

ISLAND SUSTAINABLE ENERGY ACTION PLAN

Outer Hebrides

25 July 2011

EXECUTIVE SUMMARY

- i The Outer Hebrides comprise a chain of islands off the west coast of Scotland from Lewis in the north through Harris, North Uist, Benbecula and South Uist to Barra in the South. The entire population is 26,190 with 8,000 of that population centred around the main town of Stornoway in Lewis. The islands have an ageing population. By 2024, the number of people over 65 is projected to account for 31% of the entire population. The area is sparsely populated with a density of only 9 people per square kilometre compared to a Scottish average of 65.
- ii Crofting is the predominant land use with 80% of land held in crofting tenure and subject to unique crofting law. The islands have a unique Gaelic culture with the Gaelic language forming a major component of the history and culture of the Outer Hebrides. Almost 60% of inhabitants speak the language and the Outer Hebrides are recognised as the global centre of the language.
- iii The Outer Hebrides economy can be described as 'fragile' with an over dependence on the public sector and relentless decline in some of the traditional industries. The public sector accounts for 43% of total employment compared to a Scottish average of 23%. Annual Gross Domestic Regional Product is £382m or £14,500 per capita. Growth is evident in Harris Tweed, food production and the creative industries but the economic driver with the highest potential for growth is renewable energy.
- iv Comhairle nan Eilean Siar, as Local Authority for the Outer Hebrides envisions the islands of 2020 characterised by a diverse and growing population, a dynamic renewable energy sector of international renown, a high quality environment maintaining biodiversity, a private sector which is a high value economic contributor, a tourism industry which has developed the islands into a world class destination, a confident community utilising new forms of land and sea ownership, globally connected communities in terms of transport and communications, Stornoway as a world class entry point, the University of the Highlands and Islands providing full University services at Lews Castle College and a diverse range of high quality leisure, culture and heritage facilities.
- v Final Energy Demand for the Outer Hebrides is circa 680GWh. Residential consumption, at 280GWh, makes up 40% of regional energy consumption with energy consumed by 26,180 people living in 12,335 households. 85% of the burning oil supplied to the islands is used for domestic purposes. It is estimated that the Primary sector consumes 52.9GWh with this total largely shared equally by fishing and agriculture with a small amount for quarrying. Data for Secondary sector (manufacturing, water and sewerage, waste management and construction) is more difficult to access as is data for Tertiary sector (wholesale and retail trade, motor vehicle repair, accommodation and food, defence, justice, police, fire, education, health and social work, public lighting and transport) although some robust data subsets exist.
- vi In terms of Secondary Energy Conversion there is only electricity as the product, sourced mainly from gas oil generation followed by Hydro, onshore wind and, to a very small extent, Biogas CHP. 90% of electricity consumed in the islands comes from two interconnectors. In 2009 / 10, this amounted to 161.5GWh drawn from the National Grid through these interconnectors. 6.5% of annual demand, or 11.6GWh, is provided by back-up diesel generation at Battery Point (Stornoway), Arnish Point

(Stornoway), Lochcarnan (South Uist) and Ardveinish (Barra). In 2009 / 10, 15.2GWh was exported to the local Distribution network.

- vii DECC estimates for Carbon emissions state that the Outer Hebrides emit 305,600 tonnes of CO₂ (2008 figures), equating to 11.7 tonnes per capita. Emissions directly related to energy are estimated at 188,100 tonnes or 7.2 tonnes per capita. However, preliminary local assessment suggests that these figures could, in reality, be 25% higher at 229,400 tonnes of CO₂ per annum across all sectors. Electricity accounts for 42% of emissions, Gas for 18% and DERV / Petrol for 19%.
- viii The ISLEPACT Island Sustainable Energy Action Plan proposes the following actions:

Renewable Energy Generation The Comhairle aspires to an Outer Hebrides which is 'zero carbon' and sources all its energy requirements from renewable sources. ISLEPACT is viewed as a key supporting process which will enable this outcome. In furtherance of this objective, the Comhairle and its partners will explore the viability of investment in community or commercial onshore wind projects in order to secure a return for the community. Through the formation of an Outer Hebrides Energy Supply Company, this return could be in the form of electricity for local consumption with the retail of any surplus generation.

Energy Efficiency The Outer Hebrides have the highest rate of Fuel Poverty in the UK (currently 50%), a prevalence of 'hard to treat' properties and an aggressive climate. The regression rate for improved houses is also very high. A rolling programme of energy efficiency works, for domestic and business premises, is required. This programme will reduce the energy needs of these properties and will address the serious energy poverty issues facing the islands.

Sustainable Transport As an island community heavily dependent on imported goods and fuel, transport by sea and road is viewed as a lifeline service. The islands have always been heavily dependent on private transport and a highly dispersed population makes effective public transport provision problematic. There is significant scope, through the use of alternative fuels (electricity, biofuels) and ultimately Hydrogen, to reduce carbon emissions in the transport sector. The ISLEPACT project will seek to increase the uptake of low carbon fuels across the sector, particularly in relation to road freight and sea transport activities.

- viii Comhairle nan Eilean Siar has acted as Project Coordinator for the first phase of the ISLEPACT project with support from the Exergia consultancy in Brussels. The Comhairle has presided over the Pact of Islands signing ceremony and has taken a leadership position with regard to ISLEPACT within the Council of Peripheral Maritime Regions (CPMR). In particular, the Comhairle has led the campaign which resulted in a CPMR Islands Commission resolution calling on the European Commission to continue funding ISLEPACT beyond the conclusion of phase 1 in July 2012. The Comhairle anticipates a continuing project coordination role in ISLEPACT 2 and has the organisational structures in place to deliver this role.

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1 CONTEXT

1.1 THE LANDSCAPE

- 1.1.1 The Outer Hebrides is situated 34 miles (55km) off the northwest coast of Scotland. It consists of over 100 islands; 15 of which are populated. The major islands are Lewis, Harris, North Uist, Benbecula, South Uist and Barra. Among the smaller islands is St. Kilda, which is a world heritage site of both natural and cultural significance.
- 1.1.2 The islands are linked to the mainland by several ferry services, from Ullapool, Uig on Skye and Oban. Air links are from Inverness, Aberdeen, Glasgow and Edinburgh on the mainland. There are also several inter-island air and ferry services.
- 1.1.3 The Outer Hebrides covers an area of 3000 square kilometers. It consists of one major town; the capital, Stornoway. The Greater Stornoway area (Stornoway, Laxdale, Sandwick and Newmarket) has a population of 8000, representing just over 30% of the population with the remainder in some 280 townships across the islands. The total number of households is 12,018.
- 1.1.4 Most of the islands have a bedrock formed from Lewisian gneiss. These are amongst the oldest rocks in Europe, having been formed in the Precambrian period up to 3000 million years ago. These rocks are largely igneous in origin, mixed with metamorphosed marble, quartzite and mica schist and intruded by later basaltic dykes and granite magma.
- 1.1.5 Granite intrusions are found in the parish of Barvas in west Lewis, and another forms the summit plateau of the mountain Roineabhal in Harris. The granite here is anorthosite, and is similar in composition to rocks found in the mountains of the Moon. There are relatively small outcrops of Triassic sandstone at Broad Bay near Stornoway.
- 1.1.6 Much of the area is a protected habitat, including both the islands and the surrounding waters. There are 53 Sites of Special Scientific Interest; of which the largest are Loch an Duin, North Uist and North Harris. There are more than 7,500 freshwater lochs in the Outer Hebrides; the longest being the 11 kilometer long Loch Langavat on Lewis.
- 1.1.7 The Outer Hebrides has a cool temperate climate that is mild and steady, given the northerly latitude of the islands. This is largely due to the influence of the Gulf Stream. The average temperature for the year is 6°C (44°F) in January and 14°C (57°F) in summer. The summer days are long and May to August is the driest period. Winds are a key feature of the climate and even in summer there are almost constant breezes.
- 1.1.8 Crofting is the predominant use of land in the Outer Hebrides, with almost 80% of land held in crofting tenure and subject to crofting law. The average size of croft is around 3 hectares and is estimated to support work for 2 days per week.

- 1.1.9 Gaelic forms a major component of the history and culture of the Outer Hebrides. Almost 60% of inhabitants speak the language and the Outer Hebrides is recognised as the global centre of the language.

1.2 DEMOGRAPHY

- 1.2.1 The population of the Outer Hebrides is 26,190. This has been relatively steady in recent years, but represents a long term decline in population over many years. Since 1991, the population has declined by in the region of 10%. The recent decline has been largely as a result of “natural” population decrease; more deaths than births. Net migration has been largely neutral in recent years. It is predicted that this declining trend will continue for the foreseeable future; with a population estimate of 26,058 by 2016.
- 1.2.2 The area is sparsely populated with a density of 9 people per square kilometer, compared to a Scottish average of 65.
- 1.2.3 The average age of the population is estimated to be 42 for males and 45 for females. The age profile for the area is:
- | | |
|-------------|-------|
| 0-4 Years | 5% |
| 5-19 Years | 17% |
| 20-44 Years | 27.7% |
| 45-64 Years | 29.3% |
| 65-84 Years | 18.4% |
| 85+ Years | 2.7% |
- 1.2.4 In common with the rest of Scotland and the UK, the population is ageing. This trend is more profound in the Outer Hebrides. By 2024, the number of people aged 65 and over is projected to increase further, to account for 31% of the total population.

