



Futures Ltd

Our Community – Our Environment – Our Actions



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Bute Island *Energy Audit*

Coordinated by:

Scottish Islands Federation



Consulting Partner

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1. Executive Summary

Isle of Bute is connected to national grid for both gas and electricity. Everyone is connected for electricity supply; around 90% are within the gas grid area however approximately 10% remain unconnected for gas. A range of other fuel types are used for heating. Renewable energy generation is in growth but by no means wide spread.

There is a high awareness of energy use connected to heat and light. Energy use for transport and waste are less likely to be considered when discussing consumption levels. Most people are concerned to reduce their energy consumption for reasons of environment and cost.

Despite evidence to support a high level of behaviour change, installation of energy efficiency measures and growth in installations of renewable energy generation, fuel poverty remains high. This is largely driven by high fuel costs, low income levels and poor energy efficiency within the built heritage.

With a wealth of natural resources there is great opportunity for switching from national grid supplied energy to local energy production. There is good potential for micro renewables particularly solar for householders. There is good potential for larger scale renewables across the range of technologies for agricultural community. There is limited potential for fuel switching across the commercial sector. There is still a lot of work to do on energy efficiency measures across all sectors.

Transport and waste are two areas which require a great deal more investigation. Waste represents an area of potential to reduce energy consumption and for energy generation. There is a great deal of opportunity for reduced consumption across the supply chain and introduction of electric vehicles.

2. Energy Audit Introduction

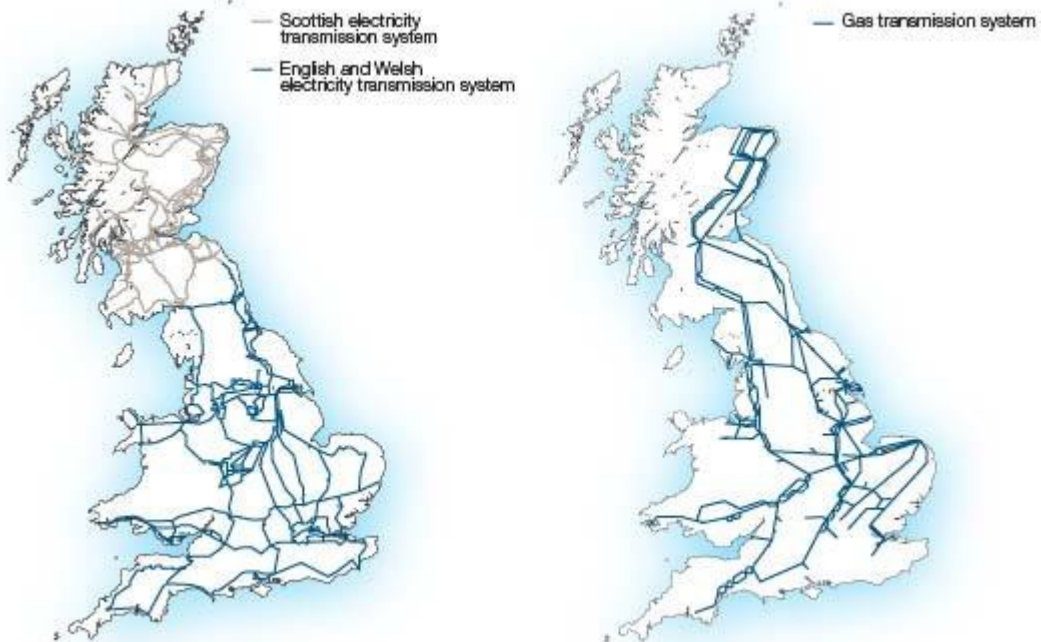
Towards Zero Carbon Bute (TZCB) is a project name used by Fyne Futures. TZCB has undertaken extensive project work on Isle of Bute over the course of five years with a view to reducing the islands carbon footprint. A number of methodologies have been used to increase understanding of energy use and energy efficiency.

In compiling this energy audit, there has been a desk top review of previous work undertaken including commissioned case studies and feasibility studies, domestic and commercial energy audits, and data gathered from key stakeholders including community survey work. A number of new assessments were undertaken as part of TZCB project work and to directly inform this report.

The scope of the audit is much broader than the resources available to complete it allow. Every effort has been made to provide detailed, accurate and up to date information. There are areas which would benefit from further detailed scoping work.

3. Island: Energy Mix

Isle of Bute is one of the few Scottish islands that are connected to mainland national grid for electricity and gas. In January 2012, the resilience of the island was tested when a storm cut electric energy to the island for three days. It became evident very quickly that emergency planning was non-existent. The reliance on national grid energy and vulnerability of infrastructure to severe weather brought issue of local energy generation into sharp focus.



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Table 1 presents a summary of types of fuel used on Isle of Bute, with transmission method to the island from primary production source. The main suppliers in the market place are set out, alongside the general purpose of the fuel.

Table 1 - Types of fuel available for supply

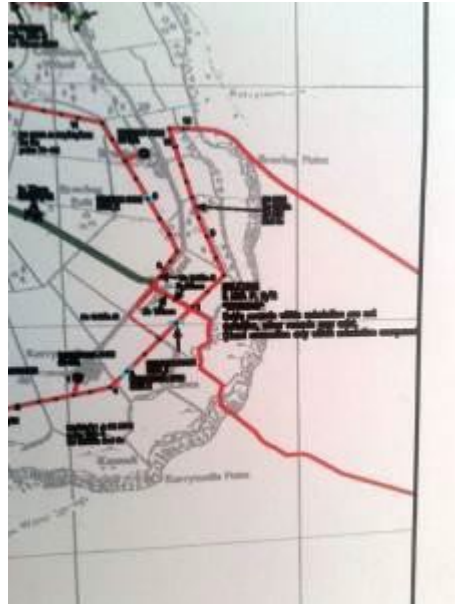
Types of Fuel	Transmission Method	Suppliers	Use
Electricity	National Grid	All suppliers in electricity market including Centrica; Electricite de France; Npower; E.ON UK; Scottish Power and SSE along with smaller energy supply companies such as Ecotricity and First Utility	Domestic & Commercial Heat & Light
Gas	National Grid	As above	Domestic & Commercial Heat

