Sustainable Westray
Action Plan

October 2009

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www.care4energy.co.uk

Contents

Executive Summary

The action plan was compiled following a weekend-long series of workshops and consultations in March 2009.

An island-wide mail shot agreed that Westray should be part of the national target for greenhouse gas emission reduction target of 80% by 2050.

We will continue to be at the forefront of Scotland's journey to a low carbon society.

We will learn from our successes and failures as we pioneer this uncharted territory.

Through this Action Plan we have set out our strategy and how we will achieve our vision of a sustainable future for generations to come through reducing Westray's carbon impact.

Section 1 – Introduction to Westray

The Environment on Westray

Westray is the most north westerly island of the Orkney archipelago, fully exposed to Atlantic influences. It has a long irregular form, 16km long by 6km wide, which is buttressed in the West by a range of hills including Fitty, Gallo, Knucker and North Hills which bear the brunt of Atlantic forces against a line of high cliffs. Its Eastern coast is long with saw tooth succession of bays and headlands 'ness'.

Figure 1 – Satellite image of Westray and the smaller Papa Westray

The outstanding natural heritage Westray has to offer is a vital resource, crucial to the areas future and an asset that must be carefully managed. The island fully recognises the importance of the natural heritage and strives to ensure its activities have minimal impact.

In recognition of the Natural Heritage asset that Westray has, Scottish Natural Heritage contributed funding to the Westray Development Trust towards the completion of a Natural History Audit in 2003, completed by Martin Gray.

Westray is a maritime area of immense ecological, earth heritage, cultural and archaeological importance. The influences of this northerly location, and of the sea, pervade the entire ecology and culture of this area. A shared Norse history is evident in land use, settlement patterns, place and family names. The area is characterised by gently undulating lowland, much of it given over to grassland fringed by precipitous cliffs to the West, shallow bays, sea and lochs. Woodland is notable by its absence.

A substantial proportion of the Westray economy is dependent upon a healthy natural heritage. The rural economy is dominated by agriculture and the area also supports a range of other economic activities linked with the natural heritage including tourism, built development and aquaculture.

Westray is a land of rolling farmland and scattered settlements. The area is ringed by dramatic coastal scenery, and is home to large colonies of seabirds, while the surrounding seas hold a great diversity of marine life. This rich and distinctive natural heritage has been shaped by the underlying geology, the harsh climate and by its long history of human occupation.

The climate is heavily influenced by the North Atlantic Drift and characterised by mild winters, cool summers and persistent winds. The mild winters that result in normally unfrozen wetlands and open waters, help account for the large number of overwintering wildfowl and waders that frequent the area.

Underlain by a sedimentary sequence of Devonian age rocks, sometimes referred to as the Old Red Sandstone or Rousay Flags, this bedrock has been sculpted by ice and sea. The result is a generally subdued topography with rolling hills punctuated by wetlands and lochs. In Westray, this mix of land and fresh water is enhanced by proximity to the sea, producing the dramatic land and seascapes for which the island is renowned.

Figure 2 – Pierowall Bay, Westray

The local variation in the hardness and composition of the sedimentary rock layers is responsible for the diversity of coastal forms. Subtle differences in the hardness of these layers have been exploited by the sea to produce some of the most dramatic cliff scenery in the UK - epitomised by Noup Head – and to create ideal ledges for breeding seabirds.

Scouring by ice during the last ice age carved out valleys and hollows, many of which now hold lochs or were flooded by the sea. Present day climate continues to influence the form of the land. In contrast to most of Scotland, this area has been slowly sinking since the last Ice Age, and consequently a variety of unusual landforms have developed. Atlantic gales have reworked sand and gravel, produced during the ice age, to build up sand dunes in places.

The gently undulating topography is characterised by farmland. In most locations on Westray, improved grassland incorporates all land from the coastal rim to the tops of once heather-clad hills. In general, this presents a landscape of scattered housing and a mosaic of green and brown; the improved grassland and moorland often delineated by a distinct boundary line. In-bye farmland vegetation is dominated by improved grassland, and to a lesser extent permanent pasture.

Intensive grass management for grazing and silage crops is the mainstay for the beef farming industry; while limited barley production provides supplementary feed for overwintering cattle. Both crops are particularly important for birds throughout the year. The corncrake, a globally endangered species, utilises fields used for silage production as nesting sites. Grassland and arable areas are an important source of food for large concentrations of post-breeding and wintering birds.

Rabbits are prolific on Westray, contributing to the continued occurrence of species rich grassland at several sites.

The lochs and pools have a range of water chemistry and acidity reflecting the surrounding rocks, soils and proximity to the sea. Where loch catchments contain base-rich rocks or shell sand their waters are more nutrient-rich.

Eutrophic lochs are a rich source of food, both animal and vegetable, and provide sustenance for a wide variety of waterfowl. On these open waters are breeding mute swans, near their British northern limit. In winter, these lochs hold internationally and nationally important aggregations of wildfowl such as: greylag goose, whooper swan, pochard, tufted duck, scaup, goldeneye and wigeon. In the wetlands of fen, marsh and mire, nesting opportunities are provided for wildfowl, such as pintail and shoveler, and waders, such as redshank and curlew. Invertebrates, such as caddis flies until recently sustained abundant brown and sea trout and eel populations.

Maritime grassland is the commonest coastal habitat covering nearly half of the coastline. The best remaining examples of maritime heath in Scotland are a significant habitat within Westray. Two plants occurring only in Scotland are the Scottish primrose, found on cliffs among maritime heath and on stabilised (grey) dunes, and an eyebright, found in short grassland close to the coast.

The community of internationally important seabirds dominates the faunal interest of the coast: auks (guillemot, puffin, razorbill and black guillemot), fulmar, shag, Arctic tern, gannet and kittiwake, along with several large colonies of storm petrel.

The seas locally provide a range of environments from the extremely exposed rock faces and reefs of the outer coast to the sheltered, muddy conditions in some inshore waters. This is reflected in the variety of plant and animal communities present, which include unusual mixtures of temperate and northern species. Rocky shores typically support extensive areas of underwater kelp 'forest', which shelter a great diversity of other organisms. Underwater caves consist almost entirely of animal communities.

More sheltered coastal locations in Westray such as Tuquoy bay have sandy seabeds inhabited by burrowing animals such as lugworms and cockles. Eelgrass beds occur on some subtidal mudflats providing food for seafowl. Sand also covers extensive areas of seabed offshore where it is particularly important for sandeels, a food source for important economic fish species such as cod, haddock and whiting. These fish, especially sandeels, provide essential food for seabirds and mammals.

Approximately 600 people live in Westray and close on 50% of the population live in Pierowall. The remainder is fairly evenly distributed throughout Westray. The rural areas are characterised by small settlements and scattered housing.

The distinctive landscapes of Westray result from the characteristic combinations of bedrock, landform, vegetation, and in many areas, successive human activity over thousands of years. The rise of sea level since the last glaciation is responsible for the drowned topography of Orkney. The submergence of the land, coupled with frequent strong winds and the erosive force of the sea in the area, has been responsible for rapid marine erosion along the exposed West coast which has produced the impressive cliff formations. The submergence of the landscape has also created the distinctive coastal valleys or 'voes' such as Tuquoy Bay, Bay of Tafts, the Ouse and Pierowall Bay.

Inland landscapes are characterised by rolling hills with tracts of heather moorland, which are sharply delineated from areas managed more intensively for agriculture. There are still extensive upland areas to the West of Westray that give a strong sense of isolation and wildness. The pattern of agriculture varies from relics of udal strips in the South of the Island to more consolidated fields of large rectilinear shape in the middle of the island. Mostly the orientation of fields is towards the coast.

Settlements in more sheltered lowland areas create more diverse landscapes which are accentuated by the contrast with the open hills beyond. Here, intricate patterns of pastoral, arable and marshland are interspersed with houses, drystone and flagstone dykes, fences, and farms.

Many landscape features are of historical importance and the area, which includes several internationally renowned archaeological sites.

The gently undulating topography with rounded hills to the West of up to about 169m is a characteristic feature of Westray.

The Economy of Westray

At about 25 square miles (11,551 acres), Westray is the second largest of the North Isles with the largest population of around 600. The primary industries are agriculture and fishing, with tourism rapidly emerging as a strong, third element to our economy.

Westray is served by a regular roll-on-roll-off ferry from Kirkwall to Rapness at the southern tip of the island twice daily in winter and three times daily in summer. From Pierowall there is also a passenger service to Papa Westray and to Kirkwall, often via the North Isles. Westray has a little less than 33 miles of tarred road and public transport on the island is minimal. In addition to school buses, a private minibus service on request connects with ferry arrivals and departures from Rapness and Pierowall. The ferry service has been a crucial factor in the development of Westray's economy, especially since the establishment of the ro-ro service in 1992 which permitted the export of more goods such as shellfish, fish, cattle, sheep, bakery products, salmon and craft products.

Westray also has three General Merchants – one with a post office and another with a sub post office, six public telephones, 2 hotels with public bars, a heritage centre, a Gallery and Art Studio and a community owned nine-hole golf course.

Also more recently three Workshop Units and a Drop-In centre have been built. The workshop units were built in order to encourage small industry and were funded by Highlands and Islands Enterprise, they can be rented by a small business until it can afford to buy or build their own workshop premises. The island is also served by a local building firm who employ a significant number of the locals and provides apprenticeships. Other local industry includes a bakery, an organic salmon farm, a co-operatively owned shellfish factory, a shellfish trader, fish processors, several tourism businesses and more recently renewable energy businesses.

Figure 3 – 6kW turbine at local shellfish co-operative.

Figure 4 – Open day at the Tuquoy Biogas Plant

The Westray Development Trust working with the small boat owners association were also successful in securing a small marina for the island at Pierowall Harbour which brings in many visitors contributing to the economy on the island.

Social provision on the island of Westray

With regards to social provision, Westray has one junior high school which also has a community hall used for sports, dances and other functions, a community room and a community classroom which can be used for evening classes, meetings etc. The School is also used as an outreach centre, with laptops available for public use. In addition to this the school also has a playing field across the road with various pitches for various sporting activities and a Play Park in one corner. More recently the 15m swimming pool has been deepened and the building has been extended to include video conferencing facilities, team changing and a fully equipped gymnasium.

Westray has a doctor's surgery with 1 doctor and a full time nurse from a rota of nurses on duty. Westray also has a care centre providing sheltered housing for the elderly and infirm supplied with energy from its own renewable energy equipment including solar panels, heat pump and a wind turbine. It also has other emergency services in the form of a Fire Station and ten auxiliary firemen, eleven auxiliary coastguards and an Ambulance and driver.

The Hofn 'Drop-in' Centre and play park was built by the Westray Development Trust for the young people of Westray to have somewhere to meet up.

Another recent addition to Westray's social provision is the Church of Scotland building which has recently been refurbished. The out-dated church was transformed to make it more community friendly. It now has four rooms as well as the main church, a well-equipped kitchen and three public computers with Internet access. There is no charge for the use of the facilities merely a donation box if people wish to leave a donation, but there is no obligation. Once again the building has won numerous awards for it renewable energy provision including wind turbines, heat pumps and a standby generator fuelled by biodiesel.

Figure 5 – Westray Parish Kirk and 6kW wind turbine

Section 2 – Community Engagement and the Sustainable Westray Action Plan

History of community development activity in Westray since 2000

The population of Westray continuously increased since the 1790s, the population of Westray and Papay reached its peak in 1881, with a combined total of 2,190. Since then the population has continually decreased and is now less than a third of what it was a century ago. Historically demographic trends follow employment opportunities, and this continued depopulation reflects in turn the collapse of the kelp industry, mechanisation in agriculture and generally increased contact with the outside world.