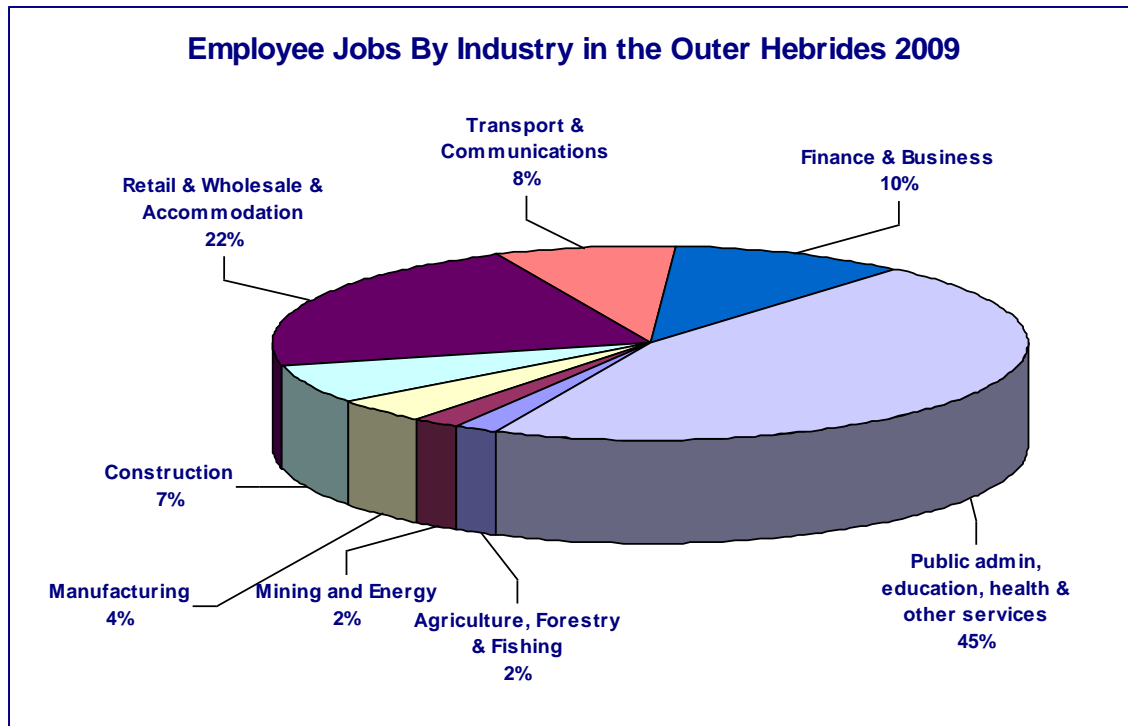
1.3 OUTER HEBRIDES ECONOMY

- 1.3.1 The economy of the Outer Hebrides is regarded by Highlands and Islands Enterprise (the economic development agency for the area) as “fragile”. This is due to a number of factors, including depopulation, peripherality, lower than average economic growth, lower than average earnings, higher costs (particularly associated with energy and transport) and a higher than average dependency on the public sector. Annual Gross Domestic Regional Product is estimated at £382 million or £14,500.
- 1.3.2 Over 70% of economic output and employment is in the service sector and this sector is dominated by the public sector; which accounts for about 43% of total employment. This is almost double the Scottish average of 23%. Agriculture, fishing and fish farming are still significant contributors to the economy, with growth potential in renewable energy, food production, creative and cultural industries. In terms of scale, renewable energy is by far the best prospect for growth.
- 1.3.3 The dominant global brand associated with the Outer Hebrides is Harris Tweed. This unique industry is emerging from a period of sustained decline and is re-establishing itself as a desirable luxury global product. Made entirely on the islands of Lewis and Harris, its production cycle is governed by law, ensuring that

the cloth is woven by hand by weavers at their homes. It bears the famous “Orb” symbol as a mark of authenticity.

1.3.4 There are a total of 12,900 people who are economically active, representing 83% of the population of working age. Of these, 10,400 are employed and 1,500 are self employed.

1.3.5 In terms of jobs, the economy is made up as follows:



1.4 POLITICAL AND ADMINISTRATIVE STRUCTURES

1.4.1 The Outer Hebrides is part of the United Kingdom and as such is subject to legislation passed by the Government at Westminster. In addition, it is subject to legislation and policy implemented by the devolved Scottish Government in Holyrood, Edinburgh.

1.4.2 The local authority is Comhairle nan Eilean Siar. It has responsibility to deliver local services such as education, social work, housing, environmental and waste management, planning and development and with the function of setting and administering local taxation through Council Tax and non domestic rates. It is one of 32 local authorities in Scotland and is governed by elected members, supported by senior officers.

1.4.3 The area is represented in the UK and Scottish Parliaments through the Western Isles (Na h-Eileanan an Iar) constituencies. The area is represented by the Scotland Electoral Area in the European Parliament.

1.4.4 Responsibility for economic development is shared between Comhairle nan Eilean Siar and Highlands and Islands Enterprise; the economic development agency for the Highlands and Islands of Scotland.

1.4.5 Scottish Natural Heritage (SNH) is the agency in Scotland responsible for:

- promoting care for and improvement of the natural heritage;
- helping people enjoy it responsibly;
- enabling greater understanding and awareness of it; and

- promoting its sustainable use, now and for future generations.

1.4.6 SNH is a key player in the development of the Outer Hebrides.

1.5 ENERGY INFRASTRUCTURE

- 1.5.1 **ELECTRICITY** The electrical transmission and distribution networks in the Outer Hebrides are owned and operated by Scottish Hydro Electric Transmission Limited (SHETL) and Scottish Hydro Electric Distribution Limited (SHEDL) which are part of the Scottish & Southern Energy Group.
- 1.5.2 The Outer Hebrides network is fed via a 132kV overhead transmission line extending across the Isle of Skye to the Ardmore from Loch Lundie on the Fort William – Fort Augustus 132kV circuit. At Ardmore the voltage is transformed to 33kV via a 132/33kV 45MVA transformer which feeds two 33kV sub-sea interconnector cables one to the northern isles (Lewis & Harris) and one to the southern isles (Uists and Barra) of the Outer Hebrides network. The distribution networks in the northern and southern isles are effectively independent networks fed from Ardmore in Skye.
- 1.5.3 The interconnectors have capacities of 23.4MVA for the northern isles connection and 14MVA for the southern isles connection.
- 1.5.4 The sub-sea link to the northern isles terminates at the Harris sub-station. This feeds the “Harris” 33kV distribution network and a 132kV transmission line running to the Stornoway sub-station which feeds the “Stornoway” (or Lewis) 33kV distribution network.
- 1.5.5 The sub-sea link to the southern isles terminates at the Loch Carnan sub-station in South Uist feeding the “Loch Carnan” 33kV distribution network. This includes the Barra circuit, an 11kV circuit fed from the Pollachar substation in South Uist. The Pollachar substation feeds two 11 kV circuits one supplying Barra and the other supplying customers in the local area and north towards Drimore.
- 1.5.6 **LIQUID FUELS** The supply route for the majority of liquid fuels consumed in the Outer Hebrides is by sea from Immingham, England. The exception is aviation fuel which is supplied by sea from Grangemouth, Scotland.
- 1.5.7 Supply vessels offload at Scottish Fuels’ storage depots at Stornoway, Lewis, and Loch Carnan, South Uist. Prior to September 2010, the supply vessels also offloaded at the storage facility at Ardveenish, Barra ¹. Subsequent local distribution is by road tanker; the Stornoway depot serving Lewis and Harris and the Loch Carnan depot serving the Uists (and Barra since September 2010).
- 1.5.8 In 2009/10 the liquid fuels supplied through Scottish Fuels’ Outer Hebrides depots are:
- Burning Oil (also known as kerosene, 28 second oil, Class C2 fuel);
 - Gas Oil (also known as 35 second oil, Class D fuel);
 - DERV;
 - Unleaded Petrol (Ultra Low Sulphur Petrol); and

¹ Conversation with Scottish Fuels’ Western Isles Area Manager.

- Jet A1 (Stornoway only).
- 1.5.9 Fuel oils (light, medium or heavy) have not been supplied through Scottish Fuels' depots since the summer of 2008.
- 1.5.10 The storage capacities at the main fuel depots are indicated in Table 1. The role of Ardveinish, Barra, as a primary storage and distribution hub has diminished since September 2010.

	Storage Capacity (m ³)		
	Scottish Fuels' Depots		
	Stornoway	Loch Carnan	Ardveinish
Burning Oil	760	740	90
Gas Oil	1,025	510	90
DERV	340	320	111 ^a
Petrol (ULSP)	570	320	17 ^b
Jet A1	460	-	

Table 1: Liquid fuel bulk storage capacity.

^a Includes 21m³ at Barra's sole road fuel retailer, Castlebay.

^b At Barra's sole road fuel retailer, Castlebay

- 1.5.11 **LIQUEFIED PETROLEUM GAS** The Outer Hebrides is not connected to the national gas transportation system and consequently natural gas is not available. However Liquefied Petroleum Gas (LPG) is widely used.
- 1.5.12 Stornoway is served by an Independent Gas System operated by Scotia Gas Networks that supplies LPG to approximately 1,444 domestic and 18 commercial/industrial customers². The supply route for the LPG is by sea to Scotia Gas Networks' depot in Stornoway.
- 1.5.13 Elsewhere, individual domestic properties, social housing clusters and several manufacturing businesses use mini-bulk LPG systems; the regional social housing provider, Hebridean Housing Partnership, operate five mini-bulk sites. These sites are supplied by road tanker either ex mainland depots or in the case of the social housing clusters ex Scotia Gas Networks' Stornoway depot³.
- 1.5.14 Autogas (LPG as a road fuel) has a limited availability in the Outer Hebrides: a single commercial outlet in Stornoway and one private outlet in the southern isles. Supply is by road tanker ex mainland depots.
- 1.5.15 Bottled liquid petroleum gases (butane and propane) are widely used for cooking and supplementary heating. Cylinders are supplied by road ex mainland depots to local distributors.
- 1.5.15 **SOLID FUELS** Solid fuels such as coal, peat and wood are widely used particularly in the domestic sector fuelling multi-fuel and solid-fuel stove fired central heating systems as well as open fires.
- 1.5.16 Local independent distributors of bagged and loose coal products are supplied from mainland depots by road haulage via mainland ferry routes. In addition, one national distributor operates a distribution depot in the southern isles at Loch Carnan, South Uist, supplied by sea from the Clyde.