¹ <http://www2.nationalgrid.com/About-us/What-we-do/Electricity/>

Types of Fuel	Transmission Method	Suppliers	Use
LPG, Propane and Butane	National Supply Chain – Ferry & Road	National – Calor Gas Local suppliers – Bute Tools, Mill Cottage and Roseland Caravan Park	Domestic & Commercial Heat
Coal	International Supply Chain – Ferry & Road	National – British Gas Fergusons of Stirling and McKirdy’s Haulier, Rothesay	Domestic Heat
Oil/Kerosene	International Supply Chain – Ferry & Road	Bislands	Domestic & Commercial Heat
Petrol/Diesel	National Supply Chain – Ferry & Road	Highland Fuels	Transport
Wood fuel – pellets	Scottish Supply Chain – Ferry & Road	Arbuthnott Wood Pellets Ltd	Commercial Heat
Wood fuel – logs	Local Supply Chain	Mount Stuart Estates; Bute Community Forest	Domestic & Commercial Heat
Wood fuel – logs and other	National Supply Chain – Ferry & Road	National Retailers – Co-op Local suppliers – Bute Tools and Mill Cottage	Domestic Heat
Wind	Private Installations	Connected to feed grid	Commercial
Solar Thermal/Photovoltaic	Private Installations	Domestic use with excess to grid	Domestic Heat & Light
Heat Pumps	Private Installations	Domestic use with excess to grid	Domestic Heat

4. Energy Supply

Distribution Network Operator for electricity is Scottish & Southern Electric. The incoming connection comes by undersea cable from mainland Cowal, at the North end of the island.



There is a main sub-station on outskirts of Rothesay, with a smaller sub-station at the south of the island. The grid flows through Bute with lines going across to feed Kintyre on mainland to the West of Bute and to feed Isle of Cumbrae to the South East of Bute.



² Bute Network images courtesy of SSE maps

Scotia Gas Networks operate Scotland’s gas network. The pipeline comes from Ardyne Point, Cowal undersea to Ardbeg Point, Bute.



The pipeline then travels underground to Rothesay Meadows Gasworks for onwards distribution to households in Rothesay. The network extends to Port Bannatyne to the North and Mount Stuart Estate, just south of Rothesay. This system replaced the transportation of Liquid Nitrogen Gas via road. This was then stored in tanks for distribution to households.

5. Total Energy Consumption

Studies commissioned by Towards Zero Carbon Bute as part of the island’s carbon footprint exercise have provided useful baselines in planning projects. Table 2 sets out known energy use level at 2006 and 2009⁴. It is outside the time limits and resources of this study to update this with 2014 figures however details of projects undertaken since 2009 indicate that reliance on energy from off island has reduced as a result of high awareness of energy use, energy efficient measures and renewable energy installations.

Table 2 - Types of fuel available for supply

Timeline	Energy Source	Domestic (kWh)	Commerical & Industrial (kWh) includes Agriculture	Total (kWh)
2006	National Grid Electricity	17,530,910	9,538,407	27,069,317
2006	National Grid Gas	55,915,830	13,695,952	69,611,782
	Combined	73,446,740	23,234,359	96,681,099

⁵ See Appendix 1 Bute Carbon Footprint 2010

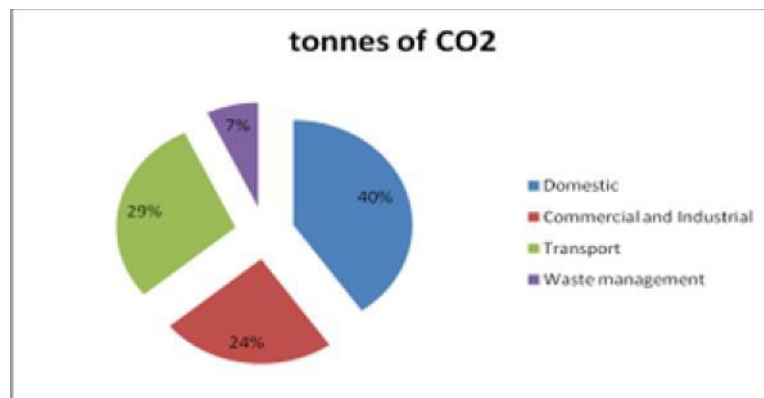
Timeline	Energy Source	Domestic (kWh)	Commerical & Industrial (kWh)	Total (kWh)
2009	National Grid Electricity	17,064,801	8,863,832	25,928,633
2009	National Grid Gas	55,589,906	13,442,061	69,031,967
2009	Coal (circa 300t)	2,442,300		2,442,300
2009	Oil (1.4 million ltrs)	16,925,246		16,925,246
	Combined	92,022,253	22,305,893	114,328,146

6. Energy Consumption Carbon Footprint

Measured with support from Climate Challenge Fund in 2010, this detailed the carbon footprint by sector for the first time⁵.

Table 3 – Carbon emissions by sector

Emission Source	tonnes of CO _{2e}
Domestic	20,645
Commercial and Industrial	12,122
Transport	14,887
Waste management	3,601
Total	51,254



As illustrated by the carbon footprint, the sector which uses the most energy is domestic. It is this sector which has received the most focus to reduce energy use through behaviour change projects; energy efficiency work and latterly encouraging adoption of micro-renewable generation.

Commercial and Industrial energy use includes working farms, audit work has indicated that there is a variety of fuels being consumed. It is within this sector that the greatest opportunity to switch from high carbon fuels to renewables exists.

The public sector contributes significantly to the carbon emissions of Isle of Bute; this is largely driven in by transport, heat and light.

⁶ See Appendix 1 Bute Carbon Footprint 2010

7. Domestic Consumption

A widespread domestic energy audit of Bute was undertaken in 2012, by conducting door to door surveys. The outputs of the complete survey are confidential as individual households can be identified. However data from the survey can be used to inform projects. The survey is relatively recent and on that basis is valid to use for Bute island energy audit. A total of 1,744 households were surveyed from a possible 3,570. It is not within the scope of the resources of this report to revisit the in depth level of this survey.

