



Isle of Mull Energy Audit

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1. Island Community / Island background

The Isle of Mull is situated off the west coast of mainland Scotland and is part of the Argyll and Bute council area. With an area of 875.35 square kilometres Mull is the second largest island of the Inner Hebrides and the fourth largest Scottish island. There are many small islands off the coast of Mull of which Erraid, Inch Kenneth, Iona, Gometra, and Ulva are inhabited.

There are around 1400 houses on Mull and a population of around 3000 usual residents rising in the summer with seasonal workers and tourists. The demography of Mull is around 20% under 16, 60% working age and 20% pensioner age in Tobermory which accounts for 1/3 of Mull's population. Outside of Tobermory it is estimated that the under 16 category falls to 16% and pensioners represent about 24%.

2. Energy Audit Introduction

The Energy Audit (phase 2) was carried out during the winter of 2014/15 in an attempt to provide baseline data of energy use on the Isle of Mull that can be used for future sustainable energy planning and to investigate the possibility of fuel switching to more sustainable energy types.

Phase 2 built on the initial planning carried out in phase 1 and aimed to collect data in particular from a variety of types and sizes of business.

It was disappointing that the majority of businesses were uncooperative for a variety of reasons, ranging from 'no time' to 'commercial confidentiality'.

However, a number of major users including Calmac and West Coast Motors indicated that they will share their data, although to date these figures have not been forthcoming, and therefore the Mull Energy Audit needs to be viewed as a living document, with any further data being added in due course.

3. Island Energy Mix

There is a broad range of fuels available all of which except wood and wood pellets are imported from the mainland. Along with many islands, natural gas is not available and peat does not seem to be used either.

Electricity is produced on the island through a number of hydro schemes run by SSE, private businesses and community companies. Grid electricity is also provided by SSE through an undersea cable.

Coal and the various oils are provided by mainland merchants through regular bulk deliveries by truck or tanker, although Gleaners have a small depot at Craignure, and are delivered on to individual properties.

Petrol and Road diesel are supplied by 3 garages on the island and the Craignure Spar shop

The use of wood as fuel appears to be increasing and is supplied by Crannich Farm as wood pellets and other enterprising local individuals. Otherwise it is harvested by users from either their own land or with the agreement of other landowners notably the Forestry Commission.

Table of fuels available, suppliers and applications used for.

| FUEL | SUPPLIER | APPLICATIONS |
|------------------------------------|-----------------------------|--|
| Grid Electricity | SSE | Central heating, underfloor heating, cookers, small appliances, boiler pumps, heat pumps, water supply pumps, IT, craft and small manufacture machinery. |
| Heating oil (kerosene) | Brogans Ltd Gleaners Ltd | Central heating, underfloor heating. |
| Red diesel, marine diesel | Brogans Ltd Gleaners Ltd | Tractors, large generators, fishing and leisure boats. |
| Diesel (white diesel, road diesel) | Gleaners Ltd | Cars, vans, trucks. |
| Petrol | Gleaners Ltd | Cars, farm bikes, outboard motors, chainsaws etc. |
| LPG | Fergus Whyte Macallum | Central heating, cooking, small appliances. |
| Coal | Fergus Whyte Macallum | Multi-fuel stoves, open fires, water heating. |
| Wood | Crannich | Multi-fuel stoves, open fires, water heating. |

| | | |
|--|---------------------|--|
| | Farm Individuals | |
|--|---------------------|--|

4. Energy Supply

It should be noted that the above table does not include the fuel use of fuel of Calmac who operate three RoRo ferries or West Coast Motors who operate the public bus service and coach tours in the summer.