Census Totals for the North Isles

Year	Westray	Papay	Stronsay	Eday	Sanday	North Ronaldsay
1901	1,956	295	1,184	643	1,727	442
1911	1,668	258	1,217	559	1,529	436
1921	1,507	247	1,067	534	1,403	439
1931	1,269	237	975	470	1,160	298
1951	1,091	184	650	308	866	224
1961	871	139	497	198	670	161
1971	841	106	439	179	592	134
1981	702	94	419	147	531	92
1991	704	85	382	166	533	89
2001	563	65	358	121	478	70

In a study from 1996, it was estimated that Westray's population would eventually stabilise naturally, and a figure of 750 was suggested. A comparison of the 1991 and 2001 census figures shows Westray has one of the most significant population declines in Orkney, Flotta being the largest. This would indicate that the 1996 prediction for Westray was inaccurate and the population decline is still rapid, and requires action to redress the situation. The 2001 census shows the current population of Westray is 563 although we believe this has since risen to nearly 600 by 2009.

The figure is also supported by anecdotal evidence. From the 139 (54%) households responding to the Islands Audit of 1998 74 people had left Westray permanently in the last 15 years. Of these 50 were under 18 years old. Furthermore, this figure does not include whole households leaving during that period.

The main reasons given for leaving are still higher education (49%) and lack of suitable employment (39%). A further 52 residents in 1998 said that they would also leave Westray if they lost their current employment. During the Same period immigration was minimal. 87% of the surveyed population in the Islands Audit of 1998 had lived in Westray for more than 15 years.

Population totals alone, however, do not present the whole picture. Orkney Health Board figures from 2003 indicate important underlying trends.

Age Range	Male	Female
0-4	15	6
5-9	11	14
10-14	23	15
15-19	19	15
20-29	32	11
30-39	34	39
40-49	48	36
50-59	44	35
60-74	55	58
75+	22	38
Total	303	267

An island audit was conducted in 1998[1] which surveyed and received responses from 139 households representing 375 people and 24 businesses employing 56 people. It concluded that 85% of homes were occupied, and the average number of people per household was 2.7. It identified depopulation as a real concern and noted a high percentage of the population (26%) was over 60. At the time over 87% of those surveyed had lived on the islands for more than 10 years. The emigration of young folk was also a serious concern with 68% of those leaving under the age of eighteen when they left permanently. The island audit led to a conference in 1998 with all public bodies attending and a decision was taken to establish what became the Westray Development Trust with the remit to arrest depopulation in the island. The island was one of the first to take part in the governments 'Initiative at the Edge' programme with support from Highlands & Islands Enterprise, Orkney Islands Council and the Crofters Commission.

Earlier community development plans 'Turning the Tide' and 'The Tide is Turning' were developed in conjunction with Alan Caldwell Associates and identified that in order for Westray to maintain sustainability and increase population levels in needed to act on three levels, social, environmental and the economic.

[1] AB Associates, August 1998 – Orkney Islands Audits Number 10, the Westray Report prepared for Orkney Enterprise.

Westray has a very active and vibrant community and this is reflected by the number of community organisations. In terms of sports the island supports a football team playing in the Orkney amateur league, a rugby team, a sports club, a golf club, a swimming club, a sailing club, a netball team and a snooker club. The island also competes annually in the North Isles sports, a local track and field event between Orkneys North Isles. The sailing club also hosts an annual regatta whereby other sailing clubs throughout Orkney come to Westray and compete.

Other active community groups include the Westray heritage trust, the buildings preservation trust of Westray, the Westray Development Trust, the community association, the craft association, the Westray and Papa Westray Tourist Association, the Westray Boat Owners Association and Energy Action Westray. The projects undertaken as community development on the island since 2000 have included;

Development Worker – Cost £100,000 over three years in 2000.
Hofn Drop In Centre - Cost £80,000 and opened 23rd Oct 2000.
Play Area - Cost £67,000 and opened May 2001
Business Nest Units - Cost £166,000
Westray Boat Owners Association Pontoons - Cost £40,000 and in place July 2001.
Church of Scotland Redevelopment into a community facility – Cost £340,000.
Natural History Research Document – Cost £3,000.
Development Plan - Cost £12,000.
Tourism Plan – Cost £5,000.
Craft Trail - Cost £10,000.
Renewable Energy Plan 2002-2012.
Community Wind Study – Cost £10,000 in 2003.
2.5 kW Hofn Wind Turbine - Cost £15,000 and installed in March 2003.
6kW Wind turbine - £26,000 and installed at Westray Parish Kirk in March 2003.
Renewables Worker 2004-2006 – Cost £75,000 in 2003.
Development Worker Post extended for 2 years – Cost £70,000.
Biodiesel Feasibility Study – Cost £5,000 in 2004.
Biofuels Production Facility – Cost £45,000 in 2004.
Electric Car Project including 2 turbines – Cost £71,500 in 2004.
Care Centre - Cost - £2,000,000 completed in 2005.
Anaerobic Digestion Project Development – Cost £100,000 by 2005.
Finger Pontoons - Cost £30,000.
Changing Rooms/ Learning Centre/Deepening Swimming Pool.
Social Inclusion Partnership – Youth Worker Cost - £160,000 over 3 years.
Skiff Build Project (small sailing boat) – Cost £11,000.
Roadmire lay-by /vantage point.
Archaeology Survey.
Broadband.
Westray Building Preservation Trust.
Sailing Club Rescue Boat.
Sailing Club Clubhouse.
Golf Course - purchase the ground £76,000 in 2005.
Wind turbine and Biofuels Sites - £37,000 in 2005.
Westray Renewable Energy and Orkney Biofuels formed – Cost £5,000 in 2005.

Scottish Community & Householder Renewables Initiative contract - £37,000 in 2005.
Fishing SVQ.
Quoygrew Archaeological Works.
South Hammer Consolidation.
Westray Heritage Centre.

Intra and Inter Island Waste projects -	Cost £10,000 in 2009.
Lottery Funding for Staff positions –	Cost £121,200 in 2008.
Fuel Poverty Project Funding from ScottishPower -	Cost £66,000 in 2009.
Sustainable Westray Action Plan –	Cost £8,225 in 2009.
Powerdown Worker –	Cost £57,000 over 2 years in 2009.
900kW Wind Turbine Project -	Cost £1,500,000 built in 2009.
Energy Efficiency Design Awards -	Cost £140,000 in 2009/2010.

Community Engagement on Sustainability Issues

One of the earliest mentions of sustainability issues came with writing the second island development plan 'The Tide is Turning'. This built on work undertaken by the islands renewable energy group which was a sub group of the Development Trust on a renewable energy plan 2002-2012. Part of this plan required to eliminate fuel poverty and implement a number of renewable energy projects most of which have now been completed. In subsequent years the island community also committed to achieve 'Zero Waste' via the community council and became a Fair trade island which is source of much pride. The Church of Scotland went on to win an Eco Congregation Award and the Westray Development Trust won the Green Energy Awards for the Biodiesel project.

A survey was conducted in September 2004 by MSc Student Monique Stevenson to gauge local opinion renewable energy in Westray. This survey of 43 people concluded that Westray's Renewable Energy Plan shows potential to contribute to the economic development of the community while minimising impacts on the environment. The consultation exercise has shown that Westray community members are behind the Plan with 93% of those surveyed were of the opinion that wind energy was appropriate for Westray.

The Energy Plan 2002-2012 Targets were;

- Register with the EU Renewable Energy Partnership's programme the Trusts aspiration for Westray to become a 100% community owned renewable energy island before 2012, generating from community renewable projects the equivalent kWh energy as is consumed annually.
- Promote the awareness of opportunities by commissioning an Energy Supply and Demand Audit to report back before the end of 2002. The Audit would firstly prioritise locations with potential to host renewable energy projects, secondly look at energy use locally with a view to installing energy efficiency measures, and finally determine the level of fuel poverty within Westray.
- Maximise the involvement of the youth of Westray in the execution of the plan.
- Set up a Trust representative to handle and direct enquiries from local people before the end of 2002.
- Identify sites and commence a programme of natural resource measurement in 2003.
- Reduce local transports dependence on fossil fuels and have at least one green transport project up and running before the end of 2003.

- Encourage the location of appropriate renewable energy research and development in Westray. Identifying at least one project in 2003, with others following thereafter.
- Establish a community energy co-operative and/or investment club in 2003.
- Develop a state of the art awareness of wind, tidal stream, hydro, solar and energy from waste renewable technologies over the duration of the plan.
- Work with others to build community capacity on installing and maintaining renewable energy and energy efficiency measures over the early years of the plan.
- Investigate the potential for local manufacture of renewable energy technologies and where feasible support the creation of manufacturing capability.
- Monitor the difficulty connecting to and negotiate securing future access to the national grid.
- Eliminate fuel poverty in Westray by 2005.

The plan was written in 2002 and the initial signatories were Willie MacEwen, Iain Macdonald, Colin Risbridger and Sam Harcus. The plan has provided the basis for all renewable energy development on the island since 2002 and is a robust reflection of the communities' desire for economic development in this sector. Many of these projects have now been delivered with the exception of achieving the 100% target and the elimination of fuel poverty. The Westray Development Trust has concentrated their effort on the elimination of fuel poverty and this has become one of the five key projects for the organisation.

Since this survey a public presentation was held on the proposed wind project alone in December 2004 proposing three turbines with nearly 10% of the islands population turning up on the evening. 94% of those who attended were in favour of a wind project on Gallowhill with 2% unsure and 4% of forms incomplete. 76% of attendees were in favour of three turbines. This was the beginning of the Westray Development Trust led project which decided to progress with a single 900kW turbine which Westray Renewable Energy Limited are currently developing as a wholly owned subsidiary of Westray Development Trust. A further two turbines at the same site have recently been awarded planning permission and are being developed as a private enterprise at the moment.

Some of the other suggestions offered at this meeting included the option for local investment and also ensuring that everyone had an equal chance to share in the benefits regardless of their financial background. The Westray Renewable Energy Limited 900kW project as it currently stands will be wholly owned by Westray Development Trust with grant assistance from the Big Lottery 'Growing Community Assets' funding stream and the balance provided by loan finance with no option for local investment at this stage. Work is being undertaken with Orkney Islands Council on an investment co-operative with a potential share offer in 2009 to help fund the additional two turbines for Gallowhill.

The community's support contributes to the 100% Renewable Energy Plan's sustainability, and indicates that community members are willing to be more involved should opportunities arise. This study also suggests that future RE developments, in addition to providing potential tangible benefits such as employment and economic returns, may also benefit the community in less tangible ways such as by promoting enthusiasm and a sense of pride in Westray as a whole.

The Westray Development Trust decided in 2008 that it could no longer commit to the Renewable Energy Plan and therefore decided to remove the aspiration target date of 2012. The

reason for the change in emphasis has been the refocusing of the organisation on a number of objectives linked to the recent award of funding from the Big Lottery 'Growing community assets'. The Development Trust found themselves trying to work in too many areas with limited resources and therefore decided to focus on building the 900kW wind turbine to generate an income to deliver the following targets;

1. To improve and develop the Westray Golf Course as a community facility.
2. To develop the Westray Learning Centre.
3. To provide a Zero Waste Centre and Waste Transfer facility.
4. To retail Biofuels.
5. To eliminate fuel poverty.