² Proposal To Continue Cross-Subsidy Arrangements For Independent Gas Systems. BERR Consultation, August 2007.

³ Road tanker supply ex Scotia Gas Networks' depot is expected to stop in the near future.

- 1.5.17 Peat is an indigenous solid fuel in the Outer Hebrides. While use has declined peat cutting continues in most townships in Lewis and Harris and the Uists. Traditionally, peat is cut by hand for private consumption although some mechanised extraction is known to take place.
- 1.5.18 There is very little mature commercial forestry in the Outer Hebrides and what virgin wood is used (in the form of split log, wood chip or wood pellet) is imported by road haulage via mainland ferry routes by local independent distributors (typically those distributing coal products). An exception is the Stornoway Trust which supplies split-log arising from the management of the mature woodlands surrounding Lews Castle.
- 1.5.19 In Barra, the consumption of a significant quantity of waste-wood has been recorded.

2 OVERALL STRATEGY

2.1 CURRENT FRAMEWORK AND VISION FOR THE FUTURE

2.1.1 Our strategy for the development of renewable energy and the achievement of the ISLEPACT targets sits within our overall vision for the Outer Hebrides. This states that with appropriate support we believe that the Outer Hebrides in the year 2020 will be characterised by:

- a diverse and growing population with a balanced demographic structure allowing young people to move freely as lifestyles change and allowing effective public services;
- a dynamic renewable energy sector of international renown providing the base for new forms of economic activity;
- a high quality environment, which maintains bio-diversity;
- a private sector that is a high-level economic contributor;
- a tourism industry which has developed the Outer Hebrides as a world-class destination;
- a confident community, utilising new forms of land and sea ownership;
- communities which are globally connected through a high quality transport infrastructure and leading-edge communications systems;
- Stornoway has grown significantly and has been developed as a world-class entry-point to the Outer Hebrides;
- UHI Millennium Institute provides a university campus, a network of learning centres and numerous students who are part of the community; and,
- a diverse range of quality, modern, social and leisure facilities, with a high value placed on Gaelic culture and heritage.

2.1.2 Each of these statements is interdependent and is impacted by the ISLEPACT project. We want renewable energy innovation to be a key driver for the economy of the next 20 years. Plans are in progress for just short of 400 MW wind energy output. The seabed off the West of Hebrides is one of five areas in Scotland designated for the Saltire Prize; a £10 million initiative to encourage the development of a commercially viable project that will generate up to 30 MW of marine energy. Lews Castle College UHI has been designated by the University of the Highlands and Islands as its centre of excellence for renewable energy.

2.1.3 This builds on a tradition of working with the environment to create sustainable mutual benefit. The sensitive exploitation of the areas natural assets has been a feature of the economy of the Outer Hebrides for generations. The development of renewable energy as a key driver of our future economy and to place the Outer Hebrides at the leading edge of low carbon and reduced emission economies is an extension of this heritage.

2.2 OBJECTIVES AND TARGETS

2.2.1 Specifically, in relation to renewable energy, we have established the following goals:

- improved connection to the national grid to facilitate export opportunities;

- development of a structure to apply community benefit, including the promotion of community owned generation;
- initial implementation of an Outer Hebrides hydrogen strategy;
- stimulation of the supply chain to allow local business to take advantage of wind farm developments;
- development of an Options Appraisal to consider the benefits of the Comhairle selling electricity;
- analysis of the feasibility of establishing an Outer Hebrides Energy Supply Company (ESCO);
- support for the development of marine energy through promotion and utilization of the Saltire Prize designation West of Hebrides;
- development and implementation of specific measures to tackle energy poverty;
- enhancement of the reputation of the Outer Hebrides as an Energy Innovation Zone; and,
- provision of on-going support to community-based renewable energy.

2.2.1 The following EU, UK and Scottish carbon reduction targets will influence the delivery of ISLEPACT objectives within the Outer Hebrides:

EU Climate & Energy Package 2020 targets

- 20% reduction in GHG emissions (from 1990 levels)
- 20% reduction in energy consumption compared to projected demand (to be delivered by improved energy efficiency)
- 20% of EU energy demand from renewable sources

UK 2020 target - EU Renewable Energy Directive

- 15% of UK energy demand to be from renewable sources
- UK Renewable Energy Strategy envisages this requires
 - 30% of electricity from renewable sources
 - 12% of heat energy from renewable sources
 - 10% of transport energy from renewable sources

Scotland 2020 targets – Climate Change Act (2009)

- 42% reduction in GHG emissions (from 1990 levels)
- 20% of Scotland's energy demand from renewable sources
- 80% of gross electricity consumption from renewable sources
- 11% of heat energy from renewable sources
- 10% of transport energy from renewable sources

3 ENERGY BALANCE AND EMISSION INVENTORY

3.1 FINAL ENERGY DEMAND

- 3.1.1 The Department for Energy & Climate Change (DECC) has prepared robust sub-national (UK) energy consumption datasets since 2005 ⁴. Regional energy consumption statistics are collated for every Local Administrative Unit ⁵ (LAU) in the UK. Eilean Siar (Western Isles) is a unique LAU1 area (LAU1 code UKM4400).
- 3.1.2 The datasets provide estimated energy consumption statistics for: electricity; gas; road transport; other fuels (coal, manufactured fuels, non-road transport petroleum and renewables); and total energy. The electricity and gas statistics are derived from actual consumption information (supplied by the respective industries) whereas the road transport statistics and other fuels statistics are modelled.
- 3.1.3 Electricity consumption, including the number of meters, is reported for the calendar year in two sub-categories: Domestic; Commercial & Industry. Allocation to a category is based on a consumption threshold; below threshold is considered domestic; above threshold is considered commercial & industrial.
- 3.1.4 Gas statistics relate only to gas supplied through the national distribution system; gas supplied through Stornoway's independent distribution network or to off-grid mini-bulk systems is not reported by DECC.
- 3.1.5 DECC also prepares disaggregated electricity and gas consumption estimates at below LAU1 areas ⁶. In Scotland, these are known as intermediate geography zones (IGZs). The Eilean Siar LAU1 area consists of nine IGZs.

IGZ Name	IGZ Code
Barra and South Uist	S02000431
Benbecula and North Uist	S02000432
Harris	S02000433
South Lewis	S02000434
Point	S02000435
Stornoway East	S02000436
Stornoway West	S02000437
Broadbay	S02000438
Northwest Lewis	S02000439

⁴ The datasets and guidance notes for their interpretation are available at www.decc.gov.uk/en/content/cms/statistics/regional/regional.aspx

⁵ LAU (Local Administrative Units for Territorial Statistics) is a hierarchical classification of spatial units that provides a breakdown of the European Union's territory for producing regional statistics, which are comparable across the EU. There are 41 LAU1 areas in Scotland covering individual or groups of whole/part unitary authorities and/or local enterprise company areas. However, the LAU1 areas do not match exactly the Scottish Local Authority Areas; there are more LAU1 areas than Local Authorities. Consequently, the DECC datasets use Scottish Local Authority Areas in place of LAU1.

⁶ The datasets and guidance notes for their interpretation are available at www.decc.gov.uk/en/content/cms/statistics/regional/mlsoa_llsoa/mlsoa_llsoa.aspx

Table 2: Intermediate Geography Zones (IGZs) in the Outer Hebrides.

- 3.1.6 DECC also produces the official national greenhouse gas inventory for the UK through the National Atmospheric Emissions Inventory (NAEI) programme. The UK greenhouse gas emissions statistics are reported as National Statistics ⁷ and like energy consumption statistics have been prepared annually from a 2005 base year. The dataset is used to assess compliance with the targets set nationally and internationally, such as the Kyoto Protocol.
- 3.1.7 The same dataset is used to prepare estimates of greenhouse gas emissions at Local Authority (LA) level ⁸. Information from several sources is used to produce these estimates, including DECC sub-national gas and electricity consumption statistics. A National Statistics status make the LA level greenhouse gas emissions estimates a robust measure for tracking actions to reduce regional emissions levels and has the advantage of requiring no local resource to prepare.
- 3.1.8 However, it has some apparent limitations:
- the exclusion of particular sub-sectors relevant to the economy of the Outer Hebrides will underestimate the regional emission levels;
 - the limited sectorial breakdown restricts the effectiveness of the dataset in identifying appropriate targeted actions; and,
 - the DECC energy consumption statistics used to prepare the estimates is thought to poorly reflect the consumption patterns of the Outer Hebrides.
- 3.1.9 To address these limitations a local assessment has been undertaken to establish a regional energy balance on the basis of factual local information. However, the survey has produced an incomplete data set. Where it has not been possible to determine energy consumption from local sources, the DECC statistics have been used to provide a robust indication of magnitude.
- 3.1.10 Final energy demand refers to the energy consumed at the point of use.
- 3.1.11 In 2008 (the latest published by DECC) the total energy consumption in the Outer Hebrides was estimated at 513.2GWh. The sectorial breakdown is presented in Figure 1. The domestic sector dominates accounting for 44% of energy consumption with road transport sector accounting for 31%.

⁷ National Statistics by the UK Statistics Authority signifying compliance with a Code of Practice for Official Statistics. This ensures a consistent time series is maintained allowing changes to be monitored over time.

⁸ Greenhouse gas emissions at LA level is designated as National Statistic with a 2005 base year.

