting community based renewables and the benefits they generate through the Community Renewable Opportunity Portal (CROP), direct support and events, as well as investigating opportunities for shared ownership of renewables. Below is the list of actions, partner(s) and timescales mentioned in the present Action Plan relevant for Oban.

[24] https://www.argyll-bute.gov.uk/ldp2 (Accessed April 2018)

Table B.7 Argyll & Bute Renewable Energy Action Plan – Summary action points

Action	Partner	Timescale
Ensure the grid is fit for purpose to meet renewable energy opportunities – Inveraray-Crossaig overhead line replacement, Northern Argyll substation and submarine cable replacement programme.	ABC, HIE, SSE	2021
Work with partners to examine opportunities for Local Energy Economies/ alternative to grid improvement e.g. ACCESS project.	LES, CES, SSE	Ongoing
Local supply chain events associated with renewable sector developments and online supplier portals e.g. SSE Open 4 Business Portal	Renewables developers	Ad hoc development occurs
Support to non-renewables sector businesses to expand into the renewables sector	ABC, HIE, SDS	2017
Promote European Marine Science Park as a location for renewables related development	HIE	Ongoing
Consider future renewables business accommodation and land requirements and feed into Local Development Plan preparation and nay relevant national policies such as NPF	ABC, HIE, supply chain	2017
Work with developers and future investors to identify any skills shortages	HIE, SDS, renewable developers, supply chain	Ongoing
Maintain suitable courses to support renewables and energy skills	Argyll College, UHI	Ongoing
Consider opportunities for apprenticeship/work experience programme	SSE, renewable developers	Ad hoc as development occurs
Schools education and skills career day	SPR via ALIenergy, ABC, renewables developers	Ad hoc as development occurs
Investigate opportunities for shared ownership of renewables	Renewable developers, LES	Ongoing
Support community benefits from renewables development	Renewable developers, LES	Ongoing
Support community based renewables through the Community Renewable Opportunity Portal (CROP), direct support and events	LES, ABC	Ongoing
Influence legislation and policy development to ensure delivery of overarching ABRA vision and to assist in securing a successful route to market	ABC, HIE, renewable developers, LES, CES, SDS	Ongoing

B.7 High level technology review

There a number of technologies that could be considered for use within the Oban area. The following section provides a brief overview of the major technologies that could be considered and some details regarding how they work and an overall suitability rating in the context of energy needs in Oban.

A simple Red/Amber/Green qualitative scoring system is used. Red means that the technology is not well suited to Oban's needs; Green means that it is well suited to Oban's needs.

Technology	Description	When is energy available?	Interaction with other technologies	Incentives Available	Technology maturity/risk	Supply chain maturity and after sales	High Level Costs and Typical ROI	Overall Technology suitability for Oban
Heat Pumps	A heat pump is a device which transfers energy from a source to another via a refrigerant. Heat pumps can be used in cooling or heating mode depending on the requirements.	H Output is available at all times only the efficiency (COP) of the heat pump will vary depending on the source temperatures.	M It would be unusual for a large heat pump to operate in conjunction with a CHP or biomass heat scheme given that both depend on a heat sink to operate efficiently. The heat pump compressor can be run with a renewable electricity production system to cover its electricity needs.	H RHI range per kWh generated depending on the type of heat pump (air, water, ground source) with no limit in capacity.	H A mature technology with relatively low risk. Sizing risks can be mitigated by using reputable suppliers. May offer opportunity to use in serving needs of a small number of dwellings via a communal system. Not well suited to properties with low fabric insulation given lower heat output	H Many providers of technology mean that it is competitively priced. Maintenance contracts are typically carried out by a specialist refrigeration contractor.	L Costs increase significantly with ground and water source systems due to the need for civil works. Typical costs for larger systems are in the region of £500 per kW heat output. With RHI and typical energy prices, the ROI would be expected to be 8% to 10% and is very much dependent on RHI income.	**HIGH (although at small scale)**
Biomass	Biomass systems generate energy using biological material. There are a number of different types of energy conversion methods such as biomass direct firing.	H Output is typically available at all times as long as there is fuel. Biomass is also typically sized not to be the sole means of energy generation. Backup systems such as gas fired boilers/burners are required to cover energy demands during maintenance periods (or	H A biomass system would require sizing so as not to clash with other LZC technologies. For example, if a gas turbine CHP has been sized for electrical baseload, it is imperative that the exhaust heat can be used	H RHI eligible. Grant funding unlikely given technology maturity and RHI support	H Biomass direct firing is a well-established low risk technology. Expensive system to retrofit for electrically heated homes given requirement for new hot water supply pipework. Could work well for new development	H Many technology providers mean that a scheme can be competitively tendered. Maintenance contracts can be carried out under contract by the supplier. It is essential that maintenance is carried out in accordance with	H Project economics will be sensitive to three main points; 1. sourcing biomass fuel at a competitive price. 2. Access to RHI for the new installation 3. The price of SIN gas. An increase in gas price would increase savings; a fall would reduce savings.	**HIGH**