Due to the change in focus of the Trust, Colin Risbridger (Former Trust Director and Renewable Energy Engineer) and Sam Harcus (currently a director of the Westray Development Trust, employee of Energy Action Westray and a local councillor) decided to use the company Energy Action Westray as a means to continue to deliver projects on Westray which reduce climate change in order to maintain the momentum built up over the years. Both organisations support each other fully and share the workload in community development with other community organisations on the island.

Energy Action Westray's aim is to deliver future projects which would reduce greenhouse gas emissions. The company was originally formed with funding from the Scottish Biomass Scheme to provide support to the biogas facility on the island by helping farmers consider the production of energy crops via a growers group. More recently EAW has become more involved in taking forward a strategy to achieve sustainability including establishing a target to reduce greenhouse gas emissions (GHG).

In 2009 Energy Action Westray received funding from the Climate Challenge Fund to develop this action plan to reduce the islands impact on greenhouse gases. This process involved an open day event hosted by Alan Caldwell Associates with presentations, workshops, and educational training. It was also followed up by telephone interviews to assess the carbon foot print of households using the Energy Saving Trust footprint calculator, quantifying island energy use via telephone audits, assessing food production levels, transport requirements, waste handling, and finally a ballot for an island wide target for GHG reduction. This community consultation formed the basis for this report.

The core aims of this report are:

- For Westray residents to understand the target and actions required to reduce our community contribution to greenhouse gas production.
- From recorded data, quantify as far as possible the scale of effort required to achieve such a target.

Once the sustainable action plan is launched we need to ensure that momentum is maintained and that everyone who signs up to the declaration is progressing in delivering the actions set out. It is important at this stage to reconfirm individual roles and responsibilities for each project. Sixty eight individuals and four businesses have signed up to become members of Energy Action Westray in 2009 and all have also committed to reducing emissions by 80% by 2050, as a result:

- Energy Action Westray is responsible (for making things happen).

- Those signing the declaration are accountable (and will make sure that a project or task is completed and a decision made).

- The whole Westray community will be consulted (about decisions to be taken on the plan and its targets, although not actually involved in the individual project or task).

- The community will be kept Informed via the www.care4energy.co.uk website (about decisions made).

Once the sustainable action plan programme is in operation and declarations are underway, Energy Action Westray will introduce comprehensive tracking and reporting processes in order to:

- Ensure that the overall plan and projects/actions within it are being implemented effectively.

- Enable the plan to be improved and optimised where appropriate.

- Provide data that can be used to inform a range of stakeholders about progress.

- Ensure that projects are meeting strategic objectives and moving the plan towards its vision.

This will be achieved by:

Holding annual reviews with all those involved in declaration activities. The review will be conducted either as a meeting with individuals or by receiving written confirmation of actions from those involved in delivery.

In order to help monitor progress we shall ensure that the emissions inventory is updated at regular annual intervals to help assess progress against targets. In this way it will be possible to track the progress of our local community against its desired emissions trajectory and towards the emissions reduction target set. It will also desirable, where possible, to measure the savings for each action implemented under the climate change action plan.

Finally to ensure that we sustain action on climate change and deliver long term reductions in greenhouse gas emissions we will also need to establish a mechanism for the review and revision of the action plan after an appropriate period of time. Our annual review will involve returning to the beginning of the process and revisiting all the questions that were initially asked, for example:

1. What are the main drivers (both internal and external) for us as a community to address climate change? Have these changed? Are there new regulations we have to meet?

2. Does our vision for greenhouse gas mitigation remain relevant and convincing? Do we need to update our strategy?

3. What is the scope of emissions to be included? Do we now want to broaden this? Does this mean we need to change/ expand the project team?

4. What new opportunities should we include in the action plan? Will these help us to meet our strategic objectives? Will they enable us to meet our carbon reduction target?

On-going monitoring will show the degree of conformity with the targets set in the plan. If the plan has not been achieved as expected, at the review point we will decide whether extra effort will be expended to get the plan back on track. We will also aim to establish whether our emissions targets are challenging enough or too demanding, and whether their timing should be adjusted.

The Sustainable Westray Action Plan

Energy Action Westray in writing this action plan have attempted for the first time to link the admirable but disparate community development projects together to formulate an island wide action plan with a primary focus to deliver a reduction in the greenhouse gases while creating a sustainable community. The five dimensions of the ideal sustainable community[2] are;

1. Increase local economic diversity
2. Self reliance
3. Reduction in the use of energy and careful management and recycling of waste products
4. Protection and enhancement of biological diversity and careful stewardship of natural resources
5. Social justice

These issues have come out in discussions in the workshop with specific examples given which could be grouped under one of the five community dimensions provided above.

Whilst we have community enthusiasm for the idea of a 'sustainable island' it may not be easy to gain acceptance for all solutions that are technically feasible therefore we have not specified any particular technologies in the action plan and concentrated on identifying the problem areas which need to be addressed and providing the opportunity for individuals and organisations to make their own declaration.

Critical to the success of the proposed sustainability plan in terms of energy issues will be the provision of energy not just in terms of electricity, but also for the provision of heat and transport. We will also have to look more seriously at reducing the impact our food production

[2] Bridger, J.C. and Luloff, A.E. (1999). Toward an interactional approach to sustainable community development. Journal of Rural Studies.

has on greenhouse gases whilst producing a wider variety of local foods. We will also have to step up our efforts to attain 'Zero Waste' by driving forward some exemplar projects. The initial projects identified in the action plan include;

1. **Increase the level of renewable energy on the island.**

- Maximise the potential of the Gallowhill location by constructing three 900kW wind turbines and investigate supplying this energy directly to those living on the island.
- Increase the biogas plant capacity on the island to utilise the nutrients in organic materials in order to minimise the import of chemical fertilisers whilst producing renewable energy and reducing GHG emissions from slurry management.
- Provide advice to householders and businesses as to how they can generate their own electricity from renewable energy and reduce energy use by energy efficiency.
- Work to provide a 'wind energy heating tariff' by selling the wind energy produced in the island directly at a discounted rate for islanders.
- Look into the feasibility of a renewable power and heating network in the village picking up the primary heat users at the school, bakery and crab factory.
- Improve all of the domestic building stock to attain a SAP rating of 60 or greater.
- Look into the potential of using digested fibre as a means of providing a renewable briquette type product to be used in coal fires.
- Create an Energy Heritage centre to show the changes in technology and disseminate good practice in GHG reduction.
- Eliminate fuel poverty by providing affordable energy from low GHG sources.

2. Promote and demonstrate 'Zero Emission' transport

- Develop a mobile heat station which can be used to transport heat around the island.
- Provide a means to access biogas as a road fuel. Undertake a number of community vehicle conversions to demonstrate the successful use of biomethane in a car, van, bus, HGV, and ferry.
- Market renewable road fuel products such as biomethane and biodiesel.
- Provide charging points for the existing and future electrically fuelled vehicles.
- Promote more energy efficient means of transport in the agricultural and fishing sectors.
- Work with Orkney Islands Council on 'pool cars' and 'many to one' to reduce single occupancy journeys on or to the island.

3. **Attain 'zero waste' on the island.**

- Provide a community facility to handle the transfer of waste materials from producers to treatment facilities with access provided to those interested in recycling.
- Provide a source segregated waste collection service.
- Provide a source segregated waste collection service.
- Investigate methods to utilise the waste seaweed washed up on our shores every year as a resource.

4. **Increase the diversity and quantity of food produced locally.**

- Create a community garden for food production and a space for generations to share knowledge.
- Establish the GHG footprint of the foods currently being produced on the island in addition to those imported to the island.
- Provide advice and support to those producing food locally.

5. **Improve on current methods of measuring GHG emissions.**

- Work with the Scottish Government to provide a more appropriate method to quantify the emissions associated with food prodcution and in particular beef cattle production.
- Design an appropriate system of measuring GHG emissions within the island boundary with clear rules on GHG associated with imports and exports.

6. **Build Strategic Partnerships.**

- Work with the Energy Saving Trust on the low carbon communities' programme.
- Work with Community Energy Scotland and Development Trust Association Scotland on the 'Powerdown' Initiative.
- Work with the local authority to feed into the community planning process.
- Work with everyone on the island to maximise the number of declaration to reduce GHG's.

Further human resource is now required to undertake both the projects identified above in addition to the additional ones highlighted by the local community in appendix 1 at the climate change event. These projects have been condensed into an action plan which summarises the content of this report.

At the moment Energy Action Westray have 0.6 FTE working on the 'Powerdown' project and the Westray Development Trust have 0.4 FTE working on fuel poverty and 0.2 FTE working on waste projects. In order to deliver many of these opportunities at least one additional FTE will be required to secure funding to begin the projects identified above to realise the targets.

Section 3 – Technical Background to Action Plan

Domestic Sector - Housing

There are 282 dwellings in Westray, of which 240 (85%) are currently occupied. This is the second highest occupancy percentage of the outer isles. The Council Tax Bands for all habitable properties are:

Band A	136	48%	Band D	22	8%
Band B	62	22%	Band E	10	3.5%
Band C	50	18%	Band F	2	0.5%

More properties are in higher bands than in most outer isles. House building and renovation have been continuous in the past 30 years. In addition there are 5 self-catering properties on Westray. There are also 36 council houses (15 x 3 bedrooms; 10 x 2; 10 x 1, 1 x 3 disabled) of which 4 have been purchased under the Right to Buy legislation. A number of domestic properties are also installing wind turbines, ground source heat pumps and air source heat pumps as the confidence in the technology has increased since the beginning of the renewable energy plan in 2002.

Figure 6 – 6kW household turbine at Cotterochan.

A fuel poverty mapping exercise conducted by Orkney Islands Council in 2005[3] identified the island of Westray as one of the areas within Orkney at risk from fuel poverty[4] due to the lack of access to cheaper fuels, older poorly insulated houses and low income levels.

After securing funding in 2008 from the Lottery and ScottishPower the Westray Development Trust embarked on a project to rid the island of fuel poverty. This led to a programme of surveying in 2009 whereby every house on the island is being offered an energy survey. Of the fifty six properties surveyed early in 2009 the average national home energy rating (NHER) is only 2.91 out of 10 and the standard assessment procedure (SAP) rating 42.04 out of 100. A recent EAGA partnership charitable trust report[5] suggested setting minimum SAP ratings for social housing in various locations across the country. In the area of Orkney and the North East the suggested figure is a SAP of 63 and as you can see most of the Westray properties would fail this standard suggesting there are many energy efficiency improvements to be made. The average weekly income in Orkney is £390 which would equate to an annual figure of £20,280 meaning up to £2,028 could be spend on fuel use in properties without dropping into fuel poverty. The average greenhouse gas emissions associated with heating and appliance use in the fifty six surveyed properties was 11.9 tonnes of CO_2.

The NHER rating system takes into account appliance use and location and is more appropriate in terms of measuring energy efficiency for the purpose of identifying fuel poverty. The NHER assessment generates an energy rating for a dwelling on a scale of 0 (poor) to 10 (excellent), based on the total energy costs per square metre of floor area required to achieve a standard heating regime (Weekdays 9hrs heating, Weekend heating 16 hours, Main living room

[3] Mapping Fuel Poverty at Ward and Sub-ward Level in Orkney, Final Report report prepared by Bill Sheldrick, Alembic Research, January 2005

[4] Fuel Poverty – Spending 10% of your disposable income or more on household energy needs.

[5] Wilkinson, B, 2007 - Energy Ratings and Affordability in Social Housing in Scotland and Northern Ireland a report for the EAGA Partnership Charitable Trust.

heated to 21 degrees Celsius and all other rooms at 18 degrees Celsius). The assessment procedure is not, therefore, based on what the household actually spends to maintain the heating regime of its choice, but on the theoretical costs of maintaining a standard regime for a standard level of occupancy, derived from knowledge of the appliances, fuel source, insulation, size and dwelling type of the premises.

