Developing Woodfuel Production and Use in South East Wales
A report for the South East Wales Energy Partnership

Authors: Andrew Tolfts and Sam Whatmore
Date: March 2011

With support from:
Developing Woodfuel Production and Use in South East Wales
A report for the South East Wales Energy Partnership

Executive Summary

Commissioned by the South East Wales Energy Partnership, this report looks at the ways of developing woodfuel production and supply in South East Wales, and focuses on virgin timber.

Currently c. 25 heat only installations operate on woodfuel, using around 2,500 tonnes of wood pellet or wood chip annually. Boilers currently planned in the public and private sector, including large installations such as the district heating scheme at The Works in Ebbw Vale will increase demand over the next 5 years as shown in Table i.

<table>
<thead>
<tr>
<th>Source</th>
<th>Gross potential (green tonnes)</th>
<th>Available for wood fuel (green tonnes)</th>
<th>Potential wood fuel (30% moisture content)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEWEP woodlands</td>
<td>144,427</td>
<td>28,274</td>
<td>20,195</td>
</tr>
<tr>
<td>Arboricultural arisings</td>
<td>19,975</td>
<td>10,465</td>
<td>8,222</td>
</tr>
<tr>
<td>Sawmills</td>
<td>50,000</td>
<td>50,000</td>
<td>35,714</td>
</tr>
<tr>
<td>Woodlands in neighbouring counties</td>
<td>472,648</td>
<td>72,376</td>
<td>53,840</td>
</tr>
<tr>
<td>Total</td>
<td>687,050</td>
<td>161,115</td>
<td>117,971</td>
</tr>
</tbody>
</table>

Table ii Woodfuel potentially available in the SEWEP area.

These figures show there is considerable opportunity to increase the number of woodfuel installations in the SEWEP area. Biomass heat provides the cheapest carbon saving per £ of capital investment – and has additional advantages of local employment and stimulation of woodland management.

Both wood pellet and wood chip fuel are currently used. Logs generally supply small mostly domestic systems, making it difficult to estimate current usage. To date there has been an unusually high proportion of pellet boilers installed relative to chip boilers, when compared with other areas of the UK. Reasons for this include:

- the relative ease of retrofitting pellet systems to replace coal and oil boilers – reduced storage requirements and ease of delivery into confined sites;
- a record of successful pellet installations leading to confidence in the technology;
- availability of a national framework purchase agreement for pellets and several companies offering national delivery reduces perceived risk in fuel procurement, in contrast to wood chip where local suppliers are the norm;
- an impression that wood chip systems have lower reliability and availability due to teething problems with some systems in the region;
- the lack of local wood chip production using locally produced timber (this is unlikely to develop in the absence of demand, a significant market failure).
The balance between pellet and chip is likely to change in the future, with large new build projects able to make efficient use of cheaper chip. Other, smaller chip boilers will be installed as the wood chip supply chain develops and gives the market confidence in chip as a viable and reliable product. Although there will continue to be pellet installations, this report has focussed more on wood chip as there is currently a market failure in a woodchip supply chain not already having been established, and there are considerable advantages to the establishment of one. By contrast, the wood pellet supply chain will continue to develop on its own.

Arboricultural arisings cannot be used to make wood pellet, whereas with appropriate conditioning and processing can enter the wood chip supply chain. Using local timber (including arboricultural arisings) for local heat is c.85-90% efficient, compared to c.25% efficiency for biomass power - therefore using this material for local heat, rather than power generation, appears to be the best usage of a resource.

Intervention to correct this market failure will help ensure a supply chain is built and arboricultural arisings are used in local wood heat.

The Renewable Heat Incentive announced in March 2011 is intended to significantly increase the uptake of biomass heat towards the 2020 target of 12% of heat from renewable sources. This will provide a good “demand pull” which should stimulate the local supply chain. However, there is a risk that without intervention to establish production within the SEWEP area wood fuel will be brought in as pellets or chip rather than being made locally. This would leave local woods undermanaged and forego the local economic, employment and environmental benefits of wood fuel production.

Therefore, different options for wood fuel hubs were modelled in detail, including comparison of:

- one or two large hubs;
- a larger number of smaller hubs; and
- woodland based production

Woodland based production was ruled out as impractical when serving a multiple small users. The analysis showed that a large production hub provided significant cost savings compared to small hubs in investment per tonne of production capacity and operating costs per tonne of chip processed so a large hub was recommended as the most viable. The indicative initial investment costs for setting up a small (4,000 t/yr) and large (10,000 t/yr) production hub are £180k and £240k respectively.