Technology	Description	When is energy available?	Interaction with other technologies	Incentives Available	Technology maturity/risk	Supply chain maturity and after sales	High Level Costs and Typical ROI	Overall Technology suitability for Oban
		interruption to biomass fuel supplies)				manufacturer's guidance.	ROI would be expected to be 8% to 10%	
Wind	The wind blows and rotates the blades of the wind turbine which then transforms the kinetic power of the wind into electricity.	M Wind is an intermittent source of energy and output can vary from full rated output of the turbines to zero.	M A wind turbine will require a backup via grid or energy storage system to meet net demand. Wind turbine can be coupled with other (non- wind dependent) systems to cover user needs e.g. solar PV.	M Unlikely to receive any grant funding or incentives via FiT or CFD	M Wind energy is a mature renewable energy system but planning issues make it a medium to high risk technology for development. Siting of turbines would be outwith immediate LEP area and therefore need negotiation with land owner Existing grid capacity will constrain scale of turbine output in medium term	H Well established technology with range of turbines to suit client requirements. Many providers of technology mean that it is competitively priced. Maintenance contracts are typically carried out under contract by the manufacturer.	H Average project cost for a turbine ranges between £1,000 to £6,000 per kW installed depending on the scale. ROI can range from 5% to 10% depending on funding mechanisms.	**MEDIUM**
Gas CHP	A gas fired engine or turbine where electricity is generated and heat is recovered for use from engine cooling systems and exhaust.	H Output is available at all times.	M CHP and other LZC technologies have to complement rather than clash.	M Not eligible for RHI or FiT and unlikely to attract grant funding. Good quality CHP can lead to reduction in Climate Change Levy paid on gas via CHPQA scheme.	M Low risk – Gas Fired CHP is a mature technology, well understood and reliable when maintained. Limited capacity to connect to SGN gas	H Many providers of technology mean that it is competitively priced. Maintenance contracts are typically carried out under contract by the supplier.	H Expect ROI to range from 5-10% with a payback of 6-8 years.	**MEDIUM (small scale)**

Technology	Description	When is energy available?	Interaction with other technologies	Incentives Available	Technology maturity/risk	Supply chain maturity and after sales	High Level Costs and Typical ROI	Overall Technology suitability for Oban
					network so size constrained			
Biomass CHP	This technology is based on the combustion of biomass to create steam. The steam is then supplied to a steam turbine generator. This generates electricity which is typically used on site to reduce the import of grid electricity.	H Output is typically available at all times as long as there is fuel. Biomass CHP is also typically sized not to be the sole means of energy generation. Backup supply systems would be required to cover energy demands during maintenance periods and unplanned outages.	M A biomass CHP system would require sizing so as not to clash with other LZC technologies. For example, if a biomass CHP has been sized for electrical baseload, then it may limit the opportunity for installing additional electricity generation such as wind turbines or solar PV.	H RHI eligible - There is a dedicated Biomass CHP tariff. This applies to qualifying heat produced from the turbine and used within a process rather than condensed. It is possible that the scheme could bid for a Contract for Difference (CfD) for electricity generated. Grant finding unlikely given technology maturity and RHI and CFD support.	M There are few examples of biomass CHP systems and this technology would be considered medium risk. For maximum efficiency this would need to be several MW in size. It would therefore need to be part of larger supply solution to be viable.	H Any scheme can be competitively tendered. It may be logical to procure on a turnkey basis for the two main elements of the project; the biomass boiler and the steam turbine. Maintenance contracts can be carried out under contract by the suppliers of boiler and turbine. It is essential that day to day maintenance is carried out in accordance with manufacturer's guidance.	H Reference pricing is more difficult than other technologies such as wind and solar PV. 5 MWe biomass CHP package with grate boiler and steam turbine is likely to cost £15M to £20M dependent on technology used. Project economics will be sensitive to three main points; 1. Being able to source biomass fuel at a competitive price; 2. Access to Contract for Difference for electrical output; 3. The price of SIN gas. An increase in gas price would increase savings; a fall would reduce savings. The ROI would be expected to be 3% to 6% with a simple payback of 8-10 years.	**MEDIUM**
Solar PV	Solar Photovoltaic (PV) technology converts energy from the sun into electricity.	M Hours of daylight only without storage with	H Building specific or would need to be considered part of	M Feed in Tariff available at a rate per kWh produced depending	H Solar PV technology is well established and would be	H Supply chain and after sales are well established with	M Typical cost is £1,000 per installed kWp. Typical ROI	**MEDIUM**