The 2002 Scottish Housing Condition Survey (SHCS) identified a mean NHER score of the Scottish housing stock as being 4.5 with a standard deviation of 1.8. The mean SAP is 46.47 with a standard deviation of 16.24. Grouping the NHER scores together into bands, 14% of dwellings have a 'poor' energy rating (<2), 12% have a 'good' rating (>7), with the remaining 74% being 'moderate'. There are more dwellings with 'good' NHER scores than there were in the SHCS 1996.

Such a low average NHER rating of 2.91 for the properties surveyed in Westray demonstrates the failure of householders to improve the energy efficiency of their homes either due to the fact they are hard to treat or the fact that the supply chain often doesn't provide the same incentive in Westray as elsewhere in Scotland. Improving the NHER ratings is a huge opportunity to reduce GHG emissions from housing stock.

The Westray development trust programme of assistance includes benefits checks, advice on social tariffs and guidance to access funding for energy efficiency and renewable energy measures. This is similar to the recently launched Scottish Government Energy Assistance Package therefore the development trust, energy action Westray and the Energy Saving Scotland advice centre – Highlands & Islands are now working on a memorandum of understanding to improve the service level to islanders. The Westray Development Trust also secured £140,000 to put remedial measures into nine of the worst fuel poor properties late in 2009 including an innovative product nansulate paint for solid walls. This award came from the Energy Efficiency Design Awards via the Energy Saving Trust and will include an evaluation of nansulate at the Glasgow Caledonian University.

Current Situation

Energy Production and Consumption

Energy in Westray is either delivered by the 33kV undersea electricity network operated and owned by Scottish & Southern Energy to the local 1MW 33/11kV substation or it is brought in by roll on roll off ferry in road tankers.

There is no mains gas network on Westray and of the fifty one properties recently surveyed for fuel use; 23 were supplied by oil central heating; 15 with storage heating or off peak electricity; 9 on peak rate electricity; 2 with heat pumps and the remaining 2 were still supplied by coal. In addition 15 of the 56 households used bottled gas for cooking.

Local energy generation includes a number of household ground and air source heat pumps in addition to heat pumps in the local care centre and parish church building. The care centre is also supplied with solar hot water and a 6kW wind turbine supplies electricity. The parish church building also has a 6kW wind turbine and a Biodiesel standby generator. There are two

additional domestic 6kW wind turbines on the island and the Westray Development Trust owns a further 6kW wind turbine supplying the Westray Processors Shellfish factory, a 2.5kW turbine supplying the Hofn youth centre and a 2.5kW machine supplying the Rapness ferry terminal. The Trust turbines are to supply and charge a community electric vehicle although the vehicle has been plagued with problems and remains unused. Two farm biogas plants are operated by Heat and Power Limited using biogas to treat farm waste materials and the use of biogas for electricity production and further cleaning for use as a road fuel is being investigated. Work has also been completed on a third digester, this time a batch plant to be used for treating other organic wastes. Planning permission has been granted for 3 x 900 kW wind turbines and the first of these is being built this year by Westray Renewable Energy a subsidiary of the Westray Development Trust. The additional two are planned for 2010. Orkney Biofuels Limited another subsidiary of the Trust continue to produce Biodiesel from waste vegetable oil and trial its use in private vehicles. The plan in 2009 is to offer the fuel to the public via a dispensing pump at the local shop. A wide variety of expertise exists on the island in terms of renewable energy production but to achieve the targets for GHG reduction there will need to be a considerable step change in activity.

The household carbon foot printing exercise was conducted on Westray by telephone interviews to populate the carbon foot printing tool provided by the Energy Saving Trust[6]. More than 50% of the households on the island took part in the exercise with an average carbon footprint of 13.05 tonnes of CO_2 and a standard deviation of 5.71 tonnes. The high level of standard deviation reflects the variability in the data due to different occupancy levels, house types, appliance numbers and availability of transport. The average greenhouse gas emissions associated with heating and appliance use in the fifty six NHER surveyed properties was 11.9 tonnes of CO_2.

Using the assumption of 240 households on the island in 2009 with an average CO_2 footprint of 13.05 tonnes each this equates to a total household emission rate of 3,132 tonnes.

Included in this assumption is the electricity consumption on the island 4,721,920 kWh per annum recorded at the island substation which using the national emission rates for electricity would account for 2,030 tonnes of CO_2. This figure includes household electricity use in addition to commercial and industrial electricity use and the small amount used to charge the communities electric car.

Looking at the liquid fuel use on the island the aggregated total of deliveries of kerosene, diesel (white and red) and petrol equates to 12,295,600 kWh of delivered energy to the island. These fuels are mostly used in agriculture as red diesel with smaller amounts used in fishing. Diesel and petrol are supplied at the local merchants and kerosene is commonly used for heating homes and in industry. A limited quantity in the region of 12,000 litres of Biodiesel is manufactured from waste vegetable oil which would save 32.7 tonnes of CO_2. Again using an average carbon content of 0.26 kg CO_2/kWh would mean emissions of 3,197 tonnes of CO_2 for liquid fuels.

Food Production and Consumption

[6] www.energysavingtrust.co.uk

The food produced locally is mainly for export with a large number of beef cattle on the island. Westray is the second largest parish in terms of cattle numbers within the Orkney Islands. Beef cattle are generally raised as store cattle within the isles where they are sold between 12-18 months of age typically at the Orkney Auction Mart and are bought by farmers on the mainland to be fattened on cereals before going to the abattoir. A limited number of cattle are slaughtered locally at the Orkney Meat abattoir but most of the Westray cattle are shipped South.

Census category	CPLAN category	Total number
Beef cows & heifers in milk	Breeding cattle	2,402
Beef cows in calf	Breeding cattle	195
Beef cows & heifers in calf over 2yrs	Breeding cattle	116
Bulls for service over 2yrs	Breeding cattle	91
Other male cattle over 2yrs	>2	129
Beef cattle for breeding over 2yrs	>2	58
Female cattle not for breeding over 2yrs	>2	56
Beef cows & heifers in calf under 2yrs	1 to 2	52
Bulls for service under 2yrs	1 to 2	8
Other male cattle under 2yrs	1 to 2	943
Beef cattle for breeding under 2yrs	1 to 2	218
Female cattle not for breeding under 2yr	1 to 2	771
Male cattle 6 months to under 1yr	<1	218
Female cattle 6 months to under 1yr	<1	206
Male cattle under 6mths	<1	1,133
Female cattle under 6mths	<1	1,029

Figure 7 - Number of beef animals recorded in the June 2005 census as present on Westray and the classification into age related groups for inclusion in the CPLAN model.

A combined total of 7,625 beef animals were recorded as present on Westray at that time (note that the total in the census report was recorded as 7,639 without any explanation of the difference). A total of 2,856 breeding cattle were recorded; 251 animals over 2 years of age; 1932 aged between 1 and 2 years and 2586 less than one year old.

The farms raising these animals often produce other local foods including potatoes and lamb. Farms are permitted to slaughter animals for their own consumption however if they are to supply meat locally to anyone other than themselves the animals have to travel by boat to Kirkwall to be butchered.

There is also a bakery on the island, WFM Brown which exports bakery products to the mainland along with an organic salmon farm, Westray Salmon who have 150,000 fish in the water selling in the region of 100,000 annually. There are also shellfish processors G Costie and Westray Processors and fin fish processors, Pierowall Fish. Food production accounted for 39% of employment on the island in 2003.

Consumption of food apart from that which is consumed on farms is typically bought in the local shops or bought during trips to the Orkney mainland. Limited amounts of food are grown in gardens for home use. There is a huge opportunity to increase the amount of food grown for local consumption on Westray by diversifying from the traditional food production.

Waste Production, Treatment and Handling

Approximately 14,000 tonnes of municipal waste are produced in Orkney every year and 10,000 tonnes of this is shipped to Shetland, where it is processed through the Green head energy from waste plant to provide district heating in Lerwick. The Council is committed to achieving the Scottish Executive recycling targets of:

· 25% by 2006
· 30% by 2008
· 55% by 2020

Various recycling schemes have been set up in the county through Council, voluntary and community initiatives, including:-

- Bottle banks and can banks for both aluminium and steel cans
- Mini recycling centres on 10 islands and mainland rural areas
- Kerbside collection scheme for collection of glass and paper from mainland towns, villages and rural settlements
- Glass, cans and cooking oil collected from hotels, clubs and restaurants by OIC
- Westray Development Trust processes waste cooking oil into biodiesel for use in the community bus
- Local company, Orkney Flaked Bedding, shreds waste paper to produce compost bedding for livestock

By increasing the percentage of recycled waste, the effect of waste on greenhouse gas production is reduced.

The municipal waste stream in Westray was sampled in 2005[7]. This sample collection weighed 2.4 tonnes, with 600kgs being randomly removed for auditing, to give a 25% sample. Approximately 120 bags were removed, giving a total of around 480 bags for the total municipal collection for one week. Of those removed, 23 were beige trade waste bags that were not included in the audit, but the remaining 97 bags were subsequently sorted into 91.5 bags of separated waste streams. Results from this audit are given in Figure 8.

The 9 sorted waste streams included plastic, paper, organics, cans and tins, glass, textiles, disposable nappies, bulk granular wastes, and miscellaneous electrical materials. The relative weight of the separated waste streams can be put on a rising scale – cans<plastic<paper<glass<organics. Assuming the weight of an average, unsorted black bag is approximately 5kg (600kg/120bags), deducting trade waste bags gives 485kg for the 91.5 sorted

[7] WESTRAY WASTE MANAGEMENT REPORT - An investigation into the organic municipal waste stream in Westray and the establishment of an economically viable utilisation system – Skapa Mining Services 2005

bags. By making assumptions using the relative weight scale for each waste stream, we can allocate approximate weight percentages to the different sorted wastes.

Type	No. of Bags	Volume%	Est. Wt/bag kgs	Total Wt kgs	Wt %
Plastics	28	30.60	4	112	22.65
Paper	25	27.32	6	150	30.33
Organic	11	12.02	8	88	17.80
Cans/tins	8	8.74	3	24	4.85
Glass	7	7.65	7	49	9.91
Textiles	5	5.46	5	25	5.06
Nappies	3	3.28	6	18	3.64
Ash etc	3	3.28	7	21	4.25
Electrical	1.5	1.64	5	7.5	1.52
Totals	**91.5**	**100**		**494.5**	**100**

Figure 8 - Results of the Physical Waste Audit of Westray Municipal Waste 2005

Plastic was the biggest component of the bagged wastes by volume, accounting for over 30%, but this is a relatively light waste, and makes up less than 23% by weight. All types of plastic were collected together, including polystyrene, hard and soft plastic bottles, bags, packaging, tubs and pots, toys and household items.

In contrast, paper and card accounts for 27% by volume of the sampled waste, but more than 30% by weight. This includes all types of paper/card, including newsprint, magazines, cardboard boxes, cartons and packaging. As many people already segregate some of their waste paper, taking it to the OIC mini-recycling centre, the amount of paper in the black bags is probably less than what is actually produced. The fact that paper segregation is already an accepted domestic activity bodes well for introducing a separate paper collection system.

As well as aluminium cans and food tins, this stream also included foil trays, baking foil, metal aerosols, paint tins, oil-cans and bottles and various miscellaneous metallic material. This was distinct from the one and a half bags of miscellaneous goods, which included various electrical appliances, smoke alarms, stereos, speakers, wire, plugs and batteries, including 2 large Zn/Cd batteries.