Subsequent surveys and energy audits have focussed on particular sections of the community with purpose of informing, monitoring and evaluating specific projects.

All households on Bute have access to national grid electricity. Around 10% are off gas grid. The main residential area that is off gas grid is Kilchattan Bay which has circa 200 households occupied.

Household Fuel Type

Fuel use levels were not captured as part of 2012 survey. Table 4 below shows the split of main fuel type. 1,155 household also give details on a second form of heating.

Table 4 - Main Fuel Type

Property Type (Units)	Bulk LPG	Electricity	Mains Gas	No Value Given	Oil	Total
Bungalow	5	17	91	4	20	137
Flat	1	120	830	6	31	988
House	7	47	449	12	75	590
Maisonette		4	18			22
No Value Given				7		7
Total	13	188	1388	29	126	1744

Fyne Homes undertook a 2 year thermal imaging project to understand heat loss issues across the housing stock with subsequent contribution to CO2. As part of this project annual energy use was captured. The survey work connected to this project gives significant indication of domestic energy use in tenement flats as all 313 were in multi-occupancy households in Rothesay and Port Bannatyne – see table 5⁶.

Table 5 – energy use in social housing

Survey	Number of Households	% of Total Social Housing Units	Total Energy consumption kWh per annum	Average consumption per household kWh per annum	Total CO2 kg per annum
2012	128	10.89%	226,702	1,771	51,242
2013	185	15.75%	265,017	1,432	52,473
	313	26.64%	491,719	1,571	103,715

⁶Table produced by permission of Fyne Homes from confidential data

With over 60 farmsteads on Isle of Bute, and almost all off gas grid, domestic energy consumption is a significant consideration for the viability of our agricultural community. The typical farmhouse is pre 19th century stone built cottage style.

Detailed feasibility work was undertaken to understand what energy efficiency measures and renewable energy technologies could be employed to improve energy performance in 6 farmhouses in 2010. A subsequent funding application for a project to implement the recommendations failed to attract investment. A few energy efficiency measures have been installed in a couple of the houses however little improvement has been achieved to date, all continue to use oil as a main source of fuel. ¹Table 6 sets out estimated kWh required to heat space and water, alongside electricity use for light.

Table 6 – farmhouse energy use

Property type	Main heating	Litres	kWh per annum	Secondary heating	kWh per annum	Electricity kWh
1 ½ storey Farm House	Oil ⁷	7,872	80,448	Log Burner ⁸	8,200	2,982
Semi detached Small Brick Cottage	Oil	2,416	24,694			664
Semi detached Small Brick Cottage		2,416	24,694			704
Mid-terrace stone cottage	Oil	2,924	29,881			927
2 storey stone lodge	Oil	3,641	37,212	Log burner	4,100	959
Bungalow style stone built lodge	Oil	2,285	23,351			736
Totals		21,554	220,280		12,300	6972

⁷ Oil to kWh conversion - <http://www.energyandcarbonmanagement.com/conversion-tables>

⁸ Logs to kWh - http://www.biomassenergycentre.org.uk/portal/page?_pageid=75,20041&_dad=portal&_schema=P_OR TAL

¹ Since this audit was conducted, a new project is underway utilising bio-mass as a fuel source and energy efficiency measures installed. 22/4/2015

Energy Efficiency on Bute

There have been a number of good projects on Bute to improve energy efficiency amongst the housing stock. Both social landlords have worked towards and achieved Scottish Housing Standard (SHQS) which was introduced to ensure a national minimum standard for the social housing sector. This was not 100% about energy efficiency but did include elements that related to heating systems and energy efficiency ratings.

Innovative projects on new builds have ensured that new households on Bute have high quality insulations measures and high energy efficiency ratings⁹.

However, the main issue remains the high level of historic buildings which are hard to treat, with expensive solutions.

Of the many ways to measure energy efficiency, roof insulation is perhaps the main one that one would expect there to be a high awareness of. The survey of 1,744 properties in 2012, gives an indication that most people are not aware of the importance of roof insulation. This is particularly true for multi-occupancy tenement flats.