Technology	Description	When is energy available?	Interaction with other technologies	Incentives Available	Technology maturity/risk	Supply chain maturity and after sales	High Level Costs and Typical ROI	Overall Technology suitability for Oban
		reduced output over winter	overall baseload of electricity supply technologies to avoid grid export and increase ROI.	on the size of the installation (up to 5 MW). Note that this will cease to be available from April 2019.	considered as relatively low risk.	competitive market space.	is less than 8% with simple paybacks over ten years.	
Energy from Waste – Gasifier or Anaerobic Digestion	Energy from waste systems convert the fuel source into useable energy. This can include electricity, heat and transport fuel. Waste streams are typically converted into energy by combustion, gasification or anaerobic digestion	H	M	H	M	M	L	**MEDIUM**
		Available at all times as long as there is fuel (waste). Backup system required during maintenance periods.	Energy from waste systems would require sizing so as not to clash with other LZC technologies. For example, if a biomass direct firing system has been sized for heat baseload, an energy from waste system would need to ensure that heat is not rejected to atmosphere.	Depending on the system, Feed in Tariff could be available for electricity generated and RHI for heat.	Main issue in lack of existing food waste collection since this is a major element of cost of production. Relatively mature technology with a number of potential planning issues which make it a technology involving moderate risks.	Well established technology which remains relatively expensive.	The costs of AD systems will depend on whether the system is heat only or combined heat power. Costs for a heat only system range from £1,500 to £2,000 per kW thermal output. On £ per kWe basis, AD CHP systems range from £2,500 to £5,000 per kW electrical output. Typical ROIs can range from 8% to 12% with simple paybacks ranging from 8-10 years.	
Energy Storage	Energy storage systems are devices which capture the energy produced, usually using a renewable source, to use it at a later time. Energy storage systems can be used to assure an efficient use of the electricity produced by renewable systems such as wind and solar PV which are not always available to meet the user demand.	H	H	L	M	L	M	**MEDIUM**
		Energy is available as long as the battery is charged. As an example, wind turbine electricity can be used to charge a battery during periods when wind generation occurs. The system would then supply a site during periods of higher electricity charges.	Battery type energy storage systems can easily be integrated with renewable and non-renewable electricity production systems.	Energy storage does not qualify for FiT or RHI but could potentially attract grant funding as part of an innovative installation.	The technology is still developing. Commercial applications and risks are relatively high. There is limited evidence base of operational systems that have been installed for an	There are a limited number of commercially viable electricity storage systems but ongoing maintenance is understood to be minimal.	Current costs range from £750 to £2,000 per installed kWh of storage capacity depending on scale. A domestic battery system linked to a Solar PV array in Oban might provide an ROI of 2% to 5% and typically an 8-10 year simple payback. This relies	