The separated glass included bottles, jars, broken glasses, crockery, window glass and mirrors. The textiles category, which included clothes, shoes, material and wool, may be skewed given that this particular waste collection from Westray contained many, full commercial spools of wool, suggesting a one-off clearance of old or unwanted stock. The 3 bags of disposable nappies also included incontinence pads, and the 3 bags of bulk granular waste included material such as fire-ash, cat litter, vacuum bag contents and crushed plaster-board.

The 11 bags of organic material make up 12% by volume, but as it is heavy, is nearly 18% by weight. Most of the organics was food wastes including potato-peelings, banana skins, orange/tangerine peel, bones and chicken carcasses, bacon, crab shells, bread and bread rolls, sugar, flour, biscuits, cooking oil, coffee granules and tea-bags. Meat waste accounts for less

than 20% of the total. Other materials in the organic stream were dog faeces, some garden waste – grass, cuttings and houseplants (sometimes including potting mix, occasionally with the pots!), and wood.

Some of the kitchen waste is partially separated, but most is intimately intermixed with the packaging it came in, plastic wrap, polystyrene, paper and card, cans, plastic tubs and pots, cartons etc. Cat and dog food is often still in the cans and foil pouches that they come in.

If the island is to have a segregated organic waste collection either as a feed for an anaerobic digester or for composting, a concerted effort will be required to educate householders to be more meticulous in removing packaging when separating food waste.

With an average weekly collection of 2.4 tonnes the annual tonnage of municipal waste from Westray being shipped to Kirkwall, before being shipped on to Shetland to the Waste to Energy plant is in the region of 120 tonnes.

Transport inter and intra island

Transport is a vital part of everyday life for Orkney. The Council has a new Local Transport Strategy, which details how they intend to deliver on national objectives at a local level, and provides an action plan for meeting local challenges and objectives. One part of this multifaceted Strategy is to improve accessibility to/from the mainland and other isles. This will invariably necessitate new ferries coming into the network, and could include a greater or lesser use of air services in the transport mix. New and cascaded ferries around the network will provide for enhancements across the network that will deliver social and economic benefits to the isles. New ferries will be inherently more efficient then their existing counterparts. Due to new regulations for vessels and also to address existing capacity constraints, there will likely be an increase in vessels size and consequently fuel consumption but hopefully a switch to more renewable fuels can offset the GHG emissions associated with ferry use.

At the moment the island is served by an air service (8 seater) and a roll on roll off ferry service. The plane uses 50 litres of fuel per return journey and makes 12 return journeys each week. The island is also served by a roll on roll off ferry service providing for those wishing to visit Westray as well as those travelling from Westray. The annual consumption of the ferry service providing two return trips in the winter and three return trips in the summer is 15,260,000 kWh. We attribute 50% of this to the island and 50% to the mainland.

On the island most of the travel is by car as there is no public transport service to speak of. Buses are provided from the ferry to the village and there is also a tour business operating on the island, however most locals have more than one car to enable them to live on the island. A large number of these vehicles are higher emission older vehicles as there is no requirement to have an MOT on the island as there is no local MOT station. Often islanders have one car for use on the island and another which they use to travel onto the Orkney mainland. Goods are transported via the island haulier, R Rendall & Co who travels daily on the ferry shipping goods and services.

Included in the goods transported each year are 3,000 cattle at approximately 500kg each. An 11m lorry travels 6 days a week transporting 20 tonnes of goods with a larger bulker travelling 3 days per week carrying 40 tonnes from Kirkwall and 15 tonnes of goods into Kirkwall. A cattle float vehicle is used for a five month period, six days per week carrying 40

tonnes in and 20 tonnes out to Westray. A van also travels in six days a week with a trailer carrying 5 tonnes of goods to Westray. A 13.8m arctic lorry also travels in 4 days per week with salmon carrying 20 tonnes into Kirkwall returning with 35 tonnes of goods.

Pierowall Fish also travel with a van of goods once per week. Farmers will carry on average 1,000 tonnes of goods in their own vehicles in a year. G Seatter also carries on average 7 tonnes of goods into Kirkwall once a week returning with 15 tonnes and the fuel lorries carry 15,000 litres of oil each time they visit.

Greenhouse gases in Westray

Introduction to greenhouse gases

In order to manage a system it is necessary to measure the components you want to manage. GHGs can be measured directly in the soil-plant-animal components of a farm or unit of land, or in the generation of energy but this is impractical and expensive to do at more than few sites. Consequently in the early 1990s indirect methods to estimate changes in GHGs due to agricultural activities were developed, so that national GHG emissions inventories could be compiled. Similar activity was also undertaken for energy, transport and waste. It was necessary that these methods used simple, readily available data to calculate the emissions, since they were to be used all over the world to meet United Nations Framework Convention on Climate Change (UNFCCC) reporting requirements. The Intergovernmental Panel on Climate Change (IPCC) is a scientific body tasked to evaluate the risk of climate change caused by human activity. The panel was established in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP), two organisations of the United Nations. The IPCC was charged with this task and in 1997 published the "1996 Revised Guidelines for National Greenhouse Gas Inventories" (IPCC, 1997).

For agriculture, this provided methods to account for non-CO_2 GHG emissions (N_2O and CH_4), and in a separate section (on land use, land-use change and forestry; LULUCF), to account for CO_2 emissions resulting from loss (or gains) in soil organic carbon (SOC). The non-CO_2 GHG emissions are calculated using emission factors (EFs) based on such factors as the amount of nitrogen fertiliser applied, or the number of livestock of different categories kept on farms. The estimates of soil organic matter to CO_2 ratios were based on changes in land use and changes in intensity of management and tillage, broken down by five soil categories (IPCC, 1997). The methods provide the default Tier 1 approach described above, but also allow countries to develop either their own country / region specific emission factors (termed Tier 2 approach), or to use more complex systems (such as spatially disaggregated ecosystem models) to calculate fluxes (termed Tier 3 method).

It was widely recognised that the IPCC guidelines provided the best, widely applicable default methodology and, as such, were suitable for global use in compiling national greenhouse gas inventories. The guidelines may also be of use in more narrowly-defined project based estimates, although it is noted they should be used with caution to ensure they correctly include just the emissions and removals from within the system boundaries. In order to compare across systems producing more than one GHG, a method to calculate the so-called global warming potential of each greenhouse gas was developed. Essentially all GHGs are compared in terms of

equivalents to CO_2. The concept of a global warming potential (GWP) was developed to compare the ability of each greenhouse gas to trap heat in the atmosphere relative to another gas. The definition of a GWP for a particular greenhouse gas is the ratio of heat trapped by one unit mass of the greenhouse gas to that of one unit mass of CO_2 over a specified time period.

The GWP for the three main GHGs over a 100 year time span are: CO_2 = GWP 1 CH_4 = GWP 25 N_2O = GWP 298. Put simply the emissions of CH_4 are multiplied by 25 are expressed as CO_2 equivalents. Sometimes it is desirable to express GHG emissions as carbon equivalents i.e. multiply CO_2 equivalents by 0.273 to convert into carbon equivalents (Ceq).

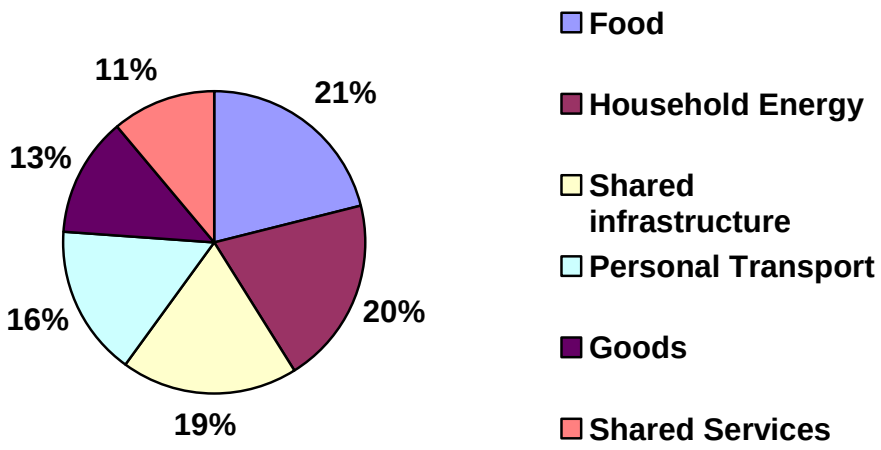

Figure 9 – CO_2 Emissions in the UK[8]

The categories used above include food production (21%) which includes the energy required to produce and distribute food; household energy consumption (20%) heating, electricity and building materials; shared infrastructure (19%) the embodied CO_2 of all buildings and facilities other than homes; personal transport (16%) commuting, shopping and private travel; goods (13%) the embodied CO_2 of all consumer items except food, both domestic and industrial and finally shared services (11%) which includes energy consumption in schools, offices, hospitals and public buildings.

Greenhouse gas emission on Westray

Work by Highlands & Islands Enterprise (HIE) in June 2007[9] on a theoretical island suggested that each islander is likely to average about 9.50 tonnes of CO_2 per annum, compared to the UK average of 10.62 tonnes[10]. High emissions associated with ferry use are more than out weighted by the lower than UK average levels of consumption of goods and services however it was interesting to note that tourism is assumed to add 10% to the overall carbon footprint of the theoretical island modelled.

[8] Stockholm Environmental Insitute

[9] Alex Walker & Associates (2007), Establishing a Carbon Neutral Island, A report for Highlands and Islands Enterprise and the Highlands and Islands Community Energy Company.

[10] www.carbontrust.co.uk

Of the total 9.50 tonnes of 'direct emissions', electricity use, space and water heating, and the impact of food and vehicle use amount to about 45% of the total footprint. Through the introduction of renewable technologies and changes in lifestyle the reports authors believed carbon emissions could be eliminated.

The remaining 55% are 'direct emissions' associated with the consumption of goods and services – including air travel, centrally managed services and ferries – over which islands have little or no direct control. The report concludes, unless we make assumptions about changes in society as a whole, these emissions will need to be 'offset' to create a carbon neutral island.

What the HIE report failed to include was the other greenhouse gas emissions associated with island life and in the case of Westray this report clearly shows the non carbon dioxide emissions actually could be responsible for most of the islands impact.

The household carbon foot printing exercise was conducted on Westray by telephone interviews to populate the carbon footprinting tool provided by the Energy Saving Trust[11]. More than 50% of the households on the island took part in the exercise with an average carbon footprint of 13.05 tonnes of CO_2 and a standard deviation of 5.71 tonnes. The high level of standard deviation reflects the variability in the data due to different occupancy levels, house types, appliance numbers and availability of transport. The average greenhouse gas emissions associated with heating and appliance use in the fifty six NHER surveyed properties was 11.9 tonnes of CO_2.

Using the assumption of 240 households on the island in 2009 with an average CO_2 footprint of 13.05 tonnes each this equates to a total household emission rate of 3,132 tonnes.

Included in this assumption is the electricity consumption on the island 4,721,920 kWh per annum which using the national emission rates for electricity would account for 2,030 tonnes of CO_2. This figure includes household electricity use in addition to commercial and industrial electricity use and the small amount used to charge the communities electric car.

Looking at the liquid fuel use on the island the aggregated total of deliveries of kerosene, diesel (white and red) and petrol equates to 12,295,600 kWh of delivered energy to the island. These fuels are mostly used in agriculture as red diesel with smaller amounts used in fishing. Diesel and petrol are supplied at the local merchants and kerosene is commonly used for heating homes and in industry. A limited quantity in the region of 12,000 litres of Biodiesel is manufactured from waste vegetable oil which would save 32.7 tonnes of CO_2. Again using an average carbon content of 0.26 kg CO_2/kWh would mean emissions of 3,197 tonnes of CO_2.