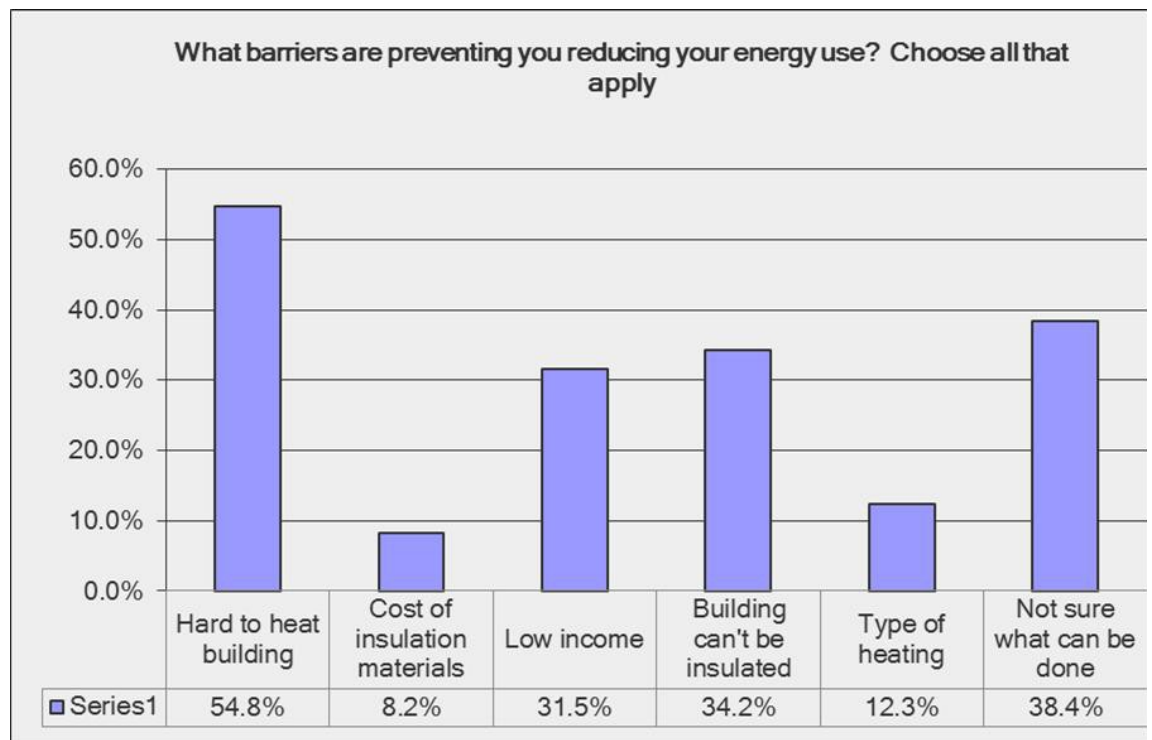
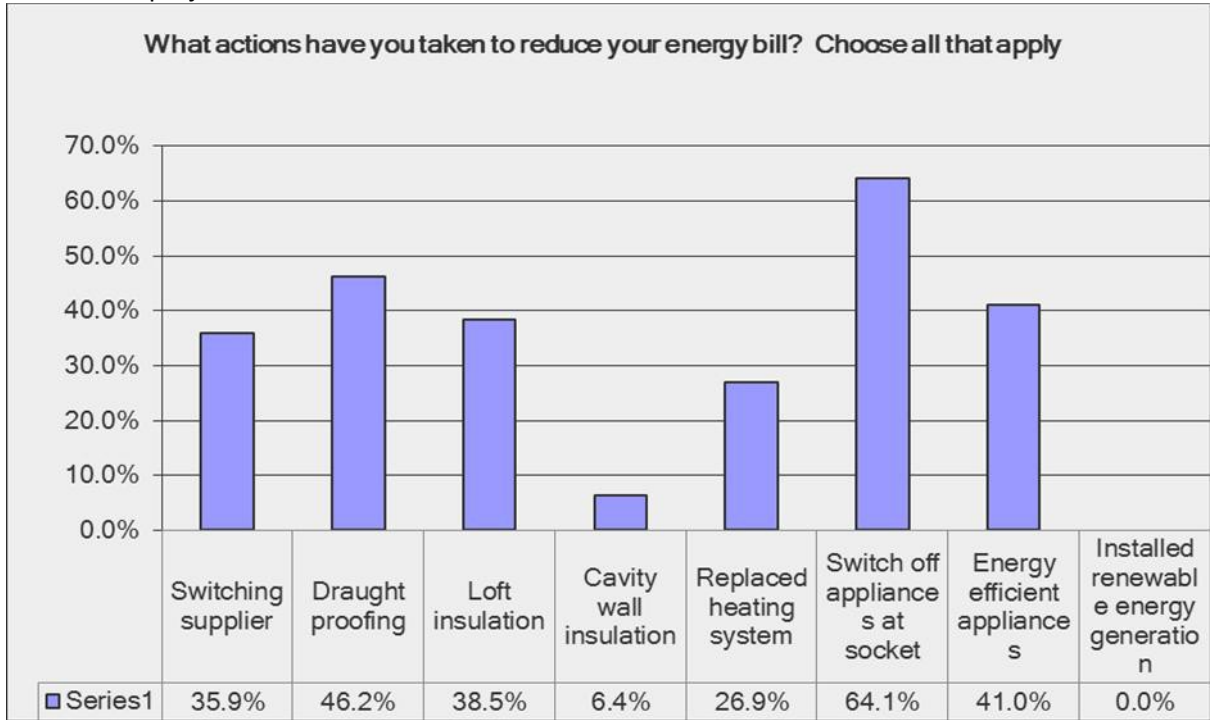
Table 7 - Household Main Roof Insulation

Property Type (Units)	None	Up to 50 mm	100 mm	150 mm	200 mm	250 mm	300 mm	Don't Know	No Value	Total
Bungalow	8	17	30	8	10	8	15	42		137
Flat	78	35	56	13	18	7	18	751	12	988
House	49	41	109	57	23	41	31	239		590
Maisonette	3	1	1	1				16		22
No Value	1								6	7
Total	139	94	196	79	51	56	64	1047	18	1744

⁹Mansefield Place Case Study

Towards Zero Carbon Bute 2013 Project – Over Coming Barriers to Change in Hard to Heat properties focussed on supporting households with high energy costs to achieve a higher level of energy efficiency. The project was concluded in Spring 2014.

A survey conducted at the end of the project was useful in establishing the impact of the project and what barriers had not been overcome.



Over 50 households were monitored over a two year period. 31 provided data confidentially to the project. Total combined annual fuel costs of £42,461. All properties had the benefit of gas connections. Circa 707,683 kWh of gas per annum and circa 73,208 of electricity per annum was consumed. Reductions in energy use were recorded from 10% to 50%. For the purposes of this audit, we revisited two properties in October 2014 for updated year on year consumption figures.

Impact of behaviour change and energy efficiency measures

Domestic Case Study 1 – Stone built, 6 bedroom detached villa. Built circa 1877

	2013	2014
Electricity kWh	7,055	6,863
Gas kWh	48,328	32,476

Energy consumption measured over a 2 year period during which time insulation was installed in all roof voids. Gas central heating system was re-programmed with on times reflecting occupancy times and a temperature setting to reflect householder activity, specifically a lower temperature was set during hours of sleep. Changing the usage habits electrical devices was also put in place through educating the householders to read and interpret the daily average information available on the energy supplier’s website.

Electricity use was not significantly reduced – 2.72%

Gas use was dramatically reduced by 32.80%

A total reduction of 16,044 kWh year on year

Case Study 2 – Stone built, 3 bedroom quarter villa, upper flat. Built circa 1890.