There are a number of renewable technologies employed on Mull. The table below is taken from the CES Argyll Island Communities Audit with proposed hydro schemes inserted. These should be on line by the end 2015.

| Technology | Number of Installations | Total Capacity (kW) |
|----------------|-------------------------|---------------------|
| Photovoltaic | 29 | 93 |
| Wind | 7 | 77 |
| Hydro | 1 | 180 |
| Proposed Hydro | 3 | 810 |

5. Total Energy Consumption

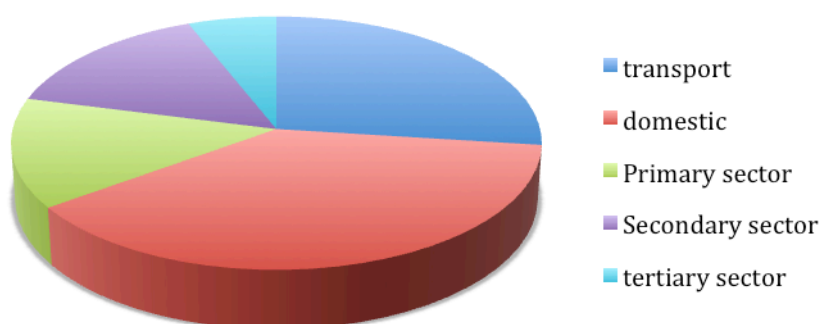
| Sector | MWh per annum | Proportion of total consumption (%) |
|------------------|---------------|-------------------------------------|
| Transport | 15,161 | 27% |
| Domestic | 20,632 | 38% |
| Primary Sector | 7,620 | 14% |
| Secondary Sector | 8,415 | 15% |
| Tertiary Sector | 3,552 | 6% |
| TOTAL | 55,380 | 100% |

The energy consumption totals are low due to the issues with data collection.

If the data from Cal Mac and West Coast Motor was included,¹ it would be expected that transport would overtake the domestic sector as the highest consumer.

¹ It is hoped that as the energy audit is reviewed annually, more data will be made available.

Total Energy Consumption



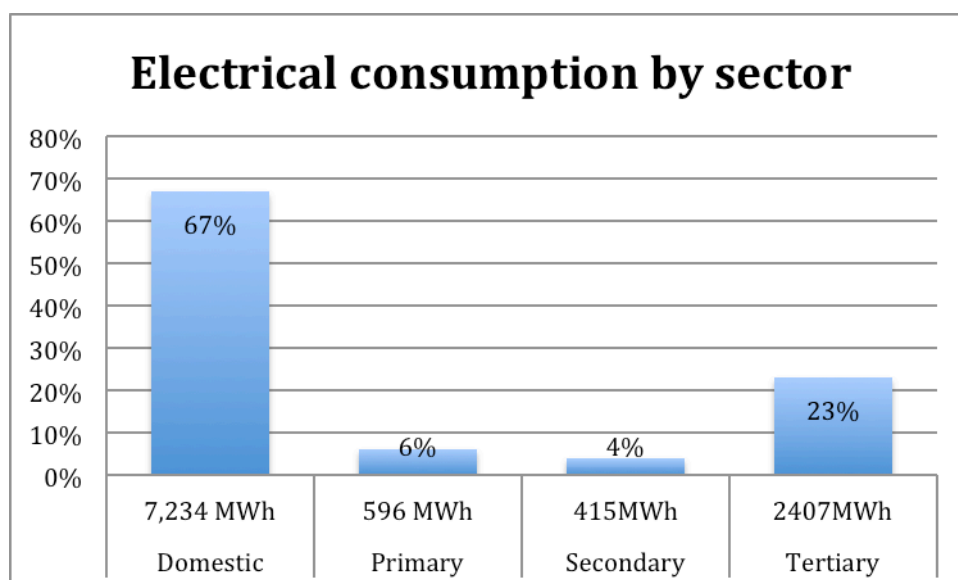
6. Electrical Energy Consumption

| Sector | MWh per annum | Proportion of total electricity consumption (%) |
|--------------|---------------|---|
| Domestic | 7,234 | 67% |
| Primary | 596 | 6% |
| Secondary | 415 | 4% |
| Tertiary | 2,407 | 23% |
| Transport | 3 | <1% |
| TOTAL | 10,655 | 100% |

The energy consumption totals are low, due to the issues with data collection, this has also meant that non domestic monthly figures have not been available.