Technology	Description	When is energy available?	Interaction with other technologies	Incentives Available	Technology maturity/risk	Supply chain maturity and after sales	High Level Costs and Typical ROI	Overall Technology suitability for Oban
		The system could also mitigate the electricity supply outages and disruptions that may occur.			extended period of time.		on use of electricity to displace grid demand at peak prices.	
Tidal	One device design is an underwater capture device (similar to a wind turbine). An alternative option is to use a barrage to capture tidal differences in order to generate electricity	H Tidal schemes will generate electricity all year round. Output will vary with peak tides	M Tidal schemes typically operate independently of other technologies	L No direct eligibility for FiT or grant funding	M The scale of system is likely to be larger than the demand for electricity in Oban. This will be constrained by present grid capacity and make the scheme unviable	M The supply chain is small	L Schemes are typically several MW in scale and so costly to install. ROI is typically low	**MEDIUM**
District Heating	District heating, also known as communal heating, is considered to be a secondary LZC technology in that it does not generate renewable energy but can provide a means of delivering both conventional and renewable heat energy to a group of end users.	H Output is available at all times so long as there is a source of thermal energy supplying the system. In most DH schemes, the end user is supplied via a heat interface unit (HIU). The HIU normally features a heat exchanger and a heat meter for measuring energy supplied and to bill the end user.	H Would need to be considered with other technologies. District heating could be supplied by a number of LZC technologies.	M Would not currently attract FiT or RHI as DH is not in itself a renewable technology. May attract grant funding as part of a LZC scheme supplied by an innovative technology such a large scale heat pump.	M Medium risk – Reasonably established technology with many successful commercial applications in Scotland although there have been examples of poor design that have led to the DH scheme being oversized and operating at a loss. Difficult to retrofit for electrically heated dwellings given need for hot	H There are a number of companies who operate in the domestic district heating space, given favourable economics.	M Costs of a DH scheme are difficult to estimate at this point due to the fluidity in relation to chosen generation technology and end users. ROI again depends on chosen generation technology and end users. But based on previous schemes, we would suggest that ROI is likely to be less than 7%. DH schemes normally work on a project lifecycle basis of 40 years.	**MEDIUM (small scale)**

Technology	Description	When is energy available?	Interaction with other technologies	Incentives Available	Technology maturity/risk	Supply chain maturity and after sales	High Level Costs and Typical ROI	Overall Technology suitability for Oban
					water distribution pipework and larger heat emitters within the dwellings			
Electrolyser	An electrolyser uses electricity to split water into hydrogen and oxygen gases. These gases can be sold to third parties. Hydrogen can be used as a vehicle fuel or storage fuel that can be converted back into electricity.	H The electrolyser can operate at any point when it is supplied with electricity	M Using renewable energy from devices such as wind turbines that are constrained by grid connections means that more locally generated energy can be stored as hydrogen and used either to generate electricity (using a fuel cell) or as a fuel for a boiler or vehicle	M There are no incentive schemes for use of electrolysers	H The technology is mature, though a number of more recent designs are emerging. This would be most suited for use with a wind generator that is curtailed in order to maximise use of the energy generated. Would need market for output hydrogen.	M The supply chain is limited	L Prices range from £2,000 - £3,000 / kW of capacity.	**MEDIUM**
Solar Thermal	Solar thermal systems absorb and use the sun radiation to heat up water or other mediums. This thermal energy can then be used to provide hot water, contribute to the heating (solar heating) or cooling (solar cooling) of a building.	M Output is available during the hours of daylight only although it can be stored. Typically best installed at close to the point of use.	L Typically installed to operate in conjunction with a conventional boiler or immersion heater. Solar thermal can also be combined with other renewable energy systems. i.e. Heat pumps for COP improvement.	L It is possible that solar thermal will be removed from the list of eligible technologies that qualify for RHI support. Unlikely to attract any grant funding.	H Mature technology and considered as relatively low risk. Relatively low solar resource so would need higher input from supporting heat source to ensure sufficient hot water	H There are many providers of technology which means that it is competitively priced. Maintenance contracts can be placed with either equipment suppliers or specialist contractors.	L A 100 m^2 system would cost around £70,000 and would save around £1,000 per annum without RHI. It cannot be considered an attractive investment with an ROI of less than 2%. RHI is available for systems below 200 kWth and this would improve ROI to 6% to 8%.	**LOW**