The island air service uses 50 litres of fuel per return journey and makes 12 return journeys per week which equates to an annual energy use of 315,180 kWh and 75.6 tonnes of CO_2. The island is also served by a roll on roll off ferry service providing for those wishing to visit Westray as well as those travelling from Westray. The annual consumption of the ferry service providing two return trips in the winter and three return trips in the summer is 15,260,000 kWh. We attribute 50% of this to the island and 50% to the mainland. This means the ferry service accounts for 7,630,000 kWh of energy or 1,907 tonnes of CO_2.

[11] www.energysavingtrust.co.uk

The varied nature of Scottish farms in comparison to those in Westray means that policy based on average data may not be the most appropriate approach to measure the GHG emissions from food production. For example, environmental conditions can vary enormously in terms of soil characteristics, topography and micro-climate. Identical activities, consequently, can generate different emission profiles at different locations. Similarly, for a given activity, management can vary in terms of, for example, livestock breeds, cultivar types or intensity of nutrient application – all of which may generate different emission profiles from identical environmental conditions.

Recently published web based GHG accounting tools for agriculture, based heavily on the well-established methods of IPCC (e.g. CPLAN at www.cplan.org.uk, CALM www.cla.org.uk), now enable simple direct GHG accounting by land managers. Both tools use extensions of the basic IPCC methods and a study of greenhouse gases on a Scottish mixed farm compared the CPLAN v1 model with the much used DNDCv9.1 model. The estimates from CPLAN using simple Tier 1 IPCC emission factors modified for UK farming conditions gave robust estimates of farm scale GHG exchange which were at least as good as using the more complex model with the data provided. A typical Westray farm was input into the CPLAN calculator and the information was extrapolated to include island wide figures for the largest food production area – beef cattle.

This report produced contained an analysis of the data and knowledge currently held by Energy Action Westray Ltd to estimate the greenhouse gas (GHG) budget from farms on the island of Westray, Orkney, Scotland, UK. Knowledge of the GHG budget of farms is a prerequisite to evaluating mitigation options. While it is possible to estimate some elements of the GHG budget from the data held by Energy Action Westray Ltd, there is insufficient detail on the farming activities to provide robust estimates or offer specific mitigation advice. No data were available to estimate the emissions or sequestration from energy and fuel use or land use change for the island. Although some data were available for other relevant categories, e.g. fertiliser and animal numbers, they were of insufficient detail to allow reliable estimates of GHG budgets for farms on Westray. While this report provides indicative values for GHG emissions from the available data, no attempt has been made to estimate a full GHG budget from the farms on Westray as the lack of data would seriously compromise any such estimate.

In order to provide a robust estimate the greenhouse gas budget of Westray farms and offer mitigation advise further funding has been sought to examine a sub-sample of Westray farmers and crofters to provided detailed data which can be used within an IPCC compliant model e.g. CPLAN v2. This project will be carried out later in 2009.

A combined total of 7,625 beef animals were recorded as present on Westray at that time (note that the total in the census report was recorded as 7,639 without any explanation of the difference). A total of 2856 breeding cattle were recorded; 251 animals over 2 years of age; 1932 aged between 1 and 2 years and 2586 less than one year old.

Greenhouse gas		Breeding Cattle	Aged >2	Aged 1 to 2	Aged <1
CH_4	**Average**	**143**	**13**	**108**	**92**
	Lower estimate	115	11	88	75
	Upper estimate	169	16	127	110
N_2O	**Average**	**11**	**0.6**	**5.3**	**4.8**
	Lower estimate	0.53	0.03	0.27	0.24
	Upper estimate	53	3.2	27	24
CO_2eq	**Average**	**6690**	**521**	**4267**	**3732**
	Lower estimate	1293	139	1139	961
	Upper estimate	20905	1383	11337	10110

Figure 10 - Greenhouse gas emissions (tonnes) attributed to beef animals on Westray as of June 2005 (see Figure 7 for full description of cattle categories).

As a result of the multiplier affect due to GWP the estimated total CO_2 equivalent (CO_2eq) for the beef herd of Westray is 15,209 tonnes, with 8,886 tonnes attributed to CH_4 emissions and 6,323 tonnes attributed to N_2O emissions. As you can see there is a huge variation between the upper and lower estimates and more detail on the animal husbandry and manure management techniques on Westray would enable mitigation options like feeding regimes to be considered.

Greenhouse gas		Ammonium nitrate	10:20:10	20:10:10
Nitrous oxide (N_2O)	**Average**	**12.3**	**3.6**	**7.1**
	Lower estimate	0.62	0.18	0.36
	Upper estimate	62	18	36
Carbon dioxide equivalents (CO_2eq)	**Average**	**3667**	**1063**	**2126**
	Lower estimate	184	53	107
	Upper estimate	18393	5331	10663

Figure 11 - GHG emission estimated for 1,200 tonnes of three types of inorganic fertiliser shipped to Westray, Orkney, Scotland.

Under the IPCC recommendations for national inventories, it is assumed that the CO_2 sequestrated by crops is re-emitted to the atmosphere within a short period (e.g. 1 or 2 years) and is ignored from the calculations. However there is an N_2O emission from the soil related to the crop residue following harvest being left on the land or ploughed in.

Crop Type	Crop_Code	Field / Parcels	Total area (ha)
Unclaimed		179	469.385
Grass over 5 years	PGRS	736	2232.03
Grass under 5 years	TGRS	527	1517.954
Rough Grazing	RGR	92	726.08
Spring Barley	SB	23	86.833
Spring Oats	SO	4	5.846
Mixed Cereal	MC	3	4.291
total			5042.419

Figure 12 - Area of land claimed as cropped in 2007/08 census to the Scottish Government.

Only 97 ha of harvestable crops was claimed to be growing in 2007/08 on Westray (Figure 12). To correct for soil type and other environmental variation, the IPCC emission factors are given per unit of yield (t/ha) rather than on area. Assuming an average yield of 5 t/ha for all crops provides an estimated yield of 21 tonnes mixed cereals, 29 tonnes oats and 434 tonnes spring barley. The GHG emission from crop residues for Westray crops is estimated to be a minor source of GHGs (Figure 11). An average estimate of only 0.15 tonnes of N_2O, or 44.5 tonnes CO_2eq, is estimated for the year 2007/08 given the assumptions detailed above.

GHG		Mixed Cereal	Spring Oats	Spring Barley
N_2O	**Average**	**0.01**	**0.01**	**0.13**
	lower estimate	0	0	0.1
	Upper estimate	0.04	0.05	0.66
CO_2eq	**Average**	**2.52**	**2.83**	**39.1**
	lower estimate	0.13	0.14	1.96
	Upper estimate	13	14	196

Figure 13 - Nitrous oxide (and carbon dioxide equivalent) emissions estimated from 97 ha of arable crops on Westray 2007/08 assuming an average yield of 5 t/ha.

Data was provided for only three of the seven categories necessary to calculate the GHG account for Westray. The three elements of the GHG budget estimated from the available data suggest that the contributions of livestock is in the order of 15,000 t CO2eq, while fertilizer may contribute around 3,000 t CO2eq, and crop residues around 45 t CO2eq. There is very considerable uncertainty in these estimates. This analysis shows the government held data is insufficient to calculate robust GHG budgets for either individual farms or for aggregated regional estimates at the island level.

These data do however indicate that out of the 25,250 tonnes of CO_2 equvalent emissions on the island farming is likely to be a major source of GHG on the island.

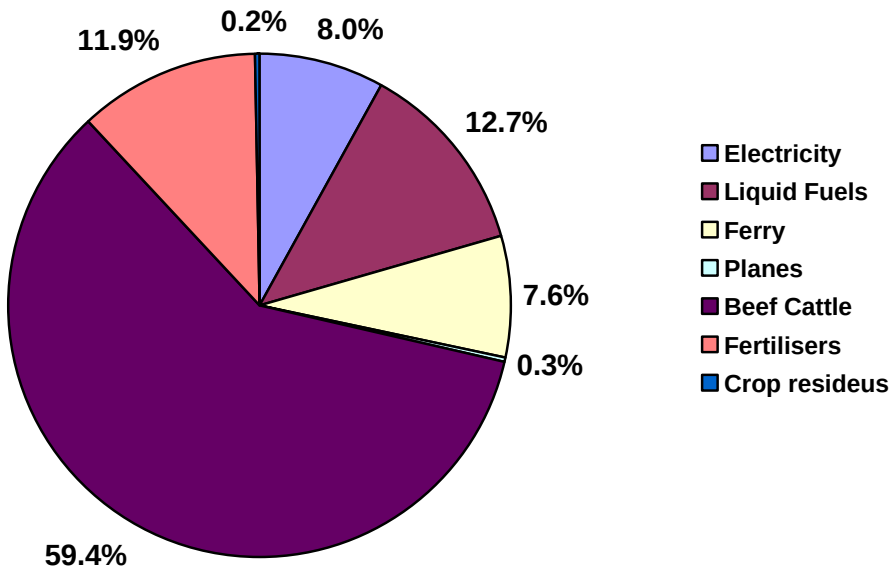

Figure 14 – CO_2 equivalent emissions on Westray 2009

Greenhouse Gas Emissions on Orkney

The Northern & Western Isles Energy Efficiency Advice Centre now known as the Orkney Energy Agency conducted an energy audit in Orkney during 2003-04. This was the third Orkney energy audit to be carried out. The original audit took place in 1991 and referred to data for the year 1990. The second audit was carried out in 1996 and again drew on data collected for the preceding year. The purpose of the audit is to identify the main fuel sources consumed within the Orkney Islands group quantifying local energy production and then identifying the balance of energy supplies imported from out with the county. All the data used in this report refers to the year 2002-03.

2003	Petroleum	LPG	Solid Fuel	Electricity	Totals
Primary Energy Consumption	1,453,618	5,632	205,356	566,784	2,231,390 GJ
% Total Demand	65%	0.25%	9%	25%	100%
CO_2 (Tonnes)	99,701	329	17,324	50,552	167,906 Tonnes CO_2

1995	Petroleum	LPG	Solid Fuel	Electricity	Totals
Primary Energy Consumption	1,393,608	5,632	312,920	445,464	2,157,624 GJ
% Total Demand	65%	0.26%	15%	21%	100%
CO_2 (Tonnes)	95,657	329	26,367	46,216	168,569 Tonnes CO_2

1990	Petroleum	LPG	Solid Fuel	Electricity	Totals
Primary Energy Consumption	1,209,899	5,632	312,421	402,264	1,930,215 GJ
% Total Demand	63%	0.29%	16%	21%	100%
CO_2 (Tonnes)	83,075	329	26,313	45,167	154,884 Tonnes CO_2

Figure 15 – Orkney Energy Audit 2003-04

Orkney Islands Council recognises the key role they play in protecting and developing the social, economic and environmental wellbeing of the county. The Carbon Management Programme strategy and implementation plan of May 2007 identified the level of Greenhouse Gas Production, which is a direct result of OIC operations was approximately 30,000 tonnes a year. The Carbon Management Programme gives them the opportunity to look at how they use energy and fuel and where possible look for alternative low carbon options.

By implementing the projects included in this strategy, they will achieve an 11% reduction in Carbon emissions over the ten year life of this programme. As fuel costs are anticipated to remain high in coming years, the value of low carbon options can have a significant positive impact on revenue costs. By projecting fuel and energy costs for the coming years, it is anticipated that the implementation of Carbon Management could save the Council 20% of our annual spend.