	2013	2014
Electricity kWh	3854.24	3275.09
Gas kWh	12681.79	6765.27

Energy consumption measured over a 2 year period during which time insulation was installed. A mid height ceiling was installed in the loft space. The floor of the loft space was double layered with rock wool the mid height ceiling was single layered with rock wool. Rock wool was also used to insulate behind partition walls around the perimeter of the loft. Underfloor electric heating was installed on insulating board in the bathroom. Additional rock wool insulation was installed around the bath area and a new window fitted in this room. Changing the usage habits for heating and lighting was also put in place through educating the householders to read and interpret the daily average information available on the energy supplier's website.

Electricity use was reduced by 15%
 Gas use a fantastic reduction of 47%
 A total reduction of 6,495 kWh year on year.

From these two case studies it is evidenced that behaviour change combined with energy efficient measures results in a reduction of energy use of 22,539 kWh year on year.

Impact of renewable energy installations

Solar Thermal completed

There are three known solar thermal installations on Bute, generating an estimated total 40,147 kWh per annum.

The largest is Mansfield Place, Rothesay. In 2008, Fyne Homes undertook a project to develop 19 units with an approach on low carbon. The project had a high level of community engagement. The approach included sourcing as much construction material as possible locally, a high standard of insulation and the use of solar thermal panels to provide heat energy. Estimated collector thermal performance per annum is 36,864 kWh.

There are two smaller installations at farmsteads.

- Heating of tank for animal washing
- Pre-heating of tank to improved energy efficiency of bio-mass heating system

Photovoltaic Solar Panels completed

Since 2009, there have been 22 installations of PV on Bute; the majority of these have been 4 kW installations. The estimated generating total from solar gain is 71,200 kWh per annum.

The largest of these installations is of 51 panels was part of new build project, the Ascog Huf Haus, 2010.

These installations represent a reduction of 108,064 kWh per annum of electricity from the national grid.

8. Public & Commercial consumption

There are over 250 business, including farms, and community organisation¹⁰. Limited energy audit work has been undertaken in this area however a sample of 6% which focussed on a broad range of energy users gives a good indication of fuel types and level of energy use. Work has been undertaken to raise awareness of energy use focussing on increasing business resilience through reduced energy costs and encouraging marketing messages about Green businesses.

A great example of marketing green is given from the hospitality sector. Blairbank Apartments offers self-catering and promotes resource efficiency through the environmental policy¹¹.

Key Non Domestic Energy Users

Energy audits were undertaken with 14 organisation and businesses¹²; these were chosen to reflect users in manufacturing, hospitality, agriculture and community groups. Types of fuel included: electricity, mains gas, kerosene, heating oil, liquid petroleum gas and wood. Energy use for 12 was captured.

Table 8 – non-domestic surveys

Fuel Type (kWh per annum)	Manufacturer X 3	Hospitality X 4	Farm X 2	Community X 3	Total
Electricity	1,087,408	245,833	68,000	25,219	1,426,460
Gas	562,150	52,000		54,573	668,723
Kerosene	1,000,000				1,000,000
Oil		167,000			167,000
LPG		108,000			108,000
Total	2,649,558	572,833	68,000	79,792	3,370,183

¹⁰ Appendix 3 Organisations and Business List

¹¹ Hospitality Case Study

¹² Appendix 4 Audit Reports

Energy advice for behaviour changes; options for energy efficient measures and renewable energy were given and sign posting to resources to support change was provided. For the purpose of this audit we will highlight three case studies.

Case Study 1 – Manufacturer

Year	Energy Source	Usage (kWh)	Unit Cost (p/kWh)
2012	Electricity	937,500	8p
2012	Kerosene	1,000,000	6p
2014	Electricity	521,350	12p
2014	Kerosene	944,330	36p

The manufacturer replaced strip lighting with LED panels, alongside introducing staff training to ensure high awareness of energy use. Adjustments were made to the heating system to reduce the time that the system was heating space, and heat exchanger installed to take heat from factory area into the office space. The heat exchanger reduced the use of portable heaters by office staff. This has dramatically reduced electricity consumption.

Case study 2 – Farm

An exemplar on Isle of Bute. When first audited the business usage of electricity was 18,000 kWh per annum, this was supplemented with oil heating system 5,500 litres per annum, circa 56,210 kWh and wood burning stove¹³.

Following initial audit work a further feasibility study was undertaken which resulted in development of a project to make the farm 100% renewable.

This was achieved through installation of solar photovoltaic panels, solar thermal panels and bio-mass pellet boiler. Achieving a saving of 74,210 kWh of carbon based energy per annum. Unfortunately data relating to energy generation has not been given for inclusion in this report.

¹³ Tonnage of wood for Farm were not captured at the time

Case Study 3 – Office



Year	Type	kWh per annum
2013	Electricity	11,241
2014	Electricity	7,420 estimated

Energy Efficiency measures taken

- Roof insulation
- Internal wall insulation
- Draught proof windows and thermal blinds
- Replaced storage heaters with infrared heating panels
- Replaced pendant and spot lights with low energy strip lights
- All IT & Telecoms equipment updated with energy efficient equipment

Average savings per month on a year on year analysis is 34%, with 3 months monitoring still to go. The accommodation was changed from five small rooms to two open spaces with reception area. The office hosted two employees before the work, and now hosts five employees. The energy savings have been achieved despite increased personnel using more IT equipment.

Public Sector

The major public sector energy users are Argyll & Bute Council and Highland National Health Service. It has not been possible within the constraints of this work to gain energy use figures.

However it has recently been announced that Argyll & Bute Council has undertaken a project at Rothesay Joint Campus. The installation of solar photovoltaic panels will have a generating capacity of 246 kilowatts. It is expected to result in a total yield of 196,800 kilowatts and reduce energy bills at the school by £32,574, with benefits to the environment of 103 tonnes carbon savings.

10. Transport consumption

A full examination of energy use in transport is not possible within the resource and time constraints of this audit. This is an area that requires a more extensive study. 29% of Isle of Bute carbon footprint is associated with transport. The large consumers are:

- Ferries
- Supply chain road haulage

- Domestic travel
- Waste management

Set out below is an overview based on data previously gathered about domestic travel¹⁴; development of the community car club and telephone survey work to inform this report.