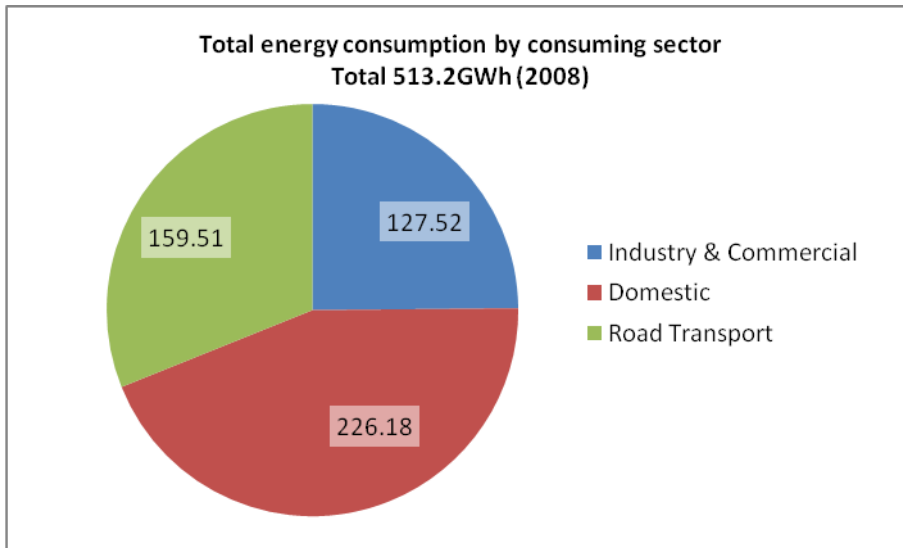


Figure 1: Total energy consumption by consuming sector (GWh).
DECC estimate for the Outer Hebrides, 2008.

- 3.1.12 The trend over time of total consumption has shown a marginal reduction, of the order of 1%, from the 2005 base year estimate. The sectorial proportions have remained broadly the same. A reduction in the road transport sector in 2008 is attributed to the increases in the cost of road fuels that prevailed at the time.
- 3.1.13 The breakdown by fuel source provided by the DECC statistics indicates a reliance on petroleum products, accounting for 61% of energy consumed, with electricity accounting for 29% (Figure 2).

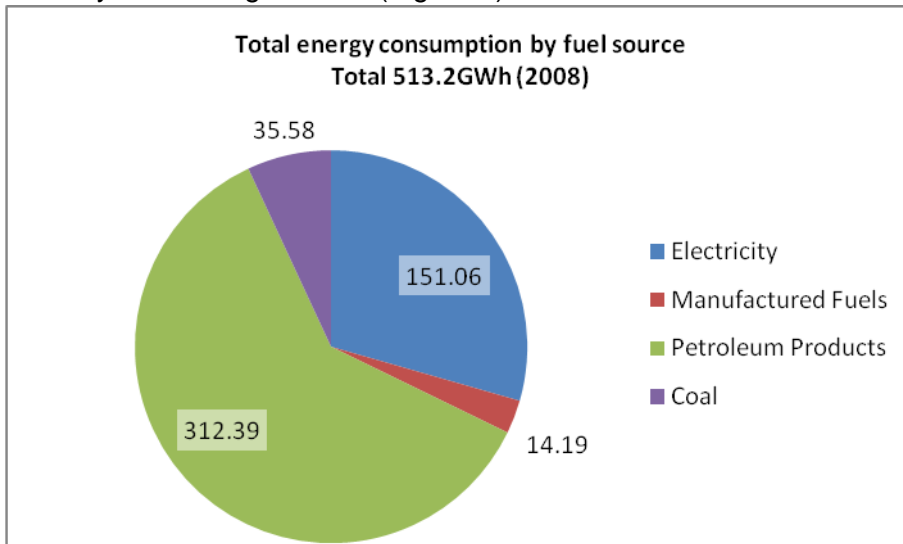


Figure 2: Total energy consumption by fuel source (GWh).
DECC estimates for the Outer Hebrides, 2008.

Regional Assessment

- 3.1.14 The energy demand of the Outer Hebrides in the financial year 2009/10 based on a survey of imported fuels estimates energy consumption as 680.0GWh⁹. This is roughly a third larger than the most recently available DECC annual estimate of total consumption.
- 3.1.15 The proportions of fuels that supplied this energy are indicated in Figure 3. Electricity (26%) and gas oil (22%) are the major fuel sources. Road transport fuels (DERV and Petrol) together supply a further 25%. The other regionally significant fuels are burning oil and LPG.

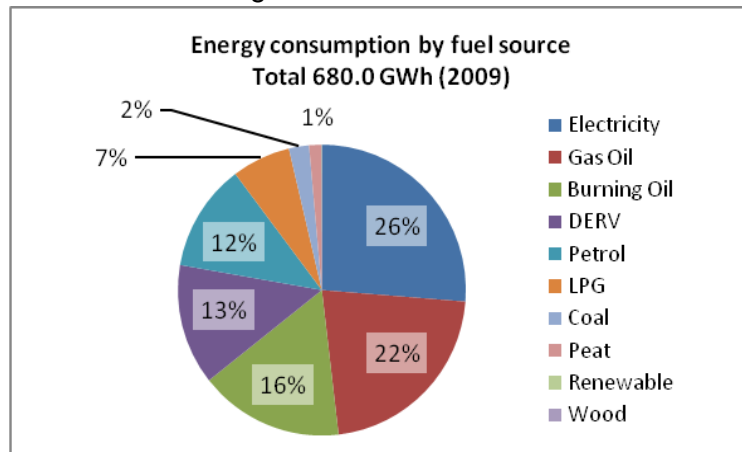


Figure 3: Energy consumption by fuel source in GWh
The proportional contribution of renewable and wood are negligible (<0.1%) and not shown.

⁹ Energy consumption associated with all aviation services in the Outer Hebrides (both mainland and inter-island services) and mainland passenger ferry services are excluded. However the contribution of the inter-island ferry services is included. Gas oil used in local electricity generation is not included.

Residential Demand

- 3.1.16 In 2009, the Outer Hebrides had an estimated population of 26,180 living in 12,335 households ¹⁰. The total residential energy consumption is estimated at 280GWh, approximately 40% of the regional energy consumption.
- 3.1.17 No systematic assessment of household energy consumption for the Outer Hebrides has been identified. However a number of studies have been undertaken within individual islands or island groups to categorise housing type and estimate typical energy consumption for each type.
- 3.1.18 In the Uists, a survey of 375 properties in 12 townships classified the local housing stock into seven type groups ¹¹. On the basis of a survey of an example from each housing type, domestic energy consumption in the Uists was estimated as:
- between 11,000kWh and 11,750kWh per capita; and,
 - between 20,000kWh and 24,200kWh per household.
- 3.1.19 In Barra and Vatersay, a survey of 100 properties classified the local housing stock into five categories and estimated domestic energy consumption in Barra and Vatersay as:
- approximately 10,700kWh per capita; and,
 - approximately 23,000kWh per household.
- 3.1.20 DECC statistics **Error! Reference source not found**, provide an estimate of average domestic energy consumption on a per capita and per household basis at local authority level ¹². The most recent data is for 2008 and suggests domestic energy consumption in the Outer Hebrides is:
- between 8,500kWh and 9,000kWh per capita; and,
 - less than 20,000kWh per household.
- 3.1.21 The two regional surveys provide consistent estimates of, and suggest the DECC statistics underestimate, domestic energy consumption in the Outer Hebrides. DECC statistics are based on a combination of measured (electricity) and modelled (other fuels) consumption and it is possible that model assumptions do not accurately capture regional circumstances. The regional survey estimates are based on recorded consumption and although extrapolated are considered to provide a better representation of the typical household energy consumption in the Outer Hebrides.
- 3.1.22 Therefore, for the purpose of this energy audit, domestic energy consumption in the Outer Hebrides is calculated on the basis of:
- 11,000kWh per capita; and,
 - 22,000kWh per household;
- producing an estimate of 280GWh for the total domestic energy consumption (an average of the per capita and per household values).

¹⁰ General Register Office for Scotland – see sections **Error! Reference source not found.** and **Error! Reference source not found.** for information on island group statistics and population trend.

¹¹ 'Hard to Treat' project, Sustainable Uist, 2011

¹² "Maps showing domestic, industrial and commercial energy consumption at local authority level", Publication URN 10D/1026. www.decc.gov.uk/en/content/cms/statistics/regional/regional.aspx. See also High level indicators www.decc.gov.uk/en/content/cms/statistics/regional/high_level/high_level.aspx

- 3.1.23 The estimated energy sources (fuels) used to deliver the total domestic energy consumption is presented in Figure 4. Electricity and burning oil are the dominant fuels with LPG (including bottled gas) and coal making a substantial contribution to the balance.
- 3.1.24 Establishing this breakdown by energy source and the end-use of each energy source is problematic as there are no known systematic surveys of domestic energy consumption for the Outer Hebrides.

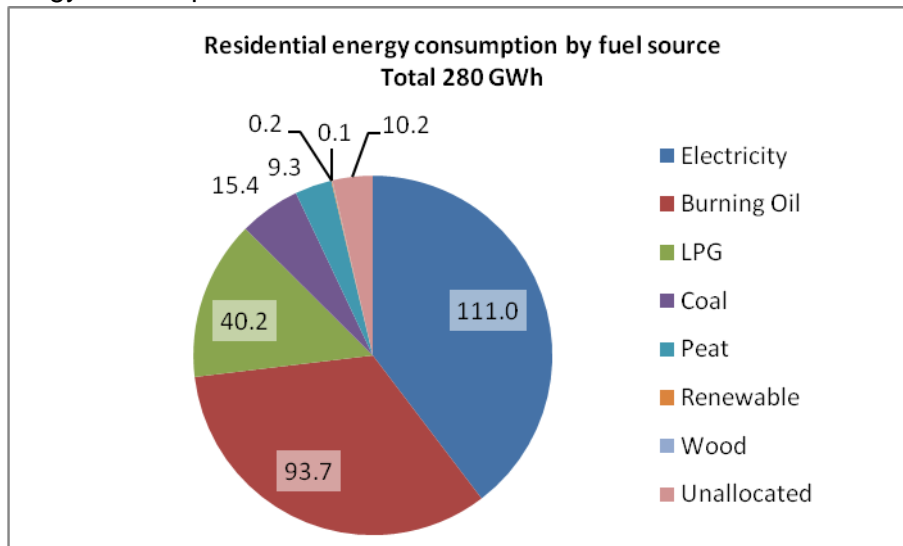


Figure 4: Energy consumption by fuel source in the residential sector.

