



Regional Approaches to Stimulating Local Renewable Energy Solutions

**Wood Energy Study Tour
10th to 13th October 2010
Highlands and Islands, Scotland**

Background

The Western Development Commission¹ (WDC) delivered this study tour under work package three of the EU bioenergy project RASLRES (www.raslres.eu). RASLRES aims to increase the uptake of locally produced bioenergy solutions in rural areas and has pilot actions in wood energy, energy crops and marine biomass.

In the Western Region, RASLRES is focused on the wood energy sector and supports the sector by delivering practical services to market players and informing policy development. RASLRES adopts a full supply chain approach - looking at the energy chain from supply (i.e. fuel producers/processors) to demand (i.e. energy users). This holistic supply chain approach is reflected by the composition of the study tour delegation and the range of sites visited.

Services to the wood energy sector in the Western Region under RASLRES include:

- provision of a range of technical and business advisory support services to selected clients progressing wood energy projects in the region
- generation of market information and intelligence to support the sector e.g. resource forecasting from private sector forestry, assessment of energy crop potential, technical and business case studies
- accessing of international expertise and facilitation of networking with EU markets

The study tour programme was designed primarily based on the information needs of public sector clients participating in RASLRES work package three. For example in county Donegal eight feasibility studies were completed for public sector buildings by September 2010 with a view to further actions over the coming months. In addition two feasibility studies were completed with Sligo County Council together with a consultation meeting with Mayo Energy Agency.

Aims

The aims of study tour were:

- to facilitate the exchange of wood energy expertise from the Highlands & Islands of Scotland to the Western Region
- to provide technical and business information to pilot project clients and thereby inform their own projects
- to increase the awareness and understanding of wood energy opportunities in the Western Region among relevant stakeholders

¹ The Western Development Commission (WDC) is a statutory body that was set up to promote both social and economic development in the Western Region (Donegal, Leitrim, Sligo, Mayo, Roscommon, Galway and Clare).

- to guide and inform on the next steps for RASLRES work package three and its clients.

The following report outlines the main lessons learnt, key issues from each site and provides on-line references for full project case studies where available. In summary thirteen sites were visited over the three day period. The boiler sites were mainly heat installations in public buildings and small district heating schemes (boiler range of 100kw-850kw). Fuel depots supplying these installations (or similar scale installations) were visited to facilitate discussion on fuel supply issues and related contract options.

At each site a 'whole project' perspective was presented i.e. main technical issues, fuel storage and delivery, project financing, project delivery and management, contract options and related issues for energy users and fuel suppliers, fuel quality etc. The delegation met with a range of public sector agencies and private companies from the Highlands & Islands Region.

Lessons learnt

From the varied site visits and meetings, the group gained insights into the main issues for initiating and delivering wood energy projects in the public sector. The main outcomes of the tour were:

- clients informed on potential of wide scale market deployment and conditions necessary to achieve growth
- increased knowledge of how to progress own individual proposals
- increased awareness among the public sector players of the opportunities within wood energy sector.

Some of the lessons learnt include:

- the availability of capital grants to stimulate market demand and supply
- the availability of advisory supports to projects e.g. ALLenergy's support to HWE Ltd and Glenshalloch district heating
- the critical need for a stable policy framework at both national and local level to support growth and provide confidence to the industry
- the vital importance of fuel quality and standards to ensure effective system operation – moisture content is key variable
- the need to engage in appropriate system design and feasibility modeling for installations – addressing errors in retrospective is costly
- the importance of fuel supply chain modeling and management by the forestry/fuel supply company
- the notable cost impact of appropriate fuel handling, delivery and storage
- within the cost structure of projects, fuel and haulage are the main cost components
- the need to assess the range of contract options available to energy users and to choose a contract appropriate to your needs. In many instances on the tour the energy user purchased metered heat via Energy Service Contracts.
- the opportunities for players across the supply chain to work in innovative partnerships to allow for project development e.g. community group HWE working with Lakeland Smolts Ltd, Local Authority selling the heat cards for meters in Housing Association units
- the long term economic and commercial viability of enterprises is enhanced by integration of components across the supply chain e.g. Alvie Estates fuel supply business is based on own forestry resource in addition to buying in from contractors, Angus Biofuels Ltd supplies metered heat to sister property company.