Table 9 - Key Consumers

User	Purpose	Frequency	Type of Vehicle
Calmac Wemyss Bay Crossing	Ferry service	Average 17 return crossings per day	2612 tonnes Ferry X 2
Calmac Colintraive Crossing	Ferry service	Average 35 return crossings per day	549 tonnes Ferry X 1
McKirdy's Haulage	Supply Chain haulage – mainly commercial	Daily – multiple units	6 X tractor units 7 X trailer units
Oban Express	Supply Chain courier – mixed	Daily – minimum 1 unit	7 ½ boxer type van
Highland Haulage	Supply Chain courier – mixed	Daily – minimum 1 unit	7 ½ boxer type van
Co-operative Retail	Supply Chain haulage – food	Daily	1 X 44 tonne tractor and trailer
Spar Retail	Supply Chain haulage – food	Twice Weekly	1 X 18 tonne tractor and trailers
Factory Shop Retail	Supply Chain haulage – household goods	Weekly	1 X 18 tonne tractor and trailer
Black's of Dunoon	Supply Chain haulage - mixed	Daily	1 X 10 tonne truck
Wallace Express	Supply Chain haulage - drinks	Twice Weekly	1 X 10 tonne truck
Shanks	Waste haulage	Twice Daily	1 X 18 tonne articulated truck
West Coast Motors	Public Transport	Daily – multiple units	1 x double decker 4 x single decker 1 x double decker open top tour bus (summer only) 2 X mini bus

¹⁴ Appendix 6 Extract of 2010 Community Consultation Travel

These are the main and most frequent consumer of transport fuel connected to Isle of Bute.

There are two local garages who supply fuel on island, from data gathered an estimated 1,005,120 litres of fuel is delivered to the island per annum. This is delivered via twice weekly tankers.

Domestic Travel

- 75% of people have access to a car or van on Isle of Bute
- Travelling to and from work is the most frequent reason for car journeys
- Most people will walk for a journey up to 1 ½ miles
- Average miles per annum travelled by car owners is 3,959
- Bike ownership is at 42% although most only cycle for leisure
- Car sharing is not viewed as a reliable travel choice

Consumption of fuel for domestic vehicles is estimated at 860,528 litres per annum¹⁵.

Car Bute was set up in 2011 as a result of positive response to the idea from community consultation and following a successful pilot. The theory of change was that car owners driving 3,000 miles of less per annum would save money by joining the car club instead of replacing their car when the time came; that people without cars would be less likely to purchase a vehicle if there was an alternative available at point of need; and that visitors would be less likely to bring a vehicle on to Bute if there was an option to access a vehicle on the island.

¹⁵ Domestic Fuel Use.xls



The car club has ran successfully for three years, with 148 users, 21 of which are from local business or organisations who have used the car club to support their employees or community work.

From 2012 to 2013, we monitored 5 members who had given up their car or chosen not to purchase one as a direct result of Car Bute membership. The combined annual mileage had been 17,500 miles at average 56 miles per gallon¹⁶ this equates to 312.5 gallons of fuel (1420.65 litres). These members converted to walking and use of public transport alongside Car Bute and clocked up 4,962 miles through the club. One member took the car on a touring holiday that account for 25% of the total. Overall, a fantastic saving of 12,538 miles of car travel!

Year to date 31st October 2014, a total of 12,726 miles have been driven across three fuel efficient cars. The first Car Bute car was replaced with a new electric/petrol hybrid this year. There is a project underway to realise a community charging point for electric vehicles, and a fully electric vehicle joining the community car club fleet.

Bio-diesel

In 2008 Fyne Futures undertook a pilot to create a carbon neutral fuel from waste vegetable oil. Following a 2 year pilot study we increased our production capacity from 170 litres per batch to 400 litres per batch. This was achieved through support of Bute and Cowal's hospitality and food retail sectors and householders. By end of 2011, we were able to divert 15,000 litres per annum from the waste stream and turn it into a useful resource. An average of 13,500 litres of bio-diesel was produced over a five year period.

¹⁶https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/265432/env0103.xls

On 1st April 2012, UK Government introduced new legislation, which meant that the fuel created was subject to fuel duty at the same level as normal pump fuel. The impact of this resulted in a significant cost to the operation.

During 2013, support was made available through the Renewable Transport Fuel Obligation (RTFO) with a process of receiving Renewable Transport Fuel Certificates (RTFC's) which could then be sold. With a strong commitment to our environmental aims, we continued bio-diesel production and worked through the process of gaining RTFC's.

This has proved to be a cumbersome mechanism with additional administrative burdens and costly external audit obligations which did not result in significant relief of the tax burden.

This legislation, combined with rising cost of other production materials, means that we have suspended bio-diesel production in November 2013. We are currently undertaking an options appraisal to establish whether there are any viable alternatives.

This means that we are no longer able to collect used vegetable oil from businesses or householders.

12. Assessment of the potential for fuel switching

Potential

As can be seen from the extent of feasibility studies above Bute has a wealth of natural resources that could be used to generate energy.

- Wind
- Solar gain
- Bio-mass from wood
- Waste for Anaerobic Digestion
- Hydro to limited extent

Feasibility Studies on Bute

Anaerobic Digestion

In 2003 we undertook a feasibility study for an ambitious bio-gas project using anaerobic digestion technology. The study examined use of animal waste from farms, waste from cheese factory and domestic food waste. The project was not taken forward on grounds of poor financial sustainability largely driven by transport and distribution costs.

Bio-mass

In 2010 we undertook a pre-feasibility study for biomass CHP district heating. The proposed project examined was ambitious and looked at biomass replacing natural gas as fuel source. The study concluded that large scale district heating was not feasible "as long as natural gas prices are... low".

Large scale wind

In 2011 we undertook feasibility study into large scale wind, posing the question “what would be required for Bute to become 100% renewable?” The study concluded that Bute had an extremely bankable wind resource and that 45 x 900 kW turbines spread across 5 sites would generate enough electricity to meet the island demand. A development for a smaller community owned wind project is underway currently.