- 3.1.25 DECC sub-regional energy statistics for 2009 indicate domestic electricity consumption of 92.6GWh at 13,172 domestic sites¹³, approximately 7,000kWh per domestic site. Again the Barra & Vatersay study¹⁴, which reports values of between 8,300kWh to 10,300kWh per household, suggests the DECC figure underestimates household electricity consumption in the Hebrides, although this may due to an apparent preference for electrical heating in the southern isles¹⁵. Using a value of 9,000kWh per household suggests that domestic electricity consumption is approximately 111GWh.
- 3.1.26 The sole importer of burning oil estimates that 85% of the fuel supplied is for domestic purposes¹⁶. This suggests burning oil contributes approximately 93.65GWh to the domestic energy production.
- 3.1.27 Domestic consumption of LPG has been established as the balance of quantity supplied after the consumption of known large users (Comhairle properties and hotels) has been subtracted. This suggests that LPG contributes approximately 40.2GWh to the total domestic energy mix. The majority of domestic

¹³ This is the number of ordinary (non-Economy 7 type) meters. It is assumed that all Economy 7 type meters are associated with an ordinary meter. The reported number of domestic sites exceeds the estimated 12,335 households of the Outer Hebrides.

¹⁴ "Report on the feasibility of a community renewable energy company delivering micro-renewables in the Uists", Scott and Macdonald, October 2008; and "Demand for energy in the islands of Barra and Vatersay and the effect on fuel poverty", MacNeil, April 2010.

¹⁵ This view is supported by the DECC sub-regional statistics which indicate a larger ratio of Economy 7 meters to ordinary meters in the southern isles.

¹⁶ Personal communication.

consumption occurs in Stornoway where the local independent gas main supplies 1444 domestic customers.

- 3.1.28 All imported coal, totalling 15.4GWh, and estimated quantities of cut peat, totalling 9.3GWh, are assumed to be for domestic consumption
- 3.1.29 In the absence of specific regional information regarding end use categories and proportions, the most recent national (UK) statistics produced by DECC for 2008 (published March 2011) have been used ¹⁷. It is recognised that this approach does not capture regional characteristics (e.g. climatic influence and housing characteristics may skew space heating requirements) however undertaking such a survey is beyond the scope of the current project. Table 3 presents estimated domestic energy consumption in the Outer Hebrides by end use.

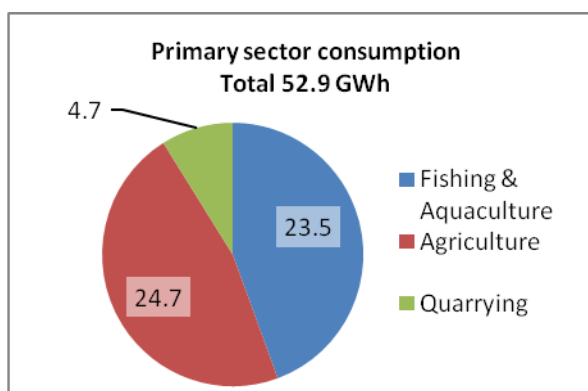
End Use	Proportion ^a	Energy Consumption (GWh)
Space heating	57.7%	161.43
Hot water	23.6%	66.05
Cooking	2.9%	7.99
Lighting & appliances	15.9%	44.53
Total		280

Table 3: Domestic energy consumption by end-use.

^a DECC end use categories and proportions for 2008 (published March 2011)

PRIMARY SECTOR

- 3.1.30 The primary sector is estimated to consume 52.9GWh with fishing and agriculture roughly equal at 44%.



Fishing & Aquaculture

- 3.1.31 CnES operate fuelling facilities at fishery piers throughout the Outer Hebrides supplying gas oil (marine diesel) to the fishing (“home” fleet and other vessels) and aquaculture fleet primarily. Included in the total are a small number of leisure craft and certain road transport functions that are permitted to operate with gas oil under certain circumstances (e.g. road gritting).
- 3.1.32 Non-CnES operated fuelling facilities are available at Ardveenish Pier in Barra; the main fuelling facility for fishing and aquaculture fleet operating out of Barra.
- 3.1.33 Estimated consumption in the fishing and aquaculture sector is based on fuel supplied through these outlets and is summarised in Table 4.

¹⁷ www.decc.gov.uk/en/content/cms/statistics/publications/ecuk/ecuk.aspx

Piers	2009/10	
	Gas Oil	
	litres	MWh
Lewis & Harris	958,340	10,513
Uists	529,176	5,805
Barra	655,120	7,187
Outer Hebrides	2,142,636	23,505

Table 4: Fuel supplied fishery pier fuelling facilities.

Agriculture

- 3.1.34 Crofting is the dominant agricultural practice in the Outer Hebrides. This is typically a small-scale operation undertaken on a part-time basis by individuals focusing on the rearing of livestock on rough grazing, primarily beef cattle and sheep, and grass-land for fodder. Individual crofts typically extend to 3 hectares of in-bye land with access to township common grazing and unimproved moorland.
- 3.1.35 In addition to crofting, there are a small number (at least three) of larger farms supporting dairy and beef herds.
- 3.1.36 In 2007, the Outer Hebrides had 6,022 registered crofts¹⁸. The Scottish Agricultural Census (June 2009) reports a workforce of 277 individuals employed full-time on 217 holdings and 3,893 employed part-time on 2,739 holdings.
- 3.1.37 The nature of crofting activity makes quantifying energy consumption by this sub-sector difficult. The major energy sources are known to be gas oil (red diesel) for machinery and electricity for lighting and machinery. Local knowledge suggests typical crofting activity in the Uists consumes of the order of 1,500 litres of gas oil and 3000kWh of electricity per annum while in Lewis & Harris to be of the order of 500 litres of gas oil and 2000kWh of electricity; a difference that may reflect a larger croft size and likelihood of full-time occupation in the Uists.
- 3.1.38 Using the Scottish Agricultural Census' reported number holdings and anecdotal estimates suggests a regional consumption of 24.7GWh

	2009/10		
	Electricity	Gas Oil	
	MWh	Litres	MWh
Full time	651	325,500	3,570
Part time	5,478	1,369,500	15,024
Outer Hebrides Total	6,129	1,695,000	18,594

Table 5: Crofting related energy consumption

Quarrying

- 3.1.39 Quarrying for aggregate for the local construction market forms the major business activity of six companies operating a total of 10 quarry sites in the Outer Hebrides (six in Lewis & Harris and four in the Uists). While several of the companies are also involved in the construction sector the energy consumption is included in this sub-sector.

¹⁸ Register of Crofts, Crofters Commission.

- 3.1.40 Information was provided by only one company (operating a single quarry) which reported consumption of gas oil and electricity. From this information the sector energy consumption is estimated as 4.7GWh.

SECONDARY SECTOR

Manufacturing

- 3.1.41 The major manufacturing activities in the Outer Hebrides are: fish and shellfish processing; the production of Harris Tweed; and the Arnish fabrication facility. In addition there are a small number of high energy consumption businesses such as seaweed processing.
- 3.1.42 Surveys of businesses in the manufacturing sector were conducted but little data was forthcoming.
- 3.1.43 Two fish processing facilities reported electricity and heating oil consumption of 2,095MWh and 1,702MWh per annum respectively.
- 3.1.44 The Arnish fabrication facility is a significant energy consumer (largely electricity and gas oil) when operational. The facility was dormant in the period under consideration although it re-started operation recently.

Water Supply, Sewerage

- 3.1.45 Scottish Water is responsible for the public water supply and sewage treatment in the Outer Hebrides. While energy consumption by their vehicle fleet was available (1,024MWh) information relating to the water and sewage treatment was not.

Waste Management

- 3.1.46 CnES is responsible for the collection, processing and disposal of waste (municipal and commercial) in the Outer Hebrides. The main collection service is delivered from two bases: Stornoway (serving Lewis & Harris) and Market Stance (serving the Uists and Barra). Mixed waste from the southern isles is transferred to Stornoway for processing into recyclate, organic and residual streams. Anaerobic digestion of the organic stream produces biogas (and other products) which is combusted in a CHP unit supplying the processing facility. Recyclates (notably plastic, paper and metals) are processed for local use or for forwarding to mainland processing plants. The residual stream is passed to landfill.
- 3.1.47 In 2009/10, 22,211 tonnes of municipal waste was collected of which 17,295 tonnes passed to landfill, 2,120 tonnes was recycled and 2,579 tonnes composted.
- 3.1.48 In handling this waste, DERV consumption by CnES (Cleansing Section) vehicles was estimated as 200,000 litres (2,112MWh).

Construction

- 3.1.49 The construction sector is dominated by a relatively small number of large companies. The remainder consists of many small companies. A significant turnover of companies has been observed in recent years. Energy consumption in this sector is variable and particularly dependent on public sector capital projects.
- 3.1.50 A survey of businesses in the construction sector was conducted and the following data was provided.

2009/10

	Electricity (MWh)	Gas Oil (MWh)	DERV (MWh)
Location (responses)			
Lewis & Harris (1)	105.0	597.0	-
Uists (2)	96.4	563.4	775.6
Barra (1)	-	504.2	178.8
Outer Hebrides (incomplete)	201.4	1,664.6	954.4

From the responses provided extrapolating a sub-sector wide estimate is not considered robust.