Technology	Description	When is energy available?	Interaction with other technologies	Incentives Available	Technology maturity/risk	Supply chain maturity and after sales	High Level Costs and Typical ROI	Overall Technology suitability for Oban
Geothermal Energy	Geothermal energy is a thermal energy derived from the heat generated and stored in the earth. Geothermal energy systems harness the heat from the earth to produce heat and or electricity. Installations typically have a heat pump as a means of energy transfer.	L Available at all times when installed at a location that is suitable.	M Consideration would have to be given to ensure that output energy does not clash with other LZC technologies such as heat pumps, CHP or biomass	H RHI available for deep geothermal.	L Still considered as an emerging technology in the UK and would be considered as high risk. Viability would be extremely sensitive to local geology and system design. Studies to date don't highlight Oban as an area with significant geothermal potential	L The geothermal energy industry is not well established and there are few companies supplying this technology. The same can be said of after sales support although many of the components are similar to what would be used in a large heat pump scheme.	L The developing nature of this technology in the UK means that it is not possible to provide estimated costs or ROI. Information from the Scottish Government would suggest that a cost of £1M to £2M per installed MW output has been achieved for some schemes overseas.	**LOW**
Fuel Cells	A fuel cell is a device that converts the chemical energy from a fuel into electricity due to a chemical reaction (no combustion)	L Available at all times as long as there is fuel. A significant potential issue is that the nature of the process means that there would be little use for the lower grade heat that is available from a fuel cell installation.	M Potential to be combined with CHP systems and other renewable technologies.	L Large fuel cells do not currently attract FiT or RHI. It is possible that the innovative use of the technology could attract grant funding.	L No extensive track record in the UK and would carry a medium to high risk. Most likely to be used in transport rather than as a stationary source of heat and power.	M Emerging technology with and aftersales support would be subject to a maintenance contract with the supplier.	M The technology has significantly higher costs per kW than conventional CHP and would have an ROI of ~ 8% (less if lower grade heat cannot be recovered).	**LOW**
Hydro	Run-of-river schemes rely on the height difference (head) between the input and output to a turbine. The other key factor in the power output	H Run-of-river schemes offer electricity output all year round. The	L Hydro schemes tend to be remote in location and so the energy output is	H Hydro run-of-river schemes are presently eligible for FiT funding (at a scale below 5	L The technology is well established and there are a number of different turbine	H There are multiple suppliers and design consultants operating in this area with	L Capital costs for a run-of-river scheme are around £5,000 - £7,000 per kW of	**LOW**

Technology	Description	When is energy available?	Interaction with other technologies	Incentives Available	Technology maturity/risk	Supply chain maturity and after sales	High Level Costs and Typical ROI	Overall Technology suitability for Oban
	achievable is the flow rate of water through the turbine. Alternative designs use a dam and reservoir with a regulated flow run through a turbine. The reservoir is topped up by pumping water back up from the discharge point	output will vary with the flow rate of water.	typically not used alongside other LZC technologies	MW). FiT will close to new application in April 2019.	designs that can be selected based on head and flow conditions. Any hydro scheme would be outside Oban and rely on land access and availability. Difficult to maximise revenue benefit given distance from large demand users.	experience of installing community scale projects	capacity. Lifecycle operating basis is 25 years.	
Wave	Wave energy converting devices capture energy from waves and convert it into electricity	H Electricity output from these devices is available all year round.	M Generally little interaction with other technologies	L No direct eligibility for FiT or grant funding	M The technologies are not fully mature and there are limited options to select from. The scale of system is likely to be larger than the demand for electricity in Oban. This will be constrained by present grid capacity and make the scheme unviable	M The supply chain is limited and typically bespoke for an individual project's needs	L Wave energy schemes are costly to install and offer low ROI	**LOW**

B.8 Initial Options Appraisal

A summary of the estimated benefits and limitations of the opportunities reviewed in Section 5.4 and Section 6 is provided here.

Table B.8 Description of measures summary

#	Measure	Description of measure
1	Replacement of incandescent lightbulbs with LED equivalent	Replacement of older style bulbs with LED equivalent
2	Loft insulation top-up	Upgrade and top-up of existing loft insulation to at least 250 mm thickness
3	Room in roof wall and sloping areas insulation	Upgrade and top up of room in roof insulation to at least 100 mm thickness
4	Internal wall insulation	Installation of internal wall insulation (partition walls or battened)
5	External wall insulation	Installation of external wall insulation as rendered surface
6	Cavity wall insulation	In-fill or replacement of cavity wall insulation
7	Underfloor insulation works	Installation of insulation material beneath existing suspended floorboards
8	High efficiency storage heaters	Replacement of existing electric heaters with modern equivalent and additional controls
9	Replacement of existing oil boilers	Replacement of existing oil boilers with condensing, high efficiency equivalent
10	Replace entry doors with modern insulated uPVC equivalent	Replacement of main entry doors with uPVC insulated equivalent
11	Install A-rated windows (uPVC frames)	Replacement of existing glazing with double glazing (uPVC frames)
12	Promotion of use of heat pumps (air or ground source) and other renewable energy sources in new build properties	Promote use of heat pumps and other renewable energy sources (where feasible) within new build development properties in the community
13	Explore potential of Moleigh site to provide local energy generation	Continue feasibility work to understand potential options for on-site generation and contribution to local energy supply by using the Moleigh site
14	Explore use of heat from wastewater (Corran Esplanade)	Maintain dialogue with relevant parties during any feasibility work to ensure that potential benefits for the local community are identified
15	Anaerobic digestion facility	Investigate use of biodegradable waste to generate biogas, to be used as local fuel
16	Explore hydrogen generation potential with local wind farms	Explore potential to use output from constrained local wind generation to feed an electrolyser generating hydrogen to be used as transport fuel or for electricity generation locally
17	Inter-agency car pool	Seek to develop a pool of EVs to be used by local public agencies, and potentially general users outwith core working hours. Alternatively look at smart travel application using pool of minibuses
18	Electric buses	Seek sources of investment to extend use of electric buses among local operators