Further work is required to collate data from Primary sector users in particular.

There are a small number of electric cars on the island and 2 charging points at Craignure and Bunessan for which data was available, but this proportion of electricity used is too small to show on the graph below.



7. Domestic Consumption

There are approximately 1433 dwellings on Mull, averagely occupied by small families or single people.

There are a large number of 'hard to heat' properties on the island, with a preponderance of homes with rooms in the roof, which are difficult to insulate.

The majority of properties make use of electricity in some capacity, for heating, lighting and cooking. Many homes are all-electric, but others are dual fuel, making considerable use of heating oil or coal alongside their electricity.

Fuel Use Breakdown

| Heating type | % | Number of houses | Total heating | MWh |
|--------------|-----|------------------|---------------|----------|
| Oil | 34% | 487 | 10 804 095 | 10 804.1 |
| Electric | 49% | 702 | 3 896 100 | 3 896.1 |
| Wood | 7% | 100 | 1 522 400 | 1 522.4 |
| Coal | 10% | 143 | 1 072 500 | 1 072.5 |

It is estimated that the total use electricity for domestic purposes is 3 338 MWh per annum.

8. Commercial and Public Consumption

| Commercial sector | | | | | | |
|--------------------------|--------------|----------|------------|------|--------------|----------------|
| | Electricity | Kerosene | MWH | LPG | MWh | Biomass MWh |
| Craignure Inn | 112 | 2000 | 20 | 1248 | 87 | |
| Other pubs | 840 | | 150 | | 652.5 | |
| THA | 107 | | | | | |
| An Roth | 43 | | | | | |
| Visit Scotland | 35 | | | | | |
| Other Shops | 457 | | | | | |
| Argyll & Bute Council | 813 | | | | | 235 |
| | 2 407 | | 170 | | 739.5 | 235 |

In the commercial sector, Public Houses are a major consumer as all venues on the island provide food.

Unfortunately as there were issues with commercial properties engaging in the project, this has left a large proportion of the data being unavailable.

Public sector

The council-run buildings are the next biggest consumer as evidenced by this table:]

| Authority | Site | Primary Heating | Total kWh/annum | Comment |
|------------------|-----------------------------|------------------------|------------------------|----------------|
| A&B Council | Lochdonhead Primary School | Electric | 40,646 | |
| | Craignure Pier | Electric | 14,168 | |
| | Public Toilets | Electric | 4,725 | |
| | Waiting Room/Public Toilets | Electric | 3,000 | |
| | Bunessan Primary | Electric | 46,203 | |

| | | | | |
|--|--|----------|---------|---|
| | School | | | |
| | Bunessan Pier | Electric | 0 | |
| | Mull Resource Centre | Electric | 0 | Closed; assume zero consumption |
| | Roads Depot | Electric | 0 | Closed; assume zero consumption |
| | Dunaros Home For The Elderly | Electric | 0 | Closed; assume zero consumption |
| | Salen Primary School | Electric | 111,979 | |
| | Handymans Store | Electric | 4,455 | |
| | Ulva Primary School | Electric | 17,541 | |
| | Public Toilets | Electric | 1,908 | |
| | Town Clock | Electric | 1,000 | |
| | Store (Former Abattoir) | Electric | 0 | |
| | Tobermory High School | Electric | 418,73 | 50 kW solar PV installed summer 2014; converting to biomass in 2015 |
| | County Buildings | Electric | 37,741 | |
| | Roads Yard | Electric | 12,457 | |
| | Waste Disposal Site | Electric | 34,451 | |
| | Dervaig Primary School | Electric | 32,705 | |
| | Craignure Pier | Electric | 6,000 | |
| | Tobermory Pre 5 - Tobermory Primary School | Biomass | 18,000 | |

| | | | | |
|--------------|-------------------------|-------------------|------------------|--|
| | Baliscate Depot | Electric | 25,000 | Ref D&I; site not developed by Property Services |
| ABC/NHS /WHA | Progressive Care Centre | Biomass | 216,000 | Data relates to the demand/consumption info combined for all partners; maximum demand value not confirmed given the tariff structure |
| | | Total kWh: | 1,046,709 | |

9. Industrial Consumption

| MWh | Electricity | Fuel Oil |
|----------------------|-------------|----------|
| Tobermory Distillery | 415 | 8 000 |

The major industrial activity is carried by the Tobermory Distillery, as above.