Tidal

In 2011 we undertook feasibility study into tidal power generation. The study was abandoned following desk top analysis which evidenced tidal flows around Bute would not support a tidal project with the exception of Kyles of Bute. The Kyles of Bute support a healthy marine leisure tourism industry and are designated National Scenic Area with surrounding land areas Sites of Special Scientific Interest.

Micro-generation and other projects

In 2012, energy audits and feasibility work was undertaken to identify the potential for micro generation. 14 local businesses and organisations were assessed. The study worked with the organisations on low cost energy efficiency measures that could be implemented to reduce use and identified potential for 300kW of solar PV and 48kW of micro wind installations. There were also opportunities for renewable heat installations. Following on from feasibility study into range of micro-renewables technologies and potential for Bute, Fyne Futures via Towards Zero Carbon Bute Project has support many householders and small business with advice, audits and support to achieve micro-renewable installations. These have ranged from 4 kW solar panel installations on approximately 20 households to a small wind development on a farm of 3 15 kW wind turbines. Other installations have included solar thermal, ground source heat, air pumps and bio-mass boilers.

Wind in progress

Community Owned Wind Farm on Bute

Bute Community Power are the lead partner in this project. Fyne Futures is supporting with project space and management resource.

- Bute Community Power
- Local Energy Scotland
- Auchentirrie Farm
- Bute Community Council
- Argyll & Bute Council
- All community organisations based on Bute
- A range of private business
- The Community of Bute

Early feasibility work suggests that 1,445,400 kWh would be the estimated annual energy yield from the project. This project is progressing with next phase of detailed feasibility study commissioned. The hope is to be ready for planning March 2015.

***Photovoltaic Solar Panels in progress
Community Owned Solar Farm on Bute***

Bute Community Power are the lead partner in this project. Fyne Futures is supporting with project space and management resource.

- Bute Community Power
- Local Energy Scotland
- Farms and Private business on Bute

An initial scoping of 9 farms suggests that a project could realise 1,421 kW of generated electricity. The project is at a very early stage.

Micro AD Pilot Project

Fyne Futures are the lead partner in this project. Outline figures suggest that with as little as 10% of food waste collected 7008 kW electricity and 7377 kW heat could be generated and with 100% collection could reach as high as 69,730 kW electricity and 73,400 kW heat.

Partners in this endeavour are:

- Scottish Bio-fuel Programme
- Argyll & Bute Council

13. Island Community / Island background

The project community is the Isle of Bute. This island has circa 6,500 residents – around 60% reside in the main town of Rothesay, whilst the remaining 40% reside in the village of Ardbeg, remote rural villages Port Bannatyne, Kilchattan Bay or remote rural settlements on West Coast of the island and farmsteads. There are clear boundaries to be drawn round the community on Bute and its associated carbon emissions given its island location. The principal carbon emissions on the island are identified as energy use – both by business/organisations and by households, transport to and on the island, and waste management.

Location

Bute is an island in the Firth of Clyde. The Isle of Bute is the most accessible of the westerly isles from Scotland's central belt, 7 miles off the coast of Inverclyde and North Ayrshire. Bute constitutes part of the Argyll and Bute council area with a geographic area of 47.2 square miles. The island has many unique and special qualities. The highland boundary fault runs through the island dividing the island into two distinct geographies. The highlands of the North are designated as Site of Special Scientific Interest for ancient oak and a range of rare diving birds. A second Site of Special Scientific Interest is located in the centre of the island known as The Central Lochs. The south and west of the island is dominated by rolling farmland. The main town of Rothesay is located on the east coast, and is Scotland's second largest conservation area for its Georgian and Victorian built heritage. The other conurbations are Ardbeg, Port Bannatyne and Kilchattan Bay with farmsteads spread throughout.

Transport

The island is very suitable for active travel, with the bulk of population living and working in Rothesay. There are around 300 daily commuters to the central belt. West Coast Motors provide public transport for the island supported by a good taxi service and community car club. At Weymss Bay there are good public transport links with rail and bus services, however links at Colintrave are limited. Bute is also well placed for Glasgow and Prestwick airports.

On island there is a good road network around and across the island of A and B classification.

14. Island Demographics and Population

Isle of Bute is facing a demographic crisis with the population decreasing 10% from 2001 census to 2011. The population is skewed towards an older population. There is a high dependency on key benefits amongst the population. Work tends towards part time and seasonal opportunities which are low paid¹⁷.

Population Base

There are 3570 households with a population of 6498, 63 farmsteads, and over 200 businesses and community organisations.

74.6% of the island's population is resident in Rothesay, which can be described as an urban environment in a rural setting. The rest of the population can be described as living in rural and remote rural locations.

Population mix

- 14.32% children (below 16)
- 55.08% working age (16 – 65)
- 30.60% pensionable age (65+)

Around 17.55% are income deprived, and there are three data zones in the top 15% of multiple deprivation areas.

Fuel poverty on Bute is driven by three main issues:

- Low income households
- High energy bills
- Hard to heat properties

¹⁷ See 2011 Neighbourhood Statistics.xls <http://www.sns.gov.uk/Sitemap/map.aspx?Page=SiteMap>

15. Local Economy

There are over 250 business and other organisations on Isle of Bute¹⁸. Like most island economies the main economic drivers are Tourism and Agriculture. Mount Stuart Trust, Argyll & Bute Council and National Health Services are amongst the largest employers on the island. Tourism and agriculture are the main economic activities however there is a broad mix of other business categories including:

- Banks & Other Financial Institutions
- Supermarkets & Retailers
- Garage Services
- Food Processers
- Electronics Manufacturing
- Estate Agents and Legal Services
- Professional and Outsourcing Services
- Boat Yards and Metal Fabricators

Land and marine use

There is significant commercial forest plantation on Isle of Bute, mainly owned by Mount Stuart Trust, who operates over 1,300 hectares. Sitka spruce is the predominant species. There is 161 hectares owned and managed by the community under the banner of Bute Community Land Company. Much of the commercial plantation is mid to late cycle, and large scale felling is underway.

There 56 farmsteads on Bute, 44 are productive with milk, beef, sheep and grains. Farm size varies from small holdings of just a few acres to farms with over 2,200 acres.