19	Electric vehicle promotion	Promote existing grant and loan support schemes for EVs and seek further funding opportunities to support uptake of EV/ULEV within Oban
20	Active travel plan	Promote e-bikes, extend charging points within town and seek to develop safe cycle routes to promote greater cycling within Oban
21	Uptake of smart meters and development of local smart grid	Roll out of smart meters and capacity to develop a local smart grid

Impact Factors

In assessing the potential overall benefits of each option the following factors have been considered:

Electrical Grid Capacity – the influence of local grid network capacity on the viability of proposed supply schemes. Where large schemes are proposed these might need reinforcement works to be carried out adding to the development costs.

Environmental designations – the influence that any proposed action might have in terms of designated areas such as Site of Special Scientific Interest (SSSI) and Special Areas of Conservation (SAC). This is both in terms of preventing use of land areas for energy development to avoid disturbing such sites and also landscape and visual impacts of any energy supply schemes.

Cultural heritage designations - the influence that any proposed action might have in terms of designations such as ancient monuments, burial grounds or archaeologically significant sites. This is both in terms of preventing use of land areas for energy development to avoid disturbing such sites and also landscape and visual impacts of any energy supply schemes.

Supply chain – The relative size of the supply chain for the technology and availability of relevant equipment. This includes consideration of whether required equipment is readily available at different scales or whether orders are bespoke to local requirements.

Technological maturity – Assessment of how well developed any technology is, and where there is risk associated with its operation. This includes how easily the technology could be used within the local area without need for significant modification.

Community ownership – The scope for community ownership and potential investment in the proposed solution.

Scale of development cost – Assessment of the relative scale of development costs involved in the proposed solution, capital cost requirements and initial view of investment return rates.

Lower energy costs – Estimate of impact on energy costs to end users

Local economic benefit – Assessment of potential local economic benefit. This is both in terms of whether any additional employment may arise from the proposed solution as well as benefit of local energy supply in reducing energy costs for households and businesses

Carbon impacts – Estimate of impact of solutions in terms of net carbon emissions associated with energy supply and use.

Human health impacts – Any impacts of measures on local environment in terms of air quality and any other benefits from a change in energy supply or transport

Increased mobility for vulnerable groups – Specifically for transport related projects, an assessment of whether the proposed solution will provide benefit for local mobility

Table B.9 List of options and estimated scale of potential impacts

#	Measure	Electrical Grid Capacity	Environmental designations	Cultural heritage designations	Supply chain	Technological maturity	Community ownership	Scale of development cost	Lower energy costs	Local economic benefit	Carbon impacts	Human health impacts	Increased mobility for vulnerable groups	**Total Rating**
1	Replacement of incandescent lightbulbs with LED equivalent	0	0	0	3	3	0	3	1	1	1	0	0	HIGH
2	Loft insulation top-up	0	0	0	3	3	0	3	1	1	1	0	0	HIGH
3	Room in roof wall and sloping areas insulation	0	0	0	3	3	0	3	1	1	1	0	0	HIGH
4	Internal wall insulation	0	0	0	3	3	0	1	2	2	2	1	0	MEDIUM
5	External wall insulation	0	0	0	2	3	0	1	2	2	2	1	0	MEDIUM
6	Cavity wall insulation	0	0	0	3	3	0	3	1	1	2	1	0	HIGH
7	Underfloor insulation works	0	0	0	3	3	0	2	1	1	2	1	0	MEDIUM
8	High efficiency storage heaters	0	0	0	3	3	0	-3	2	2	2	1	0	MEDIUM
9	Replacement of existing oil boilers	0	0	0	3	3	0	-1	2	1	2	0	0	LOW
10	Replace entry doors with modern equivalent	0	0	0	3	3	0	-3	1	2	1	0	0	LOW
11	Install A-rated windows (uPVC frames)	0	0	0	3	3	0	-3	1	2	1	1	0	LOW
12	Promotion of use of heat pumps (air or ground source) in	0	0	0	3	3	0	0	2	1	1		0	HIGH