The larger hub is recommended as the best long term option provided that demand can be developed in line with the growth in capacity. To make best use of arboricultural arisings a large production hub will need to be supported by a series of smaller timber collection points which could be co-located with other facilities such as waste transfer stations or household waste recycling sites.

The report further recommends a model of the local authorities in the SEWEP area investing in the fixed infrastructure of a site and renting the site to a private sector wood fuel company who would provide the mobile equipment and personnel to operate the site and take the commercial risk.

This model offers advantages to both the public sector and the private sector site operator.

- The public sector site owner gains a secure supply of fuel for their own chip boilers, and an outlet for timber they produce which maximises local benefits. It also helps to overcome the market failure which has lead to woodfuel production not already being in place. Finally the local authority has no need to manage the site on a day to day basis.
- The private sector investor gains from a reduced need for capital investment in the site which enables a commercial return to be made after 5 – 7 years, matching the expected life of much of the equipment. They also have a source of timber and a route to market in local public sector boilers (although this would still have to be in competition with other wood fuel suppliers).
- The financial analysis indicates a commercial rate of return for the local authority site owner over a 20 year period and a viable business case for the private sector site operator over a 5 year period.

In view of the market failure which makes it unlikely the private sector will invest in a production hub soon, the use of public funding (and European grants) could be justified in setting up a wood fuel production hub.
Other recommendations to support the sector as wood fuel use increases are:-

1. Build demand for Premium Grade woodfuel, including through:
   a. development & promotion of exemplar projects;
   b. having a planned programme of boiler installations;
   c. a “consider biomass first” policy for new and replacement boilers;
   d. matching boiler specification to available fuel quality;
   e. set a target of 50,000 t/yr of wood fuel use by 2020;
   f. making full use of the financing opportunities presented by the Renewable Heat Incentive, including ESCo services.

2. Ensure that woodfuel installations are successful. Achieve this by
   a. learning from experiences and mistakes elsewhere;
   b. using experienced operators and partners to avoid unnecessary re-learning at a time when mistakes will be very costly to the market’s confidence in woodfuel;
   c. providing a “hand-holding” service to help woodfuel users through the design, installation and set-up phases of woodfuel.

3. Take action to increase the availability of timber from woodlands to feed into the supply chain in cooperation with the Forestry Commission

4. Procurement of wood chip needs to be different from the traditional methods to attain the local advantages that wood fuel can bring. Long term contracts which appoint a single supplier for a particular installation, rather than call-off agreements, will have a significant effect on the development of the local wood fuel supply chain.

While woodfuel is an important product from woodland management, there are a range of other (higher value) products, such as sawlogs etc, which should be maximised ahead of woodfuel.

Consultees on the project included SEWEP partners, Forestry Commission, local authorities, operators of existing biomass installations, existing woodfuel suppliers in the area and tree surgery contractors operating in the area.
Developing Woodfuel Production and Use in South East Wales
A report for the South East Wales Energy Partnership

Contents

Executive Summary ........................................................................................................................................... 2

1  Background ............................................................................................................................................... 7
  1.1  Objectives ........................................................................................................................................... 7
  1.2  Policy context ....................................................................................................................................... 8

2  The available wood resource .................................................................................................................. 10
  2.1  From woodlands ................................................................................................................................. 10
  2.2  From urban trees and woods ............................................................................................................. 18
  2.3  From sawmills and wood yards ......................................................................................................... 20
  2.4  Existing and potential wood fuel suppliers ....................................................................................... 20
  2.5  Summary of woodfuel availability ................................................................................................. 22

3  Opportunities to add value to timber in the wood fuel supply .................................................................. 23

4  Woodfuel end users .................................................................................................................................. 29
  4.1  Current woodfuel use ....................................................................................................................... 29
  4.2  Choosing between pellet and chip.................................................................................................... 32
  4.3  Growth in demand ............................................................................................................................ 33