Other industrial operations are carried out by the Mull Cheese factory and Mull Bakery as well as the aquaculture sector

| | Electricity | Red Diesel | Wood | Marine Diesel | Petrol |
|------------------------------|--------------|--------------|--------------|---------------|------------|
| Isle of Mull Cheese / Bakery | 588 | 396 | 1 333 | | |
| Inverlussa | 0.5 | 220 | | 85 | 28 |
| 5 aquaculture companies | 2.5 | 1100 | | 425 | 140 |
| 4 Scottish Salmon sites | 2 | 880 | | 340 | 112 |
| 5 Scottish Sea Farms sites | 2.5 | 1100 | | 425 | 140 |
| total | 595.5 | 3 696 | 1 333 | 1 275 | 420 |

Further work is required to investigate other industrial operations, e.g. quarrying and TSL.

10. Transport Consumption

A survey was recently carried out by MICT to investigate the driving habits of residents with results as follows:

| Households | Number of vehicles |
|------------|--------------------|
| 55% | 1 car |
| 34% | 2 cars |
| 10% | 3 cars |
| 1% | No Cars |

It also found that the average weekly mileage driven on the island was 109 miles per week or 6,000 miles per annum for each vehicle.

| Fuel | MWh |
|--------|-------|
| petrol | 6 821 |
| diesel | 8 337 |

Data was not forthcoming from Calmac, West Coast Motors or tourist boats.

11. Assessment of the potential for fuel switching

There is a good opportunity for fuel switching to renewable hydro generated electricity used locally (Garmony Hydro).

Biomass conversion for public buildings such as Tobermory High school should also provide a positive example, which may be replicated more widely.

Currently there is a proposed project to create a Virtual Private Network of electricity consumers to take any electricity generation over 50 kW as this is the typical constraint put on new hydro schemes by the national grid.

With other hydro schemes being proposed on Mull, it is hoped that the pilot project is successful and can then be rolled out further on the island.

12. Appendix 1: Map of Mull and surrounding islands.



13. Appendix 2: Photographs



Typical Isle of Mull 'hard to heat' croft house



The Mull Ferry



Tobermory



Garmony Hydro



The Isle of Mull Eco croft



An Isle of Mull low carbon business: The Isle of Mull Bakery

14. Appendix 3: contact database

| | |
|-------------------------|---|
| Argyll and Bute Council | Planning and Building standards, Lorn and the Isles Municipal Buildings, Albany Street, Oban, PA34 4AW |
| Mull Community council | Billy McClymont (Chair) 01680 812435/07721623854 |
| An Roth/MICT | An Roth, Community Enterprise Centre Craginure Isle of Mull PA65 6AY 01680 812900 |
| Craginure Inn | Craginure, Isle of Mull PA65 6AY 01680 812305 |

| | |
|----------------------|---|
| I o M cheese | Sgriob-ruadh Farm, Tobermory, Isle of Mull PA75 6QD 01688 302627 |
| I o M Bakery | Lephain Dervaig Rd · 01688 302223 |
| Tobermory Distillery | Ledaig, Tobermory PA75 6NR +44 (0)168 830 2647 |
| Visit Scotland | Tourist Information Centre 3 North Pier, Oban, 01631 563122 |
| SSE | 3 Hunt Hill, Cumbernauld, Glasgow, Lanarkshire G68 9LF 01236 285800 |
| West Coast Motors | Benmhor Campbeltown PA28 6DN Tel. 01586 552319 |
| Caledonian MacBrayne | Railway Pier, Oban, Argyll, PA34 4DB. 01631 566688. |