TERTIARY SECTOR

Wholesale & Retail Trade, Motor Vehicle Repairs

- 3.1.51 There are estimated to be more than 190 wholesale and retail trade businesses in the Outer Hebrides¹⁹. Few are on a large scale other than the major supermarkets.
- 3.1.52 A survey was conducted and the following data was received:

	2009/10
	Electricity
Location (responses)	(MWh)
Lewis & Harris (1)	1,992.5
Uists (8)	1,120.6
Barra (9)	306.3
Outer Hebrides (incomplete)	3,419.4

Accommodation & Food Services

- 3.1.53 Activities included in this sub-sector are restricted to distinct hotel and restaurant businesses. Bed and breakfast and guest house services provided within private households will be captured under the residential sector.
- 3.1.54 A survey was conducted and while an estimated 70% of the sub-sector responded in the southern isles no information was received from businesses in Lewis and Harris. The information received is presented below:

	2009/10		
	Electricity (MWh)	Burning Oil (MWh)	LPG (MWh)
Location (responses)			
Lewis & Harris (0)	-	-	-
Uists (7)	462.2	775.4	566.4
Barra (6)	491.8	137.3	83.9
Outer Hebrides (incomplete)	953.0	912.7	650.3

Defence, Justice, Police and Fire

- 3.1.55 Total energy consumption in this sub-sector is estimated as 11.76GWh.
- 3.1.56 The sub-sector is dominated by the energy consumption at six Ministry of Defence sites in the southern isles operated by QinetiQ; a total of 10.59GWh was reported in 2009/10 (electricity: 3.47GWh; gas oil: 7.11GWh).
- 3.1.57 The Police and Fire services reported consumption of 1.17GWh.

¹⁹ Source: Business Gateway Directory

Education

- 3.1.58 The total energy consumption in the education sector is estimated as 11.2GWh.
- 3.1.59 In 2009/10 CnES operated a total of 37 school sites in the Outer Hebrides: 27 in Lewis & Harris; 8 in the Uists; and 2 in Barra. Further and higher education was provided by Lews Castle College (UHI) which operates a main campus in Stornoway with smaller regional facilities in the Uists and Barra.

	Electricity	Gas Oil		LPG	
	(MWh)	(litre)	(MWh)	(litre)	(MWh)
Local Authority Schools	3,900.6	903,497	9,911.4	46,045	321.4
Lews Castle College UHI	818.0	90,280	990.4	-	-
Outer Hebrides	4,718.7	993,777	10,901.7	46,045	321.4

Table 6: Estimated energy consumption in the Education sector.

Human Health and Social Work

- 3.1.60 The total energy consumption in this sub-sector is estimated at 17.0GWh.
- 3.1.61 NHS Western Isles operates three hospitals and twelve GP practices. Energy consumption at each hospital and two GP practices was obtained.
- 3.1.62 The CnES Social Work Department operates a total of 29 properties (residential care homes, supported accommodation, ceilidh houses and day centres) with a regional breakdown of: Lewis & Harris – 21 properties; Uists – 6 properties; Barra – 2 properties²⁰.

	Electricity	Gas Oil	LPG
	(MWh)	(MWh)	(MWh)
Lewis & Harris	3,343.7	9,151.7	209.7
Uists	702.3	1,846.6	138.7
Barra	302.6	510.5	0.0
Outer Hebrides	4,348.6	11,508.9	348.4

Table 7: Human Health & Social Work Estimated Energy Consumption 2009/10.

Public Lighting

- 3.1.63 There are 6,080 streetlights in the Outer Hebrides. The typical rating is 700W. At present, it is not possible to provide a breakdown of the distribution per region although this should be possible by late summer 2011²¹.
- 3.1.64 The streetlights are on unmetered circuits and energy usage is determined from average lighting hours as determined by the UK Government.
- 3.1.65 Energy consumption in 2009/10 was estimated as 1,471MWh.

		Lewis & Harris	Uists	Barra
-	-			

²⁰ Source: CnES Asset Register 2009/10.

²¹ Source: Erica Coutts, Technical Services Dept. CnES.

Lanterns	Total	6,080	-	-	-
	>20 years old	1,236	-	-	-
	White light	124	-	-	-
Columns	Total	6,060	-	-	-
	>30years old	2,198	-	-	-

Table 8: Streetlight statistics

Transport

- 3.1.66 The breakdown, by category, of vehicles registered in the Outer Hebrides in 2010 is given in Table 9. Since 2001 vehicle numbers have increased by roughly 20% in all categories with the exception of Light Commercial which has increased by roughly 50%.

	Outer Hebrides	Lewis & Harris	Uists	Barra
Private	12,336	9,415	2,345	561
Light Commercial (LCV)	2,730	1,990	565	162
Large Goods (LGV/HGV)	349	246	74	29
Buses	207	129	62	16

Table 9: Vehicles registered in the Outer Hebrides in 2010.²²

- 3.1.67 Local enquiries have demonstrated limited engagement by public transport and freight operators and reluctance to release fuel consumption information. Sector consumption estimates based on the available information are considered to be unreliable and therefore the most recent DECC regional transport statistics for the Outer Hebrides have been used.
- 3.1.68 Consumption in 2008 was estimated as 159.6GWh. Private vehicles (57%) and light commercial vehicles (21%) are the dominant transport sub-sectors.

	Diesel (DERV)		Petrol (ULSP)		Total	
	tonnes	MWh	tonnes	MWh	MWh	%
Private	2,438	30,840	4,546	59,456	90,296	57%
Light Commercial (LCV)	2,476	31,321	162	2,124	33,445	21%
Large Goods (LGV/HGV)	1,930	24,413	-	-	24,413	15%
Buses	903	11,426	-	-	11,426	7%
	7,747	98,000	4,708	61,580	159,580	

²² Scottish Transport Statistics No29 (2010 edition) – www.scotland.gov.uk/publications.

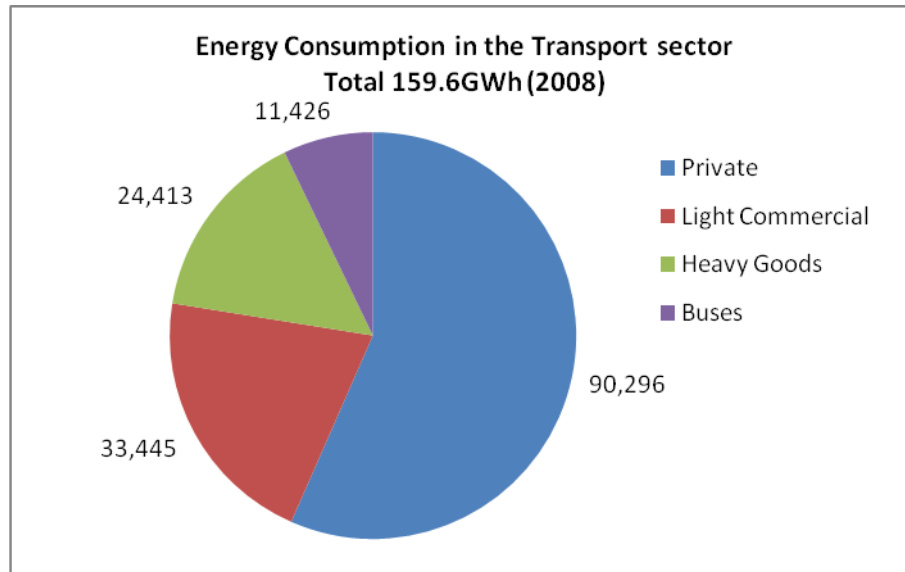


Figure 5: Transport Sector Energy Consumption

3.1.69 In conclusion, the DECC figures are considered to underestimate the final energy demand and therefore a regional estimate was put together. The total calculated from imported fuels is considered to be robust. However, the sectorial consumption surveys of imported fuels are not sufficiently comprehensive for a meaningful breakdown. Therefore the final energy demand figure for the Outer Hebrides 2009/10 is 680GWh.

3.2 SECONDARY ENERGY CONVERSION

3.2.1 Secondary energy refers to energy generated within the boundaries of the island region for the purpose of supplying the local energy distribution networks.

3.2.2 The Outer Hebrides has only one energy distribution network (electricity). Other examples of an energy distribution network are district heating systems and district cooling systems neither of which is used in the Outer Hebrides.

3.2.3 The regional centralized electricity generation capacity is summarised below

Generation Stations	Plant type	Installed capacity (MW)
Stornoway, Battery Point, Lewis	Gas Oil	23
Stornoway, Arnish, Lewis	Gas Oil	7
Loch Carnan, South Uist	Gas Oil	12
Ardveinish, Barra	Gas Oil	2
Gisla, Lewis	Hydro	0.75
Chliostair, Harris	Hydro	1.2
Arnish Moor Wind Farm, Lewis	Wind	3.9
Lionacleit Wind Turbine, Benbecula	Wind	0.9
Integrated Waste Management Facility, Lewis	Biogas CHP	0.24

3.2.4 The majority of the Outer Hebrides' electricity supply is conveyed to the islands via two interconnectors. In 2009/10 approximately 90% of the region's electricity demand (some 161.5GWh) was supplied through the interconnectors.

3.2.5 Local fossil fuel based centralized energy production provides back-up generation capacity to meet peak demands or provide supply when there is an outage on the interconnectors. Back-up capacity is provided by four gas oil fired generation stations - Battery Point, Stornoway; Arnish, Stornoway; Loch Carnan, Uists; and Ardveinish, Barra. In 2009/10 back-up generation is estimated to have generated 11.6GWh approximately 6.5% of the region's annual demand.