Participants

The delegation included:

- Thomas Becht, Donegal Woodland Owners Society Ltd
- Alan Boyd, Udaras na Gaeltachta
- Liam Carron, Letterkenny IT
- Seamus Granaghan, Mayo County Council
- John Jackson, Donegal Woodland Owners Society Ltd
- Brendan Killion, Mayo County Council
- Declan McGoldrick, HSE West
- Jimmy Scott, Energy Crops Ltd
- Meike Siebel, Donegal Woodland Owners Society Ltd
- Charles Sweeney, Donegal County Council
- Seamus Ward, FAS

From the RASLRES project team were:

- Ian Brannigan, WDC
- Kenny Boyd, ERI
- Steve Luker, Steve Luker Associates Ltd
- Bernadette Phelan, WDC



All photographs used in the report are courtesy of Steve Luker and Meike Siebel

Site Summaries

Site 1: Hereweare wood chip depot, Cairndow (Monday 11th October)

Case study available at <http://www.hereweare-uk.com>

Delegation met with Lorna Watts and John Smart.

- Hereweare Ltd is a community enterprise based in Cairndow
- Scottish Community Enterprise funded a feasibility study and this resulted in the set-up of the community energy company
- first contract was the supply of fuel to a biomass plant to heat water for Lakeland Smolts, the Norwegian owned local salmon hatchery
- a 5 year contract was signed with Lakeland
- this was a critical contract to kick-start the business and is based on a partnership agreement between Lakeland Smolts (users), Mawera (the boiler manufacturers, installers and now Energy Supply Company) and HWA (fuel supplier)
- Wood provided by Tilhill Plantations is chipped and delivered to Lakeland Smolt's
- With the Forestry Commission's assistance HWA negotiated a 5 year contract for the quantity of wood at the moisture content needed by Lakeland
- timber is sourced within approx 30 mile radius
- HWE were supported and provided expertise by the Biomass Officer from ALIenergy.
- Fuel quality must be maintained and monitored with moisture content key variable



Site 2: Lakeland Smolts Ltd, Cairndow (Monday 11th October)

Case study available at <http://www.usewoodfuel.co.uk/Docs/LakelandSmolts.pdf>

Delegation met with Owen Hutchens

- Plant produces up to four million fry for fish farms and one million smolts
- 850kw boiler providing the primary load for plant
- fuel cost saving of £25,000 – £30,000 compared to oil
- Mawera boiler with required heat meter, heat exchanger
- Boiler is six months in operation and going well to date. Support and accessibility of HWE important to client
- fuel quality a key variable to monitor and control
- no accumulator tank, straight feed into tank
- delivery method includes a moving floor and auger; in hindsight would have invested in hydraulic ram
- debarked logs are important; this function is carried out by timber merchants who supply HWE



Site 3: Glenshalloch District Heating Scheme, Oban (Monday 11th October)

Case study available at

<http://www.scotland.gov.uk/Publications/2009/03/20155542/33> and

http://www.vitalenergi.co.uk/uploadedFiles/Brochure_PDFs/Glenshallach_Community_Heating.pdf

Delegation met with Graeme Bruce, West Highland Housing Association and David Docherty, Alienergy.

- Scheme was developed by the West Highland Housing Association for 130 homes
- Alienergy is a local agency that promotes better use of energy and local energy resources throughout Argyll, Lomond and the Islands. <http://www.alienergy.org.uk> and has supported the development of this scheme
- In 2000 design and build of housing estate initiated and was led by contractor. In 2005 phase one housing of 90 units was completed and phase two planned for 45 house units
- Fuel supplied from Mull. Attain <30% moisture content (MC) and have a five year agreement with fuel supplier. Have contract condition to increase quality over time particularly in regard to achieving a low moisture content
- Have a walking floor and hydraulic ram delivery system
- Houses are very energy efficient resulting in space capacity in the boiler system; hence intention to add new houses onto the district heating system
- demand load were estimated at 1200kw per house and in reality load of 700kw per house
- O&M per annum of approx £30,000 – reduced this year to £20,000
- meter heat installed in each house and swipe cards system in operation
- approx cost of £600 per house for heat & hot water per year (compared to approx £1000 for oil system)
- plan on introducing standing charge to recoup capital investment and allow for sinking fund to finance future upgrades/maintenance
- cost of £10,000 per unit to add a retro fit to system - £500 per metre of piping
- increase market size (ie number of boilers) will result in an increase in fuel quality
- matching local fuel to boiler type is critical