Baseline Emissions		CO_2 Tonnes	Total
Buildings	Electricity	4,870	
	Fossil Fuel	4,080	
	Water	40	
	Waste	870	9,860
Transport	Ferries	7,270	
	Tugs & Harbour craft	3,650	
	Business Travel (Air)	200	
	Business Travel (Car)	290	11,410
Public Transport	Inter Islands Air	380	
	Bus	320	700
Fleet	OIC Fleet	3,190	
	Quarries	1,160	4,350
Street Lighting		360	360
Commuting		1,830	1,830
			28,510

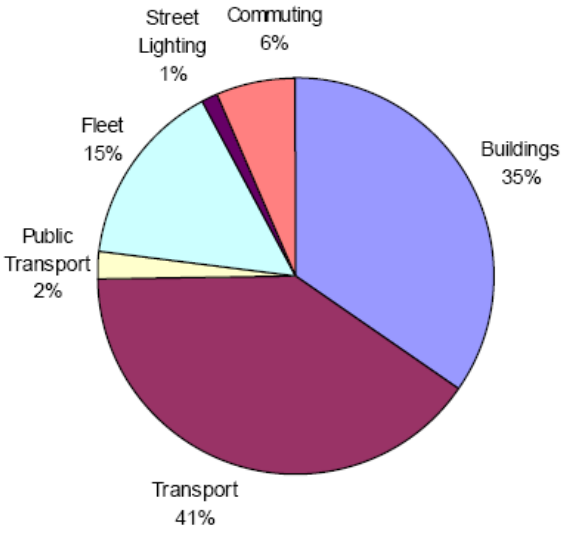

Figure 16 – Orkney Islands Council Greenhouse Gas Emissions 2007

As you can see neither piece of work includes emissions outside those from energy and the Orkney Islands Councils own activities. The 2008 Economic Review suggests that there were 87,265 cattle which is nearly 11 times that found in Westray. On a very crude assessment this means there would be 165,000 tonnes of CO_2 equivalent associated with beef cattle in Orkney and in addition to this a further 33,000 tonnes of CO_2 associated with fertiliser use.

Energy Use and beef cattle production appear to contribute approximately the same in terms of emissions. As you can see there is a need for further work to understand more fully the GHG emissions associated with Orkney life. Disappointingly the Sustainable Energy Strategy published by the Orkney Islands Council in 2009 makes no effort to estimate the GHG emissions in Orkney.

Greenhouse Gas Emissions in Scotland

The Scottish Parliament produced a SPICE briefing in 2009 which summarised the government's commitments with regard to the climate change bill in Scotland; included in the briefing was the following points;

- Evidence on climate change is now regarded by the world experts as "unequivocal".
- The concentration of CO_2 in the atmosphere is higher now than at any time over the past 650,000 years, and "the recent rate of change is dramatic and unprecedented"
- Emissions reductions of 50-85% are necessary to limit temperature rises to 2.0-2.4^{o}C
- The SNP 2007 Manifesto included a commitment to legislation containing "carbon reduction targets of 3% per annum". The Scottish Government has a commitment to reducing emissions by 2011
- The average decrease in emissions in Scotland since 1990 has been 1.23% though the latest figures showed a 5.4% increase between 2005 and 2006
- The Scottish Government consulted on emissions reduction targets, advice reporting mechanisms and duties on public bodies in January 2008 – 21,000 responses received
- Other consultations relevant to the Bill were carried out later – some were not complete at time of the Bill introduction, others remain uncompleted at publication of this briefing
- The Scottish Climate Change Bill was introduced on 4 December 2008
- The Bill sits within the context of the UK Climate Change Act 2008
- The Bill covers five main policy areas: Emissions reduction targets for greenhouse gases; Advisory functions; Reporting duties; Duties of public bodies relating to climate change; Measures to adapt to climate change and achieve targets
- The Bill sets emissions reduction targets of at least 80% reductions (on a baseline) by 2050, and an interim target of 50% by 2030 – the targets are for the 6 greenhouse gases included in existing international agreements
- The Bill requires annual targets to be set from 2010. These are to be more stringent year on year but with no prescribed limit until 2019, after which they should result in emissions cuts of at least 3% year on year – annual targets will be set in batches of years
- Targets are based on emissions from Scotland, rather than emissions from goods and services consumed in Scotland. Targets are "point in time" rather than relating to all emissions which Scotland could release on an equitable basis to 2050
- The Government is required to take advice before setting annual targets – initially this will come from the UK Committee on Climate Change, but the Bill allows for another body to take on this role, or for a Scottish Committee on Climate Change to be established
- The Bill allows for international credits to count towards the Scottish targets and prescribes no limit on this (the UK Act does require a limit to be set for the UK target)
- The Bill will include international aviation and shipping in Scottish targets, though this will be by order – the Scottish Government is committed to this
- The Bill requires that reporting on the annual, interim and 2050 targets are made to the Scottish Parliament, together with a report on how any excess emissions can be compensated in subsequent years

- The Bill gives Scottish Ministers powers to place climate change duties on public bodies
- Provisions are included to: require Scottish Ministers to publish a programme to address climate change risks; vary permitted times for muirburn; modify functions of Forestry Commissioners to participate in joint ventures for renewable energy, and to release capital from the National Forest Estate; require Scottish Ministers to publish an energy efficiency action plan; extend the role of Energy Performance Certificates in non domestic buildings; promote use of heat from renewable sources; give Scottish Ministers powers to make waste regulations.

There are significant recent global, European and United Kingdom developments which give context to the Bill.

• Global level – The current Kyoto Protocol contains commitments to reduce greenhouse gas emissions up to 2012. At the United Nations Climate Change Conference in Poznań (which concluded on 13 December 2008) some progress was made - it was agreed that the first draft of a concrete negotiating text would be available at a United Nations Framework Convention on Climate Change (UNFCCC) gathering in Bonn in June of 2009, with a view to a final agreement being made in Copenhagen in December 2009 (UNFCCC 2008), where leaders are committed to trying to achieve a comprehensive global deal which can be ratified by all

• European level – the European Union has just agreed a new package of climate change and energy measures. The main elements of the package are: reducing greenhouse gas emissions by 20% (30% if a global deal is reached in Copenhagen in 2009, and based on current Kyoto baselines); increasing the proportion of renewable energies to 20%; making energy savings of 20%. These three targets are supported by a package of four elements: an emissions trading scheme, a fair distribution of effort between countries, promotion of renewable energies and CO2capture and storage

• The UK Climate Change Act received Royal Assent in November 2008. Some of the aspects of the Bill were considered in a Scottish Parliament under a Legislative Consent Memorandum by the Transport, Infrastructure and Climate Change Committee (2008c) and in the Scottish Parliament chamber. A comparison of the UK Climate Change Act 2008 and the proposals in the Bill is available at Annex I. The UK Act:

1. Sets emissions reduction targets in statute. These are for 80% cuts in the net UK carbon account by 2050
2. Requires carbon budgets to be set for 5 year periods beginning 2008-2012
3. Requires that the carbon budget for 2018-2022 is set in a way consistent with a target of reducing the carbon budget by at least 26% by 2020 against 1990 levels
4. Provides for a system of annual reporting by the UK Government to the UK Parliament
5. Creates an independent advisory body. The UK Committee on Climate Change which was operating in shadow form, is now established to advise the UK Government and the devolved administrations
6. Enables the UK Government and devolved administrations to introduce new domestic trading schemes
7. Sets out a procedure for assessing the risks of climate change for the UK and for an adaptation programme to be developed by the UK Government and other bodies

8. Allows for other policy measures to support emissions reductions, including: Renewable Transport Fuel Obligations; charging for single use carrier bags, waste minimisation & recycling; amendments to Certified Emissions Reduction Scheme; reporting of emissions by companies and persons; and a duty to make annual reports on the efficiency and contribution to sustainability of buildings on the civil estate.

These global, European and UK measures are based on the most recent scientific analyses which show an urgent need for action to reduce greenhouse gases, and to adapt to the impacts of climate change, and in the UK, on the opinion of the newly formed Committee on Climate Change. A key source of scientific analysis is the Intergovernmental Panel on Climate Change (IPCC).

The Fourth Assessment Report of the IPCC (2007) states that "warming of the climate system is unequivocal", and that this warming is "very likely" (with more than 90% certainty) to be due to human activities; and specifically, that it is caused by the increasing levels of greenhouse gases. This report also concludes that emissions reductions of 50-85% are necessary, globally, to limit average temperature rises to 2.0-2.4^{o}C. IPCC stated that the concentration of CO_2 in the atmosphere was (in 2005) 379 parts per million (ppm), higher than at any time over the past 650,000 years, and "the recent rate of change is dramatic and unprecedented" (IPCC 2007a). IPCC analysis shows that increases in CO_2 were 30ppm since 1990, a rate of rise which had not been previously recorded over any given 1000 year period (mostly based on ice core data). CO_2 levels of 450ppm are considered to be "dangerous" and equitable to a 2°C temperature increase.

The UK Committee on Climate Change has stated:

"The world needs to aim to limit temperature increases to 2 degrees Celsius (2°C), and to reduce the chance of a 4°C increase to very low levels. Failure to do this would result in adverse environmental impacts with significant human consequences: melting of the Greenland ice caps, extinction of large numbers of animal species, flooding, extreme weather events, ocean acidification and reduction in crop yields. Cutting the levels of greenhouse gases that we emit could significantly reduce the impacts of climate change. But we must act now, and act globally"

This analysis outlines the direct relationship between the emissions of greenhouse gases and temperature rises – what is important is the cumulative amount of emissions in the atmosphere but recognition of the relationship means that there is a requirement to reduce overall emissions. Some argue this must be pursued in an equitable way i.e. where emissions entitlements are distributed around the world requiring developed nations to drastically reduce their emissions whilst others are entitled to a fair share of global emissions – this is sometimes known as contraction and convergence. The principle that developed nations must drastically reduce emissions is that which binds most international and national target setting.

Westray Initiatives

The Westray community has a strong sense of belonging and is able to embrace new ideas while maintaining a strong sense of identity. We value our excellent education system, our good transport network, our community projects and island health service. More than anything we

value our sense of community, feeding our drive and determination to improve life on our island. We see the delivery of this action plan being made in partnership with social enterprises, community organisations, public sector bodies, businesses and householders as the key to a sustainable future. As a follow up to the action plan we are asking everyone on the island to make their own declaration on the website created to monitor progress against the action plan www.care4energy.co.uk.

In order to identify the key elements associated with the action plan, EAW hosted a community event on the 28th February 2009. From this event the main topics for further development were highlighted as:

- Food Production
- Waste
- Transport
- Energy

Significant reductions in greenhouse gases can be achieved in the projects suggested during the event (Appendix 1), and in particular the emissions associated with domestic energy, food, waste and travel can be significantly reduced with conscious effort. High levels of energy efficiency, locally produced energy, local waste treatment and a high volume of locally produced food can all have a significant impact.

Appendix 1 – Consultation Event

Climate Change Event – Saturday 28th February 2009; Focus Workshops - Tacking climate change at a local level. Three groups of between 6-7 participants per group considered the impact of climate change on the following areas. The three different group comments are indicated in red, blue and black.