	new build properties													
13	Explore potential of Moleigh site to provide local energy generation	1	0	0	2	2	2	-1	1	1	1	1	0	HIGH
14	Explore use of heat from wastewater to Corran Esplanade	0	0	0	2	1	0	-1	1	1	2	1	0	HIGH
15	Anaerobic digestion facility	0	0	0	3	3	3	-2	2	2	2	1	0	MEDIUM
16	Explore hydrogen generation potential with local wind farms	1	0	0	1	2	3	-2	2	2	2	1	0	HIGH
17	Inter-agency car pool	1	0	0	2	3	0	-2	2	0	2	2	1	HIGH
18	Electric buses	0	0	0	2	2	0	-3	2	1	2	3	1	HIGH
19	Electric vehicle promotion	0	0	0	2	2	2	-2	2	1	2	3	1	HIGH
20	Active travel plan	0	0	0	0	3	0	-2	2	1	2	3	1	HIGH
21	Smart meters and develop-ment of local smart grid	-1	0	0	1	-1	1	-1	0	1	0	0	0	HIGH

Note: Each impact factor is rated according to the following scale of impact:

Negative impacts, costs, constraints			No impact	Positive impacts, cost savings, revenues		
"-3"	"-2"	"-1"	"0"	"1"	"2"	"3"
high negative	medium negative	low negative	no impact/ neutral	low positive	medium positive	high positive

Each factor is also given a relative weighting in combining the scores. A summary of the scale of impact and relative weightings is provided here.

Table B.10 Summary of impact factors and relative weighting

Impact Factor	Negative impact	Positive impact	Weighting %
Electrical Grid Capacity	Grid capacity constraint limits or prevents full use of output electricity	Present grid capacity is enhanced by proposed scheme	10%
Environmental designations	Opportunity is limited or impossible to take forward due to impact on local environmental designations	Opportunity provides enhancement of local environment	10%
Cultural heritage designations	Opportunity is limited or impossible to take forward due to impact on cultural heritage designations	Opportunity provides indirect benefits to cultural heritage sites (eg sustainable power, alternative transport)	10%
Supply chain	Opportunity requires bespoke solution only available via a restricted number of suppliers/installers with a long lead time	Opportunity can be readily delivered via wide supply chain and installer base	3%
Technological maturity	Opportunity is an emerging technology with likelihood of high ongoing maintenance and insurance costs	Opportunity is well established with no significant difficulties to address in installation and well understood ongoing maintenance requirements	2%
Community ownership	Opportunity offers a number of routes where the community could be involved as a developer/owner and deliver ongoing benefit	Opportunity is entirely reliant on a private developer and would not offer direct community benefit	10%
Scale of development costs	Opportunity is deliverable with a moderate capital requirement that may be met in part via funding/loan schemes	Opportunity requires large capital investment which is difficult to obtain	15%
Lower energy costs	Opportunity offers significant energy cost savings for end users	Opportunity will not offer cheaper energy costs or potentially result in increased costs in order to achieve a cost-effective supply	15%
Local economic benefit	Opportunity offers additional local economic benefit in terms of lower fuel costs, enhanced	Opportunity offers no additional local economic benefits	5%

Impact Factor	Negative impact	Positive impact	Weighting %
	community income, potential employment		
Carbon impacts	Opportunity offers significant reduction in carbon emissions associated with energy use	Opportunity offers no carbon reduction emissions benefit or potentially increases net emissions associated with energy use	10%
Human health impacts	Opportunity provides support for better health outcomes in terms of better heating in homes or improved air quality	Opportunity offers no benefit to local environment	5%
Increased mobility for vulnerable groups	Opportunity offers more flexible transport that more closely meets needs of vulnerable groups	Opportunity does not improve access to transport for the community	5%

The overall rating (combining the individual factors) then provides a HIGH/MEDIUM/LOW prioritisation score for taking forward the proposed theme. This is a combination of the weightings and the technology fit.