Site 4: Highland Wood Energy Ltd office, Fort William (Monday 11th October)

Further information available at <http://www.highlandwoodenergy.co.uk/>

Delegation met with Bruno Berardelli, MD of HWE Ltd in their showroom.

- HWE Ltd are one of the longest established Scottish wood fuel installation companies. Clients include public sector, estates and farms and district heating systems. They provide range of solutions to clients from fuel supply, O&M, to full energy supply options
- Currently have staff of 25 people with a turnover of £3.5 million. Their catchment area is approx within a three hour drive radius of this office with sub-offices for team members
- Training of staff and provision of quality service is defining principal of company
- Turnover has doubled each year since establishment in 2003
- Oil price is critical driving factor for wood energy market
- General awareness of wood fuel needs to be increased; planning regulations and environment must be supportive towards renewable energies to facilitate adoption of the technology
- capital grants and interest free loans are important market stimulus
- In UK the capital schemes are due to be replaced by a Renewable Heat Incentive which would be a direct support to market. The RHI announcement is due November and until then market is stagnant. A clear policy framework is critical for market development and confidence. Policy impacts on market momentum
- HWE now has own fuel supply and felt this was critical to secure long term viability – offer security of supply to heat users and control supply chain
- Expertise and skills base specific to wood energy installations is critical – this is a key need for industry growth



HWE showroom displaying both boilers and project case study information boards



Example of information panels on each of the HWE installations

Site 5: Old Folks Housing Scheme, Fort William (Monday 11th October)

Delegation met with Bruno Berardelli

- HWE designed, installed and operate a 100kw boiler supplying metered heat to 22 flats for the elderly
- HWE Ltd bill the Housing Association for heat i.e. deal with one customer
- Cabin holds boiler and fuel storage. Blow delivery of fuel
- wood boiler is the lead with back-up and peak provider by oil boiler
- peak demand of 240kw
- total investment cost of £105,000 for the system
- expect boiler life of 15 years
- delivery of fuel takes approx one hour; in winter delivery every 3-4 days
- fuel cost of £20,000 - £30,000 per annum (approx £75 per tonne of fuel)
- user cost of 3.7p per kwhr compared to 6p per kwhr for oil
- HWE provides fuel contract, metering, O&M, annual service, remote monitoring, combustion monitoring
- Forestry is a significant sector in the region with over 150,000 tonnes of timber produced regionally per annum. The volumes required for wood energy would see the fuel demand as being relatively insignificant in wider sector
- planning systems can be slow and advocate a need for increased awareness and education base within planners



Site 6: Nevis Centre, Fort William (Monday 11th October)

Further information at <http://www.neviscentre.co.uk/>

Delegation met with Bruno Berardelli

- The Nevis Centre is a multi-purpose meeting place and events venue e.g. social functions, sports activities, competitions, live music and art, business conferences and Ceilidhs.
- HWE designed, installed and manage the 400kw boiler
- a combined boiler house and fuel storage unit was sourced from Finland
- investment of £175,000



Site 7: Lochaber High School (Monday 11th Oct)

- 500kw Kob boiler for re-developed school facility which is currently under construction
- three oil back-up boilers
- purpose built boiler house with bunker storage of 27m (3mx3mx3m)



Site 8: Lovat Arms Hotel, Fort Augustus (Tuesday 12th October)

Case study available at <http://www.usewoodfuel.co.uk/Docs/Lovat%20Arms%20Hotel.pdf>