5  Developing a wood fuel supply chain ...................................................................................................... 35
  5.1  Price trends for wood fuel ................................................................................................................ 35
  5.2  Basic requirements for a wood fuel production site ........................................................................ 36
  5.3  Production site location in the SEWEP area .................................................................................... 36
  5.4  What type and size of hub? ............................................................................................................... 37
  5.5  Operation of the hub ........................................................................................................................ 45
  5.6  Recommendations and next steps .................................................................................................... 49
  5.7  Risks .................................................................................................................................................... 51
  5.8  Financing a wood fuel hub ............................................................................................................... 53
  5.9  Procurement of wood fuel by end users ......................................................................................... 57
  5.10  Price trends for wood fuel .............................................................................................................. 58

6  Overcoming barriers to the growth of a woodfuel industry ..................................................................... 60
  6.1  Experience at other local authorities .............................................................................................. 60
  6.2  Demand-side barriers to wood fuel development .......................................................................... 63
  6.3  Supply-side barriers to wood fuel development ............................................................................. 64
  6.4  Measures to overcome barriers ...................................................................................................... 66

7  Workshop for fuel producers and users .................................................................................................. 70

8  Recommendations to develop wood fuel use and supply ...................................................................... 71

References ..................................................................................................................................................... 73
Appendices .................................................................................................................................................... 74
Glossary

sustainable yield  the maximum amount of timber that can be harvested annually without reducing future harvests

RED  EU Renewable Energy Directive 2009

WID  European wide EU Waste Incineration Directive

Yield class  the maximum mean annual growth rate for an area of even aged woodland expressed as m³/ha/yr

FC woodlands  Welsh Assembly Government woodlands managed by the Forestry Commission

BTC  Biomass Trade Centres, Austrian concept of a central point where all forms of wood fuel are available, with guarantees of quality

arboricultural brushwood chip  small branches chipped on site by tree surgeons to reduce volume for transport. May contain a large proportion of leaves in the growing season.

RHI  Renewable Heat Incentive is a scheme introduced by the UK government to stimulate the uptake to all forms of renewable heating, including wood heating.

WEBS  Wood Energy Business Scheme. Grant scheme administered by FC Wales to support investment is all stages of the wood fuel supply and use chain.

Energy crops  perennial crops planted specifically for production of biomass for energy. The two main types are Miscanthus (elephant grass) and SRC although other species are also grown.

SRC  Short Rotation Coppice. Densely planted (15,000 stems per ha) trees usually willow, that are harvested at short intervals (usually every 3 years) for energy production.

IRR  Internal Rate of Return. The equivalent of the interest rate earned by an investment in a new project or business

Step grate boiler  a boiler design that allows the use of high moisture content fuel up to 50%. More common in larger systems.

Underfed hearth boiler  boiler design often found in smaller wood boilers which requires fuel at a maximum of 35% moisture content.

ESCO  Energy Services Company that will supply, maintain and operate a boiler charging the user for the heat consumed.

SME  small and medium sized enterprises, that is employing fewer than 250 people and with less than €50m turnover.

Shadow price of carbon  The shadow price of carbon is based on estimates of the lifetime damage costs associated with greenhouse gas emissions. It was developed in by the UK Government in 2007 but has now been superseded by a new estimate the Social Cost of Carbon (SCC).

CRC  Carbon Reduction Commitment Energy Efficiency Scheme requiring a year on year reduction in CO₂ emissions, for larger organisations with ½ hour electricity meters. Liability to make payments to the government is reduced by cutting energy consumption. Renewable electricity production does not reduce liability.

Climate Change Levy  Tax on larger users of fossil fuels which can be avoided by using renewable energy
Developing Woodfuel Production and Use in South East Wales
A report for the South East Wales Energy Partnership

1 Background

The South East Wales Energy Partnership (SEWEP) was formed with the objective of being the focus for sustainable energy in South East Wales and to bring together a number of organisations to create a step change in the implementation of renewable energy projects. The partnership believes that there are clear benefits from taking a strategic approach to energy efficiency and renewable energy and brings together 6 Local Authorities: Torfaen, Blaenau-Gwent, Caerphilly, Bridgend, Merthyr-Tydfil, Rhondda Cynon-Taff and a range of other partners including WAG, the Carbon Trust, Forestry Commission Wales, and the Energy Saving Trust.

The area is the most densely populated region of Wales. The six boroughs have a combined population of 747,100 (2001 census). Cardiff is home to a further 305,300 people. The project brief was to look at local authority and Forestry Commission woodlands.