Generation Stations	Input - Gas Oil		Output MWh	Efficiency %
	litres	MWh		
Lewis & Harris	1,745,000	19,150	8,430	44%
Loch Carnan	600,000	6,580	2,880	44%
Ardveinish	40,800	450	272	60%
Outer Hebrides	2,385,800	26,180	11,582	44%

Table 10: Fossil Fuel Secondary Generation.

3.2.6 In addition to back-up generation capacity, several renewable electricity generation stations are in operation:

- Two conventional hydro generation stations – Gisla, Lewis and Chliosta, Harris;
- Two wind farms – Arnish Moor, Lewis (3 turbines) & Lionacleit, Benbecula (1 turbine);
- One biogas CHP unit – Integrated Waste Management Facility, Creed Enterprise Park, Lewis.

3.2.7 In 2009/10 a total of 15.2GWh of renewable electricity was exported to the local distribution network.

3.3 PRIMARY ENERGY DEMAND

3.3.1 The primary energy demand for the Outer Hebrides differs from the final energy demand only in relation to the quantity of gas oil imported for use by the back-up electricity generation stations and the electricity that is so produced.

3.3.2 In 2009/10 it is estimated that 2,385,800 litres of gas oil (with an energy content of some 26.2GWh) was consumed by the region's back-up generation stations in the production of 11.6GWh of electricity.

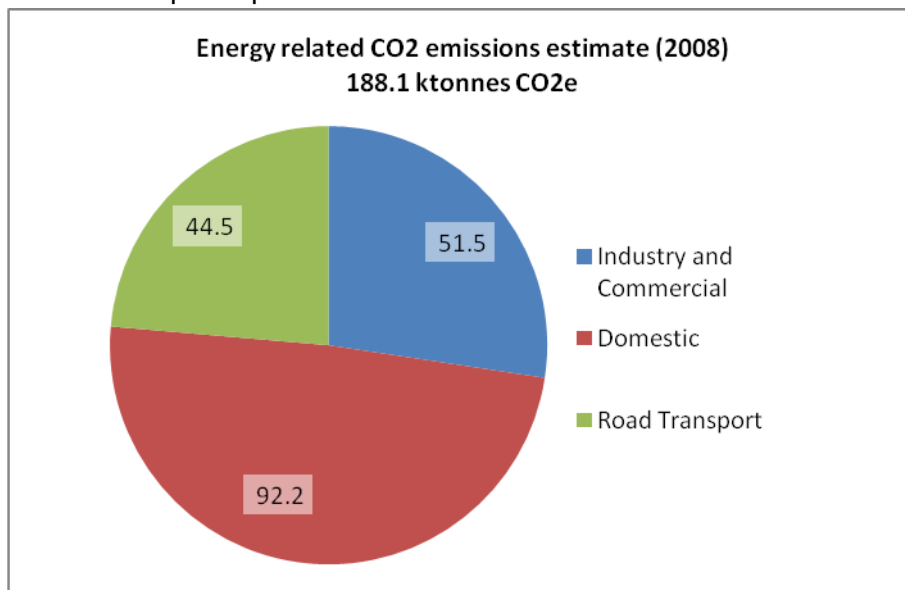
3.4 EMISSION OF CARBON DIOXIDE

Department for Energy & Climate Change Regional estimates

3.4.1 The Department for Energy and Climate Change estimates of greenhouse gas emissions at Local Authority (LA) level are presented in four main sectors

- Industry/Commercial;
- Domestic;
- Transport; and
- Land Use, Land Use Change and Forestry (LULUCF).

- 3.4.2 The industry/commercial, domestic and transport sectors are concerned with the end-use of energy while the LULUCF sector is concerned with regional uptake (removal from atmosphere) of CO₂ and regional net losses and gains from soils.
- 3.4.3 The regional estimates do not include the emissions from particular sub-sectors where that information cannot be spatially disaggregated from the national inventory to a LA level. Omitted sub-sectors relevant to the Outer Hebrides are domestic aviation, fishing, coastal shipping and exports.
- 3.4.4 The regional CO₂ emissions for the Outer Hebrides in 2008 are estimated as 305,600 tonnes, equivalent to 11.7 tonnes per capita. Excluding the contribution of LULUCF, the energy related CO₂ emissions are estimated as 188,100 tonnes or 7.2 tonnes per capita²³.



- 3.4.5 The trend in regional CO₂ emissions indicates a marginal reduction (approximately 2%) from the 2005 base year estimate primarily due to a reduction in the LULUCF contribution (Figure 6). No significant trend is noted in the energy related sectors.

²³ National Indicator 186 (per capita CO₂ emissions in the LA area) excludes the contribution of Land Use Land Use Change and Forestry (LULUCF).

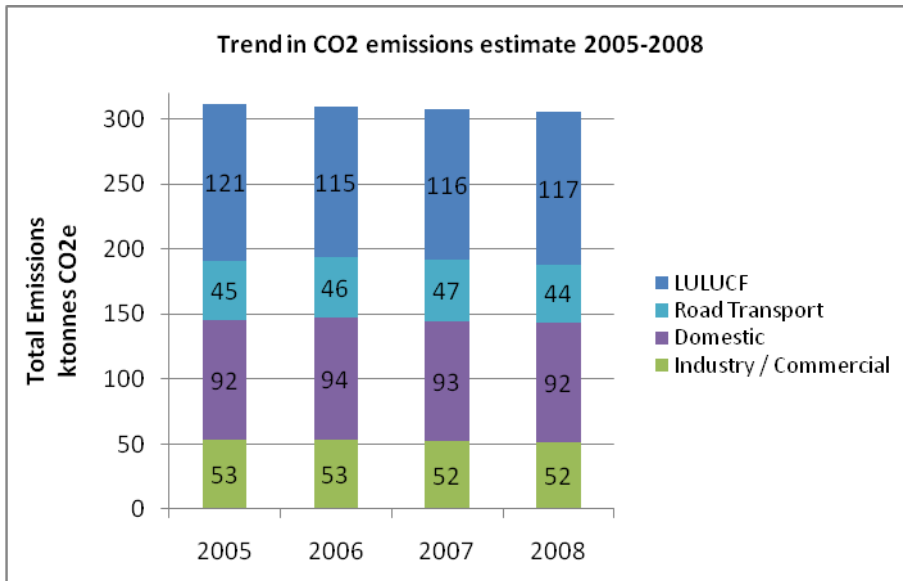


Figure 6: Trend in CO₂ emissions estimate.

Local Assessment

- 3.4.6 The greenhouse gas emissions associated with the local estimate of energy consumption (see section **Error! Reference source not found.**) is 229,400 tonnes CO₂ equivalent, roughly 25% higher than the DECC estimate.
- 3.4.7 The sources of the emissions are indicated in Figure 7. Electricity (42%) and gas oil (18%) are the major sources of the region's emissions; Road transport fuels (DERV and Petrol) account for 19% while the other significant source is burning oil.

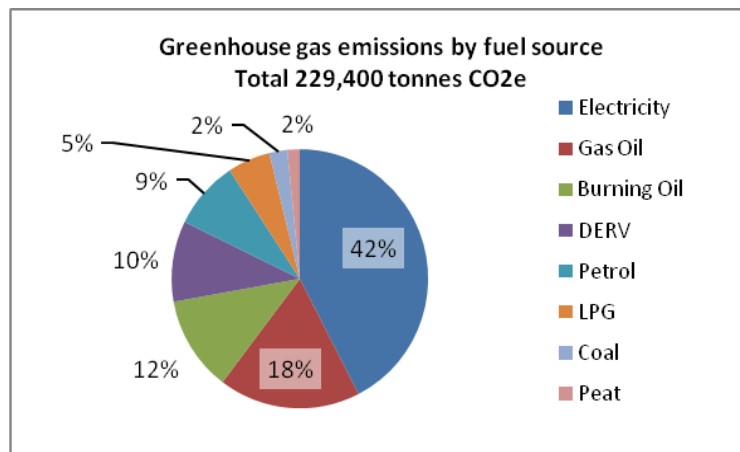


Figure 7: Greenhouse gas emissions by fuel source.

4 ACTIONS

Energy Generation & Storage

4.1 Electricity

- 4.1.1 The Outer Hebrides are home to one of the best wind and wave regimes in Europe. Access to this resource has been hampered by poor Grid connectivity. At present, there is no export capacity within the transmission network to allow the UK and Europe to benefit from the significant electricity generation capacity around these islands. Comhairle nan Eilean Siar is committed to the development of a renewable energy industry in the Outer Hebrides which will supply green electricity to urban markets and secure significant socioeconomic benefits for the islands in terms of fabrication (Arnish Yard), research (Lews Castle College) and investment in the wider supply chain.
- 4.1.2 In order to release these benefits, the transmission capacity of the local Grid must be significantly improved and the Transmission Operator, Scottish Hydro Electric (Transmission) Limited, is currently in procurement for a new 450MW Radial Connector (upgradeable to 900MW) between Gravir in the Isle of Lewis and Little Loch Broom on the Scottish mainland. This new link will allow export of renewable electricity from Scotland's area of best resource to the UK Grid. Commissioning date for the new cable is October 2014.
- 4.1.3 While an installed renewable electricity generation capacity of 60MW would be sufficient to meet the current annual electricity demand of the Outer Hebrides²⁴, Comhairle nan Eilean Siar is aware of its obligation to supply the wider UK Grid with renewable electricity. The Outer Hebrides renewable energy resource is therefore viewed as a matter of national interest.
- 4.1.4 At present, circa 400MW of onshore generation is operational, consented or in the advanced stages of development. Aquamarine have just been granted a Crown Estate lease for 40MW of generation off the West of Lewis and Pelamis are in the application process for another 20MW lease in the same area. Statoil are scoping the North Minch for a site for a commercial floating offshore wind deployment amounting to hundreds of Megawatts. In short, the first phase 450MW of the Radial Connector is already at capacity and the second phase 450MW will soon be taken up.
- 4.1.5 At present, community generators make up 25MW of consented onshore generation through seven deployments ranging from 900kW to 9MW. In addition, the opportunity exists for the community to purchase 20MW of generation from the 150MW Stornoway Windfarm, currently in planning. This will allow the community, through the Comhairle, to generate and retail renewable electricity to off-island markets in addition to contributing to island consumption. The

²⁴ Assuming a conservative 33% capacity factor and 95% availability, 60MW installed capacity would be expected to generate approximately 165GWh per annum.