Local Food

- Production of local produce
- Relaxation of regulations
- Why ship goods when island based?
- Support local shops, buy local produce
- Why have Tesco selling Orkney produce?
- Allotment possibilities in Westray
- Encourage healthy eating
- There is a lot that can be grown in Westray
- Don't take in other food
- Why can't we slaughter/process food locally
- Bulk buying through local shops
- We don't understand the relationship between Fair Trade v local food balance (this was later discussed and explained in some detail – Fair-Trade and local food were understood to be compatible concepts)
- Market gardening – local
- Growing plants classes – education
- Abattoir financially viable – vets – hygiene issues – training for island residents – special delegation
- Dairy legislation
- Fair Trade - massive miles involved (see discussion above)
- Farmers market etc. as population grows.
- Bartering schemes

Waste

- Lack of recycling facilities
- Plastic recycling – difficult due to large area/low weight
- Composting
- Reduce/ Reuse / Recycle
- Orkney based waste recycle centre (some suggested Westray based waste recycle centre)
- Furniture reuse to be encouraged
- Ebay – recycle your goods and get money for it!
- Education needed to teach us all how to use less and waste less
- On-island solutions
- Compressed paper for burning
- Energy recovery

- Carbon neutral
- Why heat Shetland??!!
- We are paying to heat Shetland
- Green cone scheme
- Currently ship in aggregate need to look at alternatives
- Look at alternatives in recycling was in eg. house building (bottle insulation, tyre walls, see Sam's house)
- Using alternative roofing eg. turf, flagstones, etc.
- Vehicle disposal/ use old cars as sea defences built into dunes
- Recycling
- Bring and take sites
- Wormery
- Glass for aggregate
- Furniture reuse
- White goods recycle where possible.
- Computer goods – recycle
- Create market to buy/collect waste
- Building waste from renovations
- Human waste – how do we manage best?
- Grey water system
- What about tangles? Are they a food/resource/waste?
- Extend recycling services – especially for plastics
- Look into personal disposal v recycling collections
- Keep things simple and self-explanatory eg. Kerbside collections
- General education
- Incineration
- Plastics for insulation

Energy

- What scale do we want to tackle energy use – island/community/individual household?
- Light bulb to Volcano
- Finite solutions – research alternatives
- Incentive to change
- Use what is already there
- Public support – community ownership of energy solutions
- Locally owned power lines
- More renewables
- More micro renewables
- More affordable access to renewables eg. per household
- Local top up fund to match grant
- Solar panels
- Insulation
- Vehicle fuels
- Fuel poverty = unfairness
- Causeways and energy savings/generation

- Fuel efficiency on boats
- Renewably fuelled pool car for those visiting on professional business from Mainland Orkney
- Bulk energy buying
- Insulating paints – reflective
- External roof over school site
- Production – financial obstacles – biogas especially – micro wind not viable given the initial outlay
- Wider view necessary
- More research into figures regarding turbines etc.

Travel and Transport

- Difficult alternatives
- Island based ferry
- Cost of wages and running costs
- Service but no island profit from current setup
- Benefits to island based commuters
- Keep islanders on the islands
- Cycling
- Public transport
- Biofuels
- Locally based ferry boat
- Locally owned ferry boat
- More video conferencing and teleconferencing
- Inter island transport made easier
- Ability to commute to Kirkwall
- Make more use of local materials
- Freight charges less
- One for many trips (eg. shopping in town, pooled used of cars)
- Having to justify trips to the town
- Keep ferry going to heart of Kirkwall ie. not to Hatston
- Reduce all food miles
- Looking into alternative fuels
- Eco driving – training for new & existing drivers
- Get better boats
- Looking into island linkages
- Video conferencing

General

- Legislation issues
- Less targeted funding
- Training programmes for general skills to cut down the need for external people travelling in. eg. sparkies, plumbers, etc.
- Prioritisation of how money is spent.

Appendix 2 – Energy Surveys

	SAP	NHER	Property Type	Main house Construction	Extension Construction	Main Roof Ins	Ext Roof Ins	Heating
37	1	0	Detached	Cavity Wall	-	75mm	-	Electric
16	1	0	Semi-Detached	Stone		0mm		Oil
21	1	0	Detached	Stone		0mm		Electric
56	1	0	Detached	Solid Wall		0mm		Electric
23	1	0.1	Detached	Stone	Stone	50mm	50mm	On-peak electric
22	14	0.3	Detached	Stone	Other	unknown	150mm	Off-peak electric
4	21	1.6	Detached	Stone	Cavity Wall	75mm	75mm	House Coal
48	22	1.4	Detached	Filled Cavity		100mm		Off-peak electric
1	29	2.2	Detached	Stone	Cavity Wall	75mm	100mm	Off-peak electric
3	31	1.3	Detached	Stone	Other	100mm	100mm	Off-peak electric
51	32	1.3	Detached	Stone		50mm		Oil
40	32	2	Detached	Stone	Cavity Wall	100mm	0mm	Oil
50	34	2.6	Detached	Timber Frame		150mm	Conservat	Off-peak electric
46	35	1.9	Detached	Stone		75mm		Electric
2	38	1.8	Semi-Detached	Cavity Wall	-	150mm	-	Off-peak electric
45	38	1.9	Detached	Stone		0mm		Oil
38	38	2.8	Detached	Stone	Timber Frame	75mm	Unknown	Off-peak electric
44	39	2.3	Detached	Stone	Filled Cavity	100mm	100mm	Electric
14	40	3.5	Detached	Stone	Cavity Wall	50mm	50mm	House Coal
15	41	2.3	Semi-Detached	Stone		100mm		Off-peak electric
17	41	2.8	Detached	Filled Cavity	-	75mm	-	Off-peak electric
	42	2.2	Semi-Detached	Stone		>150mm		Electric
31	42	2.5	Semi-Detached	Stone	-	75mm	-	Off-peak electric
7	42	3.2	Detached	Cavity Wall	Cavity Wall	25mm	Unknown	Oil
36	44	2.5	Detached	Stone	Stone	100mm	150mm	Oil
28	44	3.3	Detached	Stone	Filled Cavity	>150mm	No acces	Oil
39	45	2	Semi-Detached	Cavity Wall	-	150mm	-	Off-peak electric
42	45	2.8	Detached	Cavity Wall		50mm		Oil
43	45	3.2	Semi-Detached	Stone	Solid Brick	>150mm	150mm	Electric
18	47	3.7	Detached	Stone	-	150mm		Heat Pump
35	48	2.9	Semi-Detached	Stone	Solid Brick	150mm	0mm	Oil
34	48	3.2	Detached	Stone	Filled Cavity	75mm	150mm	Off-peak electric
5	49	3	Detached	Stone	Stone	100mm	100mm	Oil
6	51	3.3	Detached	Stone	Timber Frame	25mm	100mm	Oil
12	51	4	Detached	Stone	Timber Frame	100mm	100mm	Off-peak electric
8	51	6.1	Detached	Stone	Timber Frame	25mm	100mm	Heat Pump
20	53	3.4	Detached	Timber Frame	-	150mm	-	Off-peak electric
26	54	4.3	Detached	Stone	Timber Frame	150mm	150mm	Oil
47	55	3.8	Detached	Stone	Timber Frame	100mm	100mm	Oil
10	56	3.8	Detached	Stone	-	100mm	-	Oil
33	57	4.1	Semi-Detached	Stone	Timber Frame	100mm	150mm	Oil
49	57	4.4	Detached	Timber Frame		150mm		Off-peak electric
11	58	3.7	Detached	Stone	Cavity Wall	150mm	Unknown	Oil
24	59	5.2	Detached	Stone	Filled Cavity	150mm	150mm	Oil
30	60	3.9	Mid Terrace	Stone	Filled Cavity	150mm	150mm	Oil
32	60	4.1	Semi-Detached	Stone	Cavity Wall	150mm	150mm	Oil
25	60	4.2	Detached	Filled Cavity	-	150mm	-	Oil
12	60	4.5	Detached	Stone	-	100mm	-	Oil
27	75	6.6	Detached	Timber Frame		>150mm		Electric
41	76	6.6	Detached	Cavity Wall		150mm		Oil
9	80	5.9	Detached	Timber Frame	-	150mm	-	Oil
	42.04	**2.91**						

Appendix 3 – Summary Plan

Sustainable Westray
Action Plan - Summary

October 2009

Energy Action Westray, White Pow, Westray, KW17 2DR

www.care4energy.co.uk

Energy Action Westray's Action Plan

The action plan was compiled following a weekend-long series of workshops and consultations in March 2009.

An island-wide mail shot agreed that Westray should be part of the national target for greenhouse gas emission reduction target of 80% by 2050.

The specific targets we have identified are as follows:

Youth and Children

- Encourage young enterprise via local food production and marketing
- Provide work placements and apprenticeships
- Involve youth in strategic work

We aim to deliver this target by harnessing the enthusiasm of our young people and by developing a site for local food production. This site will provide the opportunity for young people to grow food, develop a cuttings and planting outlet, landscape design, land management, dry-stone dyke repairing, and food marketing at local level. This will also provide an excellent opportunity for young people to develop their entrepreneurial skills.

Transport

Facilitate and promote the use of biofuels on the island

- Biogas
- Biodiesel
- Bioethanol
- Encourage the use of electric vehicles

We will build on the work already being done by partner organizations on the island to promote the use of renewable fuels. We will facilitate the demonstration and promotion of these technologies to other community groups and individuals.

Housing

Promote zero carbon housing development

- Promote energy efficiency
- Promote renewable energy

We will provide a visitor hub to demonstrate carbon reducing techniques and materials. This hub will be open to both island residents and visitors. We will host annual carbon-reduction events to continue to evaluate new technologies and keep carbon reduction as a high profile in our community. We will work in partnership with the Energy Savings Trust and Orkney Energy Agency to ensure a co-ordinated and effective approach.

Renewable Energy

Generate 100% of the island's energy requirements by 2012

- Develop renewable heat projects
- Develop renewable transport projects
- Develop renewable electricity projects

We will further explore and implement options on how we can replace fossil fuels with renewable technologies. This will be modelled around a baseline study into energy usage in Westray. These options might include: community district heating, domestic or small-scale electricity generation, promoting anaerobic digestion and utilising its by-products.

Environment

Reduce the island's emissions to water courses

- Reduce the island's emissions to air
- Reduce pollution to the land

We will promote responsible and sustainable land-management in our community. We will develop and demonstrate effective methods of minimising run-off into water courses and lochs. We will minimise the amount of waste that is exported from Westray annually by working with partner organisations to recycle and reuse waste products where possible.

Tourism

Promote eco-tourism in partnership with local groups

- Help establish a renewable energy trail
- Increase the number of green tourism facilities

We will use our energy awareness hub as a starting point on an energy heritage trail throughout Westray. We will promote organisational membership to Energy Action Westray and invite businesses to become an active part of the trail. Westray has a unique quantity of existing sites that demonstrate the heritage of energy usage on the island. We envision the trail as an opportunity for individuals and businesses to showcase their carbon-reduction successes.

Industry

Arrange energy audits for businesses

- Reduce waste and energy costs
- Reduce GHG emissions

We will work in partnership with the Energy Savings Trust and Orkney Energy Agency in encouraging local businesses to reduce the need for energy through smart work practices and energy efficiency. We aim to facilitate businesses in accessing grant and government assistance available to reduce carbon emissions.

Community Development

Work in partnership with other community groups

- Reduce GHG from community projects
- Increase awareness of sustainability issues on the island
- Encourage social enterprise in GHG reduction

Because we recognise and value our strong and close-knit community, its development is at the heart of our activities. Our focus is a sustainable community through a much reduced reliance on imported energy.

Conclusion:

We will continue to be at the forefront of Scotland's journey to a low carbon society.

We will learn from our successes and failures as we pioneer this uncharted territory.

Through this Action Plan we have set out our strategy and how we will achieve our vision of a sustainable future for generations to come through reducing Westray's carbon impact.