Figure 1 The SEWEP study area shown in blue (map modified from map on SE Wales Energy Advice Centre website, http://www.homegrants.org.uk/about.php).

1.1 Objectives

This report focuses in virgin timber. It follows the 2008 report prepared by AEA for SEWEP which identified timber produced by Local Authorities as a potential source of renewable energy. The objective of this project was to investigate the feasibility of establishing a quality woodfuel supply chain in the SE Wales region. This includes:

- quantifying existing and potential woodfuel sources
- identifying barriers to access of the resource and recommending how these can be removed
- the development of sustainable business models for operation which suit the objectives of SEWEP and which identify existing/planned end users.
- identifying key stakeholders across the supply chain and issues significant to them.

A thriving woodfuel sector brings economic environmental and social benefits including:
- a secure and economically attractive source of heating;
- a cost effective reduction in CO₂ emissions. Wood heating has one of the lowest costs per tonne for avoided emissions after energy efficiency measures;
- less waste for disposal in landfill or by other means where arboricultural arisings are used for fuel;
- enhanced biodiversity values in woodland that are managed as a result of demand for fuelwood;
- increased local employment and economic activity; and
- very often, a sense of ownership from people who have wood heating supplied from local woodlands.

Woodfuel is commonly available in three forms, logs, wood chips and wood pellets. When grown in well managed woodlands and forests all are sustainable. The level of processing increases from logs to wood chip to pellets. Each form has attributes that suit it for use in different situations but consistently high quality is necessary for use in modern, efficient boilers and stoves.

<table>
<thead>
<tr>
<th>Firewood logs are:</th>
<th>Wood chip is:</th>
<th>Wood pellets are:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>locally produced, often from tree surgery arisings</td>
<td>bulky, low density</td>
<td>almost 3 times the density of chip</td>
</tr>
<tr>
<td>available from a large number of producers</td>
<td>variable</td>
<td>uniform size and moisture content</td>
</tr>
<tr>
<td>of variable quality and price</td>
<td>relatively low value; so</td>
<td>around 50% higher in price per kWh than chip</td>
</tr>
<tr>
<td>easily supplemented with 'found' timber and biomass briquettes</td>
<td>best produced close to point of use,</td>
<td>often imported but with more UK producers setting up</td>
</tr>
<tr>
<td>low energy use in processing</td>
<td>better environmentally</td>
<td></td>
</tr>
</tbody>
</table>

Applications include domestic heating, log stoves and gasifying boilers.

Applications in heat-only boilers and CHP plants at larger than domestic scale.

Applications at all scales, from domestic pellet stoves to large boilers for public buildings.

| Typical cost: £50 – 75 per Transit load or £85 – 130/t i.e. 2.6 - 4.0p/kWh | Typical cost £90 - 110/t @ 30% moisture content i.e. around 2.8 – 3.4p/kWh | Typical cost £250/t @10% moisture content i.e. up to 5.2p/kWh |

Table 3 Comparison of the three most commonly used forms of wood fuel

1.2 Policy context

There is a favourable policy environment for the promotion of biomass as a renewable energy source at all scales from European to local. The EU, amongst other initiatives issued the 2009 Renewable Energy Directive (RED) setting a binding target of 20 per cent of the EU’s energy consumption coming from renewable sources by 2020. The UK share of this target commits us to producing 15 per cent of our energy from renewable sources by 2020.

Heating accounts for 47 per cent of total UK final energy consumption and more than three-quarters (77 per cent) of energy use across all non-transport sectors. The UK government has set a target of 12 per cent of heat generation from renewable sources by 2020. Plans to achieve this and policy commitments have been set out.

1 Energy Consumption in the UK. DECC 2010
in the 2009 UK Renewable Energy Strategy and Low Carbon Transition Plan. To accelerate installation of renewable heating across the UK the Renewable Heat Incentive (RHI) is to be introduced in July 2011 for non-domestic buildings and will be extended to single domestic properties in 2013 (see section 5.7 for details of the RHI).

The Welsh Assembly Government (WAG) has endorsed bioenergy - and wood fuel in particular - through a series of policy documents as indicated below:

February 2009  
**Consultation for a Bioenergy Action Plan for Wales**  
pp6 – 9 list actions for the Welsