

South West Wood Fuels Ltd

Existing Schemes

18th August 2004

New Mills, Snapper

The owner at New Mills had a 35 kW P & H boiler installed by Wood Energy Ltd in 2003 to provide wood heating during the winter months. Most wood is sourced from the owners holding of 30 acres and is composed of low grade hardwood, hazel and willow. Access to the woodland and the chip store is less than ideal as it is on a steep bank. Improvements are planned for summer 2005. The chip store measures 3 metres by 3 metres base and 2 metres high giving a capacity of 18 cubic metres. This has to be filled 3-4 times during the winter but is currently being expanded to contain a whole season's supply.

Chipping is completed on site direct into the store using material previously stacked nearby. As a retired smallholder the owner provides all his own labour, cutting, stacking and chipping material (using the SWWF machinery ring chipper). Commercially the degree of handling and manual labour would be unacceptable but as the smallholder undertakes the work himself there is still a substantial saving on heating costs. In addition, the woodland has been improved and a use has been found for very low quality material.



Small scale self supply bringing low quality broadleaf woodland back into management

Loyton, Morebath

The owner at Loyton has been a long term member and supporter of South West Wood Fuels. Initially he installed a 40 kW VETO boiler in 2000. The current project developing a shooting lodge, hotel and conference centre completed in November 2003 needed a more powerful system to supply heat and hot water for guests. A 250 kW Austrian Binder boiler was selected for its power, efficiency and sophisticated automated control. Installed by Wood Energy Ltd of Oakford this boiler will be the largest in the area, consuming around 120 tonnes of wood chip per annum.

Currently, fuel is processed off site and is delivered in a 25 cubic metre trailer which is reversed up to the chip store and tipped straight in. The operation takes around 15 minutes with the minimum of disturbance, much like an oil tanker delivery. At £50 per delivered tonne of wood chip the heating is approximately half the price of oil for this high heat load property. The combination of grants for capital installation and fuel savings create an attractive economic package as well as an eco marketing angle to the lodge.



The lodge, chip store under construction and processing of the first load

Charterhouse Centre - Mendips

State of the art wood heating has hit the Mendips at last with the installation of a 55 kW Froeling turbomatic boiler in the Charterhouse Centre, Blagdon. Installed by Econergy Ltd with funding from Somerset County Council and Clearskies, it has been running since March this year (2004).

The centre is home to the Mendips AONB and provides educational and outdoor activities to approximately 44 children and adults per week. Head of Centre, John Baker explained that it fits with the centre's environmental policy for renewability and on a practical note during the winter on the Mendips a plentiful supply of green heat will keep the staff and guests in good humour!

The centre is very fortunate in being a mile from a large wood recycling centre called Mendip Wood Shavings. A very clean and uniform specification of wood shred from discarded

pallets and demolition wood has been produced. And at 10-15% moisture content and prices of £35-45 tonnes delivered, the centre is really running on a cheap and local fuel source. When SWWF visited in May the boiler was running successfully, and some planning problems affecting the fuel delivery were being addressed.

It is certainly good news to have a new installation in Somerset and hopefully many more schools will follow the good example of Charterhouse.



Grascott Farm

Commissioned in January 2003, the boiler currently heats a farmhouse and one holiday cottage. He has recently obtained planning permission to construct a further holiday cottage which will be “plugged into” the heat main, buried underground around the buildings. This forms a miniature district heating system.

The boiler burns a mixture of forest residues from 30 acres of existing woodland on the farm together with slab wood bought in from a small local sawmill. The ultimate plan is for further buildings to be heated by the boiler as they are developed over time and for the farm to become self sufficient in fuel as the 170 acres of 4-5 year old tree planting on the farm approach the age of first thinning at 12 to 15 years of age. Then the first thinnings will be chipped as whole trees to generate fuel.

Sam has held a number of open days at the farm this year to demonstrate the boiler and it's integration with the management of the forest and continues to have a number of visits by government agencies for example the Forestry Commissions Rural Development Officer and the Regional Director of the Countryside Agency providing an excellent opportunity to lobby the decision makers towards small scale wood chip heating.



Sam next to his 150kW Binder boiler at Grascott Farm north of Okehampton

Pinkworthy

70kW Wood Chip Boiler for Office and Residential Heating



Pinkworthy Barn

Pinkworthy Barn was used as workshops up until 2001 and was heated using a combination of electric heaters and wall mounted LPG burners. A new company Wood Energy Ltd took over the premises and installed a modern automatic wood-fired boiler utilizing locally derived wood chip fuel.

Wood Energy Ltd was formed in 2001 to specialize in the design and installation of automatic biomass heating systems and to help implement the idea of the “Energy Service Company”, supplying heat to customers, rather than simply the supply of a boiler and wood fuel. Wood Energy Ltd have been helped directly by the ALTENER “Heat Entrepreneur Project”

A new Wood Chip boiler was specified and installed which has sufficient capacity to heat both the offices and swimming pool, large farm house and workshops. The boiler chosen was from a leading Austrian manufacturer Binder and is rated at 70kW.

The boiler is owned and operated by Wood Energy Ltd and the wood boiler provides heat to the offices and acts as a demonstration wood heating system which is regularly shown to potential clients. In addition, heat is sold to the neighbouring farmhouse and workshop buildings and to an outdoor swimming pool which is used from May to October.



Fuel store



Binder Boiler

A sub-terranean boiler house and fuel silo was constructed. The fuel store has a hinged roof to enable easy dumping of chip using a tipping trailer. Alternatively wood can be chipped directly into the store.

Locally grown wood is chipped using a fuel-wood chipper to provide dry fuel of a consistent quality and particle size.

The boiler is separated from the existing buildings and so a twin heating pipe is laid underground between the two. This pair of pipes is encased in a flexible insulated conduit similar to large drainage pipe and has a very low heat loss, it is therefore able to work effectively at large distances.

How it works

The silo is a 3^m square block-work construction with a central revolving ‘agitator’ with two sweeping arms. An auger in an open inclined trough receives chip from the sweepers and conveys it into the boiler room where the auger continues within a closed tube. The chip is dropped through a rotary

valve seal into a horizontal 'stoker' auger at ground level which feeds the boiler with fuel on demand.

The boiler and feed system operates under full electronic control which can be interrogated via phone connection to a remote computer. The boiler has separate fans for primary air, secondary air and exhaust gas extraction, all of which are operated by the controller.

The feature that enables the controller to work so well is the Oxygen sensor in the flue. Using the information this provides, the controller can vary the fuel and air supply rates to allow the most efficient burning of the fuel, while giving the heat output from the boiler that is required at that time. An exhaust cyclone is fitted as an option on the flue which makes any fine dust particles drop out of the gases for collection.

On startup from cold some smoke is emitted for a short time, but once under normal running conditions the exhaust is clear and, using correct quality fuel, the emissions are within the strict Austrian regulations for pollution.

The heat output to the swimming pool, workshops and farmhouse are measured via heat meters and the heat is billed quarterly.



Control Panel



Heat Meters

Economics

The wood chip boiler has displaced heating oil where heat is being sold. It was important to offer heat at lower cost than the corresponding fossil fuel despite the environmental benefits, and so the price of heat sold was set at 90% the current retail heating oil price. Assuming a cost of £40/tonne for wood chip delivered to the store it is estimated that the payback period will be of order 11 years (see box). It should be noted that the size of the boiler is generally below that which is likely to be economic as an ECSO. The development was only economic in this case because of capital grants available and the high alternative cost of heating (peak electric) within the main office building.

Technical Details

Boiler	Binder – RRK 80–175
Rated Heat output	70kW
Fuel moisture content	<35%
Fuel particle size	up to 25mm cubes
Building size	6m x 3m x 2m high
Chip store volume	18m ³
Power Supply	3 phase 16Amp

Economic Details

Capital Cost (after grants)	Approx Euro 25000
Amount of heat displaced in office	36,000kWh
Amount of heat sold	33,000kWh
Annual net benefit	Euro 2230
Approximate simple payback	11 years

Wood Chip Installation - Edge Barton Manor

Background

Owner Sylvan Robinson is the chairman of British Biogen, the trade association for energy from sustainable sources of wood and other organic materials.



The recent conversion of the barn at Edge Barton Manor left a requirement for heating which could not be met by the oil boiler used in the main house. A state of the art 40kW chip boiler from French company Energie-Systeme was installed by Wood Energy Ltd. to heat the barn, a small conservatory used as an office, and the nearby swimming pool. A nearby outbuilding has been adopted as the boiler house with a partitioned section as a chip store of upwards of 25m³ capacity.

Fuel Supply

To coincide with the installation of the 40kW chip boiler SWWF were asked to source and process local seasoned wood to provide the first batch of fuel for boiler commissioning. 3 tonnes of Birch wood (with some softwood) was sourced from a local SWWF member within 6 miles, to supplement the 1½ tonnes of mixed hardwood from the floor of the owner's woodland.

The Birch had been cut to poles of up to 8' in length 6-8 months before, and air dried in a sunny location since then. Chipping was undertaken two days before boiler commissioning at the customer's site. The chipper used was the TP200 belonging to the SWWF machinery ring, connected to the tractor of a local farmer. The outsourced wood was delivered to the site by tractor and tipping trailer in one load. Two operators converted the 4½ tonnes of pole wood into 20m³ of chip in under 4 hours.

In future the owner will self supply using wood from his 20 acres of mixed native broadleaved woodland, and chip on site. Any supplementary requirements can be catered for from other local SWWF members.

Heat Finland

Hankasalmi District Heating Network

At the moment there is no district heating in Hankasalmi, but there are several small area networks. The annual use of heat in Hankasalmi is about 5 700 MWh. The size of the plant would be 1,5 MW. For reserve capacity the municipality has several oil boilers that can be used. The purchase of the plant is in process.

Background and the decision-making

The municipality of Hankasalmi was known to use a lot of oil to heat its premises and private houses in the centre of the municipality. A local Forestry Centre first contacted the municipality in 1997 and offered to perform basic calculations. A rough study was made in 1997 but didn't lead into actions. Basic calculations were made again in 2000 by the Forestry Centre. After this a meeting was held between the energy advisor (Forestry Centre) and municipality executives to launch the project. As a result of this Elomatic Oy conducted the feasibility study in autumn of 2001 where heat

produced with wood fuel turned out to be cheaper than heat produced with oil. The municipality made the decision to invest in a heating plant and network in March of 2002.

Establishing the co-operative

Already back in 1997 it was studied that in Hankasalmi area there is a possibility to heat the plant with own wood fuel. It became clear that in that area there were resources both in material and labour. Possible heat entrepreneurs were mainly found through local Forest Management Association and other forest related concerns and people. At the same time the municipality made their decision to invest in the plant, possible heat entrepreneurs were gathered up for a meeting. At this meeting were present the representative of the forest management association, several land/forest owners from Hankasalmi and representatives of Heat Entrepreneurs project. In this meeting the possibilities of heat entrepreneurship were presented. After this it was decided to hold a meeting to establish a co-operative and to start waiting for the offer request from municipality to supply heat. The co-operative was established in the spring of 2002.

Competitive bidding

In 2002 the acquisition documents were drawn up and requests for offers from the manufacturers for both the heating plant and network were made. Offer requests weren't sent until in the beginning of this year due to difficulties in the municipality. The site for a plant was chosen and municipality applied for environmental permit which was granted in 2002. The site chosen for the plant didn't please some of the inhabitants in the area and they appealed against the permit.

The supplier of the plant is chosen, but the purchase is still in progress because of the appeals. The municipality has already changed site, but another appeal emerged and is being handled at the moment. The next step is to get the dismiss of appeal from administrative court and be able to continue the purchase.

Technical Information

Heating system	Tulostekniikka Oy
Boiler	Thermia Oy
Rated Heat output	1,5 MW (at 55%)
Fuel moisture content	< 60%
Fuel particle size	up to 100mm
Chip store volume	200 m ³
Amount of heat to be sold	5 700 MWh/a

Joutsa Industrial Area Heating Network

In Joutsa industrial area there are three large industrial halls, each with their own heating systems. The heat in each hall is produced with light fuel oil. The industrial area is developing and there are preliminary schemes for four new halls. Also the existing businesses might be expanding. The use of heat at the moment is 1 600 MWh/a. Calculated use of heat if four new halls should be built would be 2 800 MWh/a. The purchase of the plant and the network is in progress.

Background

One of the companies in the Joutsa industrial area is a large carpentry shop producing window and door frames. This carpentry shop produces a lot of sawdust as a side product and at this time the sawdust is used in various, non-profitable ways. Also several of the oil boilers in the area are coming to the end of their operating life and if new halls should be built, it is already more profitable to invest in a biomass boiler than in a oil boiler but the most profitable and simple way to get heat would be to join a local area network.

A set of local entrepreneurs were interested in starting the heating activity. The form of the enterprise to be established will be a limited liability company and it was decided that offers to the possible customers will be sent and the purchase of the plant will start.

Progress

Offers to the possible customers were sent in December 2003 and answers requested in February 2004. In the calculation it became clear, that to be profitable this heating plant would need at least these three customers (=three halls). Since it is not known if the following four halls will be built the price of the heat was determined at the level that it would be profitable to produce energy to only these three halls. If more halls should be built and become customers, it could be considered as extra income.

The Fuel

The main fuel will be wood chips. In addition to wood chips, sawdust from the carpentry shop will be used. The production of sawdust is at the moment about 2 000 loose-m³ annually. Usage of peat is also possible.

The Plant and the Network

The plant size was chosen to be 800 kW. It was calculated to be effective for today's use, but also to be big enough to produce around 90% of the heat even if the four new halls should be built. The existing oil boilers in the three halls will be saved and used for peak and reserve capacity.

The network will be built at the beginning for the three existing halls, but in designing the network the future capacity will be taken into account. The network will be 480 m long in the beginning and if new halls are built and connected into the network, total network length will be around 600 m.

The offer requests for both the plant and the network have been sent. Offers are expected in the end of February.

Technical Information

Heating system	(Not chosen yet)
Rated Heat output	800 kW (at 55%, requested)
Fuel moisture content	< 60%
Fuel particle size	up to 100mm
Chip store volume	200 m ³ requested
Amount of heat to be sold	1600-2800 MWh/a

Kolkanlahti, Finland - Old People's Home

This case was studied within the project "Heat Entrepreneurs for Central Finland", which was a 2-year project (1997-1999) with 9 participating municipalities. A heating system operated by a heat entrepreneur started in 3 municipalities and heating activity such as the supply of wood fuel started in some of the municipalities. After the project, heating activity has started in most of the municipalities.

Phase 1: Basic calculations

The municipality was interested in finding out what would be the cost of changing heating system from using oil to using biomass (wood fuel). Basic calculations were made in autumn 1997 with intention to determine a payback period for investment so that the heating costs would stay the same.

Phase 2: Decision-making

The calculations were presented in detail to the technical board of municipality. The technical board made a proposal to the municipal executive board for a grant to invest in the plant. Executive board made an approving decision. After this, the procedure to get the plant was started.

The municipality had decided that even though they invested in the plant, they won't operate it, but are searching for a heat entrepreneur to operate the plant and supply the fuel. After the approving decision of the executive board the search for the suitable entrepreneur was started. Since there had been some interest beforehand, the suitable entrepreneur was found quite easily.

The heat entrepreneur in this case is a farmer, a land and forest owner, who also does some forest work.

Phase 3: Determination of the price

In the basic calculations the price of the heat with wood fuel was somewhat determined based on the experiences from existing heat enterprises. The municipality and the entrepreneur agreed to set the price of heat with wood fuel to this level. The entrepreneur also agreed to take care of the existing oil boiler. The price of the heat was thus determined to be 80% the price of heating with wood fuel and 20% the price of heating with oil. It was also agreed the price of the heat would be partly bounded in oil price: 50% of the heat price is changing according to the variation of oil price.

Phase 4: Contract

The contract was made between the municipality and heat entrepreneur and the heating started in end of the year 1998. Contract time was first settled for one year and if everything goes well, the contract is on until further notice.

Technical Information

Heating system	Thermia Oy
Boiler	Thermia Oy
Rated Heat output	300 kW (at 35%)
Fuel moisture content	< 45%
Fuel particle size	up to 50mm
Chip store volume	150 m ³
Amount of heat sold	800 MWh/a

Petäjävesi District Heating Network

The heat for the municipality of Petäjävesi is produced by wood heat. The existing heating plant is 2,5 MW in size but is at the end of its operating life. The extent of the district heating network is 3,8 km. The annual use of heat in Petäjävesi is about 13 000 MWh. The plant is operated and managed by limited liability company, Petäjäveden Energia Oy. The investment of a new plant is in the process.

Background

The existing plant being in the end of its operating life, the investment for a new plant became current in 2003. However, the municipality was not willing to invest in a new plant and came to the conclusion to privatise their heating activities. Competitive bidding was arranged to find a buyer for the activity. Petäjäveden Energia Oy won the bidding competition.

Petäjäveden Energia Oy

Petäjäveden Energia Oy is a limited liability company established in the summer 2003 and consists of 6 shareholders. Majority of the shareholders are local entrepreneurs. The biggest shareholder is

a local forest machinery entrepreneur. This is very important to the company because it brings stability to the fuel supply.

The Fuel

The main fuel will be wood chips. In addition to wood chips, bark and sawdust from the nearby sawmill (Multian saha) will be used whenever possible. Usage of peat is also possible. The majority of the wood chips to the Petäjävesi heating plant is bought in co-operation with the local Forest Management Association.

The Plant

The operating life of the existing plant was coming to an end and to ensure the reliability of the heat, to maximise the share of usage of wood chips and to minimise the emissions, Petäjäveden Energia Oy decided to invest in a new, 3,5 MW heating plant. The technology to be used in the new plant will be approved in this size and commercially well established. With this new plant usage of fuel oils will be decreased and thus the development of the heat price will be more stable.

From the existing plant building the boilers will be demolished and the new heating plant will be built into the old building. The chip storage will be totally rebuilt. Offers for the new plant were requested and received in autumn 2003 and Plotme Oy was chosen to be the supplier for the plant. The renovation of the plant will start in spring 2004. The heating plant is planned to be ready for production in autumn 2004.



The old heating plant of Petäjävesi.

Technical Information

Heating system	Plotme Oy
Rated Heat output	3,5 MW (at 55%)
Fuel moisture content	< 60%
Fuel particle size	up to 100mm
Chip store volume	250 m ³
Amount of heat sold	13 000 MWh/a

Toivakka Local Area Network

Today Toivakka is using wood heat to heat up the municipal area with a local area network. The plant size is 700 kW with fuel moisture content of 50%. The aim is to produce heat 1 900 MWh/a.

The plant is operated and managed by co-operative. Their job is to supply the fuel, manage the basic maintenance operations (chimney sweeping, greasing) and manage on-call duty. The co-operative is paid for by the amount of heat (in MWh) generated.

Background and the decision-making

In Toivakka the possibility of heating with wood chips was first studied in 1994. At that time decision was left undone, but the idea of wood heating stayed alive. During the years of 1997-1998 the municipality of Toivakka was actively involved in a project to promote heat entrepreneurship in Central Finland by Forestry Centre of Central Finland. In the beginning of the project the decision-makers decided to update the study made back in 1994. The study was updated by Elomatic Oy from Jyväskylä. The update clearly showed heating with wood chips to be less expensive than heating with oil at that time. The municipality still decided not to realise the plant.

During the project the possibility of using heat entrepreneurship in Toivakka was already studied. When the municipality refused to realise the plant the co-operative to be established decided to make an offer to invest the plant and start heating municipal network. In Toivakka the network was already existing but oil was used for the heating. After receiving the offer the municipality had to react in some way. The municipality didn't accept the offer, but decided to once more study the possibility of establishing wood heating themselves. Elomatic Oy updated once more the study in 2000 and the municipality made the decision to build a heating plant in 2001.

Building the plant

After making the decision to build the plant the next obstacle was to decide where to put the plant. The site for a plant was already chosen, but it needed exceptional permit and environmental permit. The permits were granted in 2001 and the building could be continued to this site as planned. An appropriation was granted in December of 2001.

In the beginning of the year 2002 started the draw up for the acquisition documents and request for offers from the manufacturers. Offers were received during the spring and Tulostekniikka Oy was chosen to be the supplier for the plant.

The building started in August and in September the walls of the new heating plant started to rise in the scenery. The heating plant was ready for production at the end of October, right on schedule.

Establishing the co-operative

In August a meeting was held at Forest Management Associations premises on how to supply the fuel to Toivakka heating plant and how to manage the operation of the plant. Present were the representatives of the forest management association, a couple of land owners from Toivakka and representatives of Heat Entrepreneurs project. In the meeting it was decided to establish a co-operative, VakkaLämpö (VakkaHeat) and make an offer to the municipality to supply the fuel and operate the plant.

In September the municipality sent offer requests for several instances either to supply only the fuel to the plant or to supply heat (fuel + operation of the plant). VakkaLämpö made an offer to supply heat to the municipality. The municipality received several offers, the best being the one from VakkaLämpö and so the choice was easy to make.

The contract

The contract was made between the municipality and the co-operative and the heating started in the end of the year 2002. The contract time was settled for 3 years.

The Fuel

The main fuel used is wood chip produced by the co-operative from the local forests.



Technical Information

Heating system	Tulostekniikka Oy
Boiler	Thermia Oy
Rated Heat output	700 kW (at 55%)
Fuel moisture content	< 60%
Fuel particle size	up to 100mm
Chip store volume	200 m ³
Capital cost (excluding grants)	300 000 €
Amount of heat sold	1 900 MWh/a
Approximate simple payback	11 years