There are 13 dairy farms which produce approximately 13 million litres of milk, which is transported to the mainland.

Marine activity centres on ferry services and leisure boating.

The island is serviced by 3 Calmac ferries:

- Rothesay – Wemyss Bay crossing X 2 ferries
- Rhubodach – Colintraive crossing X 1 ferry

There are 2 marina's which welcome leisure craft of all types from kayaks to motor boats to tall ships.

- Bute Berthing Company, Rothesay - 60 berths
- Port Bannatyne Marina – 105 berths

¹⁸ See Organisations and Business List

Political and Administrative Structures

LOCAL DEMOCRACY - Bute Community Council is the most local tier of government. Their primary purpose is to represent community views to the local authority and other public bodies. Bute Community Council has undertaken projects in the past to improve the environment of Bute. There are 18 elected members².

<http://www.community-council.org.uk/bute/>

Members of Bute Community Council are listed below:

Convenor Miss Grace Strong
Vice Convenor Mr Frank Baxter
Treasurer Mr Ray Beverley
Secretary Mr Mick Common
Councillor Mr Mike Blair
Councillor Mr Kevin Bye
Councillor Mr Martin Catlin
Councillor Mrs Ellen Cromack
Councillor Mrs Jean Donald
Councillor Mr Paul Duffy
Councillor Mr George Gillespie
Councillor Mr Iain Gillespie
Councillor Mrs B. Hill
Councillor Mr Ian Hopkins
Councillor Mrs Carol Sprowl
Councillor Mr Henry Tait
Councillor Mr Peter Wallace
Councillor Mr D Williams

² Since publication Mr Bye has resigned from BCC; Mr Harrison has been appointed

LOCAL AUTHORITY - Isle of Bute is served by three elected local Councillors, and operates as a multi-ward constituency as part of Argyll & Bute Council.

<http://www.argyll-bute.gov.uk/home>

Photo	Councillor	
	<p>Isobel Strong Scottish National Party Lilybank, Glebelands, Rothesay, Bute, PA20 9HN isobel.strong@argyll-bute.gov.uk</p> <p>01700 501349 or 01700 503493 (Home) 07780671571</p>	Isle of Bute
	<p>Len Scoullar Independent Tangmeer , 45 Craigmore Road , Rothesay, PA20 9ES, Bute len.scoullar@argyll-bute.gov.uk</p> <p>01700 503529/504466 or 01700 501383 07747 812296</p>	Isle of Bute
	<p>Robert MacIntyre Independent Dunallan Farm, Rothesay, Bute, PA20 0QG robert.macintyre@argyll-bute.gov.uk</p> <p>01700 503986 07712445322</p>	Isle of Bute

SCOTTISH GOVERNMENT - There is one directly elected Member for Scottish Parliament for constituency Argyll & Bute, which is part of Highlands and Islands Region.

Constituency MSP

Michael Russell



Scottish National Party
 Highlands and Islands
 Constituency: **Argyll and Bute**

- ▶ [Email me](#)
- ▶ [Full Contact details](#)

The Highlands and Islands Region contains 8 constituencies, each with a directly elected member and there are a further 8 regional members.

Regional MSPs

John Finnie



Independent
Region: **Highlands and Islands**
▶ [Email me](#)
▶ [Full Contact details](#)

Rhoda Grant



Scottish Labour
Region: **Highlands and Islands**
▶ [Email me](#)
▶ [Full Contact details](#)

Mike MacKenzie



Scottish National Party
Region: **Highlands and Islands**
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Jamie McGrigor



Scottish Conservative and Unionist Party
Region: **Highlands and Islands**
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Mary Scanlon



Scottish Conservative and Unionist Party
Region: **Highlands and Islands**
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David Stewart



Scottish Labour
Region: **Highlands and Islands**
▶ [Email me](#)
▶ [Full Contact details](#)

Jean Urquhart



Independent
Region: **Highlands and Islands**
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▶ [Full Contact details](#)

<http://www.scottish.parliament.uk/>

UK PARLIAMENT – Argyll and Bute is a county constituency of the House of Commons. There is one directly elected Member of Parliament.

<http://www.parliament.uk/>

Mr Alan Reid MP



Constituency
Argyll and Bute

Party
Liberal Democrat

Address as
Mr Reid



Contact details

Parliamentary

House of Commons, London, SW1A 0AA
Tel: 020 7219 8127
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reida@parliament.uk

Constituency

95 Alexandra Parade, Dunoon, PA23 8AL
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EUROPEAN UNION – there are 6 Members of European Parliament that represent Scotland.

	David COBURN  Europe of freedom and direct democracy Group United Kingdom: United Kingdom Independence Party
	Ian DUNCAN  European Conservatives and Reformists Group United Kingdom: Conservative Party
	Ian HUDGHTON  Group of the Greens/European Free Alliance United Kingdom: Scottish National Party
	David MARTIN  Group of the Progressive Alliance of Socialists and Democrats in the European Parliament United Kingdom: Labour Party
	Alyn SMITH  Group of the Greens/European Free Alliance United Kingdom: Scottish National Party
	Catherine STIHLER  Group of the Progressive Alliance of Socialists and Democrats in the European Parliament United Kingdom: Labour Party

<http://www.europarl.europa.eu/portal/en>

Other key organisations are:

- National Health Service Highland - <http://www.nhshighland.scot.nhs.uk/Pages/welcome.aspx>
- Scottish Environmental Protection Agency - <http://www.sepa.org.uk/>

Appendix – contain confidential information only to be released on request by request basis to report author.

Appendix 1 Bute Carbon Footprint 2010

Appendix 2 Fyne Homes Thermal Image Programme

Appendix 3 Organisations and Business List

Appendix 4 Audit Reports

Appendix 5 Plan Farm Renewables

Appendix 6 Extract of 2010 Community Consultation Travel

Supporting Documents

Domestic vehicle fuel.xlsx

Farmhouse Energy Use.xlsx

Hospitality Case Study.docx

Mansefield Place Case Study.docx