Comhairle's aspirations is for these islands to become zero carbon in terms of their electricity demand.

4.1.6 Energy storage can increase the reliability and productivity of renewable electricity production generation by buffering excess production, easing the demands on distribution and transmission networks. Exploration of energy storage solutions will therefore be a key part of the ISLEPACT process going forward.

4.1.7 Actions include:

- Support the development of a minimum of 60MW of community owned renewable electricity generation throughout the Hebrides.
- Develop energy storage demonstration project.

4.2 Heat

4.2.1 Heating oil is likely to continue to dominate the provision of space heating as access to lower carbon alternatives, for example natural gas and biomass, is presently limited.

4.2.2 At first sight, the distributed nature of properties in the Hebrides does not lend itself to developing district heat systems. Where clusters exist however the potential for district heat systems should be investigated.

4.2.3 Actions include:

- Develop a biomass (wood pellet and wood chip) supply and distribution chain in the region based on a number of anchor customers.
- Produce heat mapping of the region.

4.3 Energy Efficiency

4.3.1 Improving the energy efficiency of domestic and business properties has the potential to deliver substantial reduction in the energy consumption of the region. In addition, this is a measure that tackles the issue of energy poverty prevalent in the region. The Outer Hebrides currently has the highest rate of energy poverty in Scotland by a large margin.

4.3.2 New buildings are required to satisfy increasingly stringent energy performance criteria and local planning regulations should ensure such criteria are met and exceeded. However it is the improvement in energy performance of existing buildings that will deliver the desired reduction in energy consumption.

4.3.3 Actions include:

- Investigate and establish energy efficiency measures appropriate for the portfolio of property types prevalent in the Outer Hebrides.
- Establish the finance mechanism to implement energy efficiency measures in a rolling programme of property improvements.
- Provide training to ensure regional trades are appropriately skilled.

4.4 Sustainable Transport

- 4.4.1 The private and light commercial sub-sectors account for 78% of the energy consumption in the transport sector. Initiatives to reduce the use of private vehicles and support the uptake of low-carbon alternatives to petrol and DERV in these sectors could provide significant reduction in GHG emissions.
- 4.4.2 With the islands heavily dependent on sea and road borne freight, there is significant scope for carbon savings in these sectors through the use of low carbon alternative fuels.
- 4.4.3 Actions include:
- Develop car-sharing initiatives appropriate for rural communities
 - Lift-sharing initiatives
 - Community car-clubs
 - Reduce business mileage and the impact of unavoidable business mileage
 - Increase the provision of, access to and use of remote tele-communication facilities throughout the Hebrides (e.g. tele-conference, video-conference).
 - Implement low carbon business travel policies.
 - Establish low carbon pool vehicle fleets.
 - Install speed-limiters on public sector vehicle fleets
 - Support for the uptake of low carbon fuels.
 - Short term initiatives to focus on expanding the availability of LPG (Autogas) and supporting wider uptake (LPG provides lower GHG emissions per kWh than petrol and DERV).
 - Develop early adoption of Battery Electric Vehicle (BEV) and Fuel Cell Electric Vehicle (FCEV). Support infrastructure development and vehicle trials.
 - Continue investigations of alternative fuels in the marine sector.

4.5 Public Engagement

- 4.5.1 Engaging the general population's interest in energy efficiency measures in conjunction with the improving the uptake of appropriate distributed renewable energy generation technologies has the potential to deliver significant reduction in carbon emissions for the region. Behavioural change can be realised through targeted public engagement providing advice and assistance on energy matters. This is best delivered at a community level using resources embedded within the community.
- 4.5.2 Actions include:
- Promoting behavioural change through close community engagement.
 - Expand the remit of Community Development Officers to include the championing of energy efficiency
 - Utilise existing community groups to support engagement.

4.6 Regional Energy Monitoring

- 4.6.1 Developing the sustainable energy action plan highlighted the difficulties of acquiring accurate energy consumption information for the region. Closer engagement with national and regional energy suppliers (utilities and distributors)

and significant energy consumers (both public and private bodies) is necessary to develop accurate estimates of future consumption patterns.

4.6.2 Actions include:

- Establish post with responsibility for developing monitoring and reporting of regional energy consumption patterns.

5 ORGANIZATIONAL AND FINANCIAL MECHANISMS

In the view of Comhairle nan Eilean Siar, the following resources will be required to deliver the actions contained in this Island Sustainable Action Plan and move the islands towards delivery of the ISLEPACT Bankable Projects.

5.1 Coordination and organisational structures

- 5.1.1 The ISLEPACT process is currently being led by the Energy Unit within Comhairle's Development Department. Additional staff and funding resources have been requested for the Energy Unit in order to equip it to deliver ISLEPACT and other renewable energy objectives effectively and efficiently. At the time of writing, a decision on these resources is awaited. Additional Project Coordinator support is provided by an external contractor who has long experience in European and renewable energy issues.
- 5.1.2 It is therefore proposed that the current Project Coordination and organisational structure continues. This comprises the Comhairle's Strategy Manager as Project Coordinator on behalf of the Comhairle, the external contractor as Project Coordinator support, an additional member of staff within the Energy Unit as ISLEPACT Officer and contracted services from the Technical Services Department as required. Secondments from Lews Castle College may also be appropriate for aspects of ISLEPACT work.

5.2 Staff capacity

- 5.2.1 The Strategy Manager and external Project Coordinator Support both have long experience in European matters in general and renewable energy in particular. Some training will be required for staff who are new to the ISLEPACT process, for example the new ISLEPACT Officer proposed for the Comhairle's Energy Unit. When required additional staff resources will be contracted in from the Comhairle's Technical Services Department.
- 5.2.2 It is anticipated that project coordination can be effectively carried out by the Comhairle's Energy Unit, assisted by the Project Coordinator Support, and that technical expertise will be available through secondment arrangements with Lews Castle College.

5.3 Involvement of stakeholders

- 5.3.1 The ISLEPACT Advisory Group, drawn from the Outer Hebrides Renewables Group, will continue to advise the project. This Advisory Group is highly representative and carries much influence in the UK energy sector. Among the members are National Grid, Scottish Government, Marine Scotland, Crown Estate, Scottish Hydro Electric (Transmission) Limited, DECC, OFGEM, Scottish Natural Heritage and a whole range of commercial and community renewable

energy generators. Significant ISLEPACT developments will be routed through this Group and it will serve as a sounding board as the project moves through the Action Plan and Bankable Projects stages.

- 5.3.2 The ISLEPACT Advisory Group will meet quarterly but will be kept updated in the interim through electronic mailings. Operationally, local stakeholders such as Lews Castle College, Highlands and Islands Enterprise, Sustainable Uist etc will be fully involved in project work, providing expertise as necessary.

5.4 Budget

- 5.4.1 The Comhairle currently faces an extremely challenging set of financial circumstances with a requirement to save GBP5 million, year on year. In order to meet this target, the Comhairle has to contract to essential services only. The Comhairle views renewable energy in general and ISLEPACT in particular as an essential service, offering unprecedented socioeconomic and environmental benefits to these islands. The Comhairle is committed to remaining in a position of leadership within the European island community and will continue to support the CPMR process and to lead on the ISLENET project. However, in-house budget for this work is non-existent as the Comhairle contracts so the Comhairle is dependent on external, European funding to deliver many of these European programmes.
- 5.4.2 The Comhairle recognises the need for the European Commission to fund ISLEPACT 2 following conclusion of the current phase of the project in July 2012. If the ISEAP is to be delivered and the Bankable Projects matured, European funding for the next phase of the project is critical. The Comhairle supports the resolution of the Islands Commission of CPMR, presented in May 2011, which calls on the European Commission to fund ISLEPACT 2.

5.5 Financing sources and instruments

- 5.5.1 Comhairle nan Eilean Siar will be developing a new Capital Programme during 2012 and, although the scale of the Programme will be smaller than in previous years due to public sector efficiencies, there will be the opportunity to align Comhairle spending plans with ISLEPACT deliverables.
- 5.5.2 As stated above, the Comhairle and its ISLEPACT partners are dependent on European intervention in order to deliver the next phase of the ISLEPACT project. It is anticipated that involvement in ISLEPACT 2 will enhance access to new and existing funding sources within Europe and that these funds will be used to match any Comhairle allocations.
- 5.5.3 All the commercial renewable energy developers active around the Outer Hebrides are represented on the local ISLEPACT Advisory Group. The Comhairle is in discussion with these developers to explore the possibility of investment funding in ISLEPACT deliverables.

5.6 Monitoring and follow-up

- 5.6.1 In the first instance, Comhairle Energy Unit staff will monitor delivery of the ISLEPACT Island Sustainable Energy Action Plan. Regular monitoring reports will be prepared by the Energy Unit and will be presented to the ISLEPACT Advisory Group.
- 5.6.2 Progress with ISLEPACT deliverables will be shared regularly with local key stakeholders such as the Comhairle, Lews Castle College and the Outer Hebrides Community Planning Partnership as well as with project partners across Europe.
- 5.6.3 It is anticipated that Comhairle nan Eilean Siar will retain the Project Coordinator role for ISLEPACT 2 and will continue to lead work package areas related to overall project coordination and communications.

Elaboration / Local Authority:



Comhairle nan Eilean Siar

Financial support:



Directorate-General
for Energy

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