Delegation met with Caroline Gregory

- 100kw froling boiler
- system designed by HWE Ltd
- £60,000 boiler cost with total investment of £110,000
- received 50% grant aid
- payback period of three years
- independent contractor for O&M
- cost of wood fuel is £400 per tonne
- one tonne delivered approx every week
- estimate fuel cost saving of £1000 per month
- approx 13p per m³ of space heat
- MC of fuel approx 23%
- auger use critical function and recently added monitor to alarm when auger blocked



Site 9: Kingussie High School, Kingussie (Tuesday 12th October)

Delegation met with the school janitor

- system designed by HWE Ltd
- school has been awarded Eco-School Silver status for work in developing environmental awareness. The school 'Eco Group' leads on actions to improve the school environment and sustainability. In addition to the woodchip boiler there are plans to install wind turbine and solar technology in 2010-11.
- cabin houses a 500KW Kob boiler and fuel storage
- fuel supply from Aviemore estates
- oil as back-up and for peaks
- requires approx eight tonnes of fuel every three days



Meeting: Presentation to group by Andrew Patience, Senior Energy Manager, Highland and Islands Enterprise and joined by Jamie Williamson, Alvie Estate.

Site 10: Albyn Housing Association, Aviemore (Tuesday 12th October)

Case study available at

[http://www.usewoodfuel.co.uk/Docs/AviemoreNorthInfocard29Nov\[1\]v2.pdf](http://www.usewoodfuel.co.uk/Docs/AviemoreNorthInfocard29Nov[1]v2.pdf)

Delegation met with Donald Lockhart, Development Manager

- two wood chip boilers of 450kw Kohblach and 120kw Thermia in operation as part of the district heating scheme
- Association seeks to address issues of fuel poverty and environmental sustainability in housing developments
- three years in operation supplying a 100 houses with little downtime, energy production has run effectively
- the phased building of housing impacts on design of heating system
- System is not paying for itself at the moment. The financial modeling was based on the Association buying units from operating company and selling in turn to house customers at a margin to cover costs of system. However heat losses greater than estimated and financial projections have gone askew. Recording 50% losses between production and final consumption!
- Reviewing house meters to ensure no fraud; it is relatively easy to bypass current system
- In addition customers may have a lack of understanding about the controls and control experiments are in-train.
- Need to i) reduce costs, ii) increase payment from customers, iii) capture heat losses on the system
- 4.2p per kwh to users – real price potentially of 6-8p per Kwh – currently not breaking even
- on average 3.5p per Kwh in Scotland
- issues have been on the customer end and with system design
- fundamental question is whether a housing charity should be operating as a facilities provider & manager; core focus is on affordable housing
- not receiving ROCs or RHI
- key issue now is to develop a sinking fund for future investment requirements
- Culturally district heating is a challenge; the private sector was reluctant to engage with Association Charity
- McClune Bioenergy operate plan with service charge of £5000 per month
- annual operating costs of £60,000 - £30,000 for fuel and £30,000 in service charges
- sell heat through Local Authority office; local authority are a key partner in the process
- 1000 tonnes per annum fuel consumption
- boiler takes up to 60% MC – typically operate at 30% MC
- local farmer does delivery, handling and takes ash



Boiler house with fuel storage



Additional fuel storage



450kw boiler

Site 12: Alvie Estate, Kingussie (Tuesday 12th October)

Case study and further information available at

<http://www.usewoodfuel.co.uk/Docs/Alvie%20House%20detailed.pdf>

<http://www.alvie-estate.co.uk/>

Delegation met with Jamie Williamson

- Alive Estate has 250kw boiler in the main estate house and 75kw boiler in their caravan park, and operate a wood fuel supply business
- have approx 2000ha of forestry
- 75kw boiler to supply hot water and bathrooms in the caravan park with a 1000 person capacity. Estimate cost of approx 1.1p per Kwh. Increase of 20% in caravan park visitors last year
- caravan park boiler installation cost of was £50,000 and received £25,000 grant
- 250Kw boiler for heat and hot water in the main estate house – has 45 bedrooms and 18 bathrooms. received a 50% grant for installation
- in 2005 the wood fuel heating cost was £18,000 compared to an oil cost of £33,000.
- use own chip in both boilers
- Fuel business supplies a range of hotels, schools including Kingussie visited earlier, county councils and nursing homes.
- fuel supply enterprise has doubled turnover this year
- catchment area of 50 miles for sourcing of forestry base fuel and approx 15 miles for fuel delivery to end users
- Investment cost for fuel yard of approx £51,000 and received a 50% grand for chipper and drying shed
- Within storage shed, MC at top of piles can be 50% and as low as 10% at the bottom.
- Shed has a fan drier. Currently looking at installing hydroelectric scheme to power the fan drier
- have a tip truck for delivery
- purchase timber at between £13 to £22 per tonne from outside
- cost of harvest to roadside is approx £15 per tonne
- buy in at £4 per m³ (one year old) versus Balcas mill price of £2 per m³
- storages for approx another 12 months



Caravan boiler house with storage



Tripper truck for delivery



Fuel storage shed



Chipper in action



Drying stock on-site

Site 13: Angus Biofuels Ltd, Forfar (Wednesday 13th October)

Case study available at <http://www.usewoodfuel.co.uk/Docs/AngusBiofuels.pdf>

Delegation met with Bill Watson, MD of Angus Biofuels Ltd

- company are Scotland's largest wood heat supplier and installer
- the fuel supply business emerged from a need to diversify Dragon Farm, a primarily arable farm enterprise
- carried our research into market development in Sweden, Austria, Finland
- identified the critical development issue as the 'chicken and egg' situation that exists within the wood energy sector i.e. develop fuel demand and supply simultaneously
- set-up a fuel supply business to supply six boilers in a property owned by a sister company to Dragon Farm
- this integration of both supply and demand into one business model is a key factor for their success
- Purchased 2,000 ha of woodland in parallel to set-up of fuel supply depot
- Angus Biofuels employs six engineers for O&M services
- By January 2009, they supplied and operated 10MWs of heat and have a target of 20MW by September 2010. The 2010 target is ultimately dependent on the structure of the pending Renewable Heat Incentive scheme by government.
- at the moment nearly 90% of fuel is sold as metered heat i.e. ESCos dominate their client mix
- average boiler supplied is approx 400kw (range of between 200kw and 600kw)
- Customers include prison service, health service providers, county councils
- The increased education and understanding of users was critically important in moving to a metered heat market
- Though the ESCo model they own the boiler and guarantee fuel supply via metered heat to customers
- Do have a number of fuel contracts only – issues of poor boiler maintenance and lack of expertise in operate of systems
- In the fuel business, they are cutting forestry now for fuel supply in 2012. Purchase from both private and public plantations. Source from approx 40 mile radius from each depot
- Have a network of three depots (with current site the largest)
- Continuity of supply is critical issue and they must give clients security of supply. This is ensured via their three depots and direct forestry ownership. This level of comfort is key to them securing contracts
- three chippers in this yard with capacity to chip 100 tonnes per day
- seek to get chip to 25% MC to maximize the calorie value of the fuel upon delivery; haulage key cost factor so must be controlled.
- Drying shed as per specifications for grain drying (given business is diversification of arable farm)
- Bag kindling for distribution via garage forecourts – high margins!
- For delivery have variety of methods including highlift truck, blower, one tonne bags, and walking floor
- store approx 1500 tonnes at any one time
- screen chip to G30 quality with no fines
- ESCo contracts with county councils
 - price range from 2.7 p per kw/hr with no service contract (lowest price) to 6.5p per kw/hr with full service contract and issues such as blower delivery (highest price)
- Haulage distance is a key price factor
- delivery design is another key price factor; delivery to a boiler is priced with delivery in mind – find underground or highlift tractor most cost effective (simple tipping of load)

- index linked prices based on i) forestry price index and ii) haulage prices. Does not index based on CPI (consumer price index)
- price ratio for costs is typically 50% for fuel and 50% for supporting services with haulage being the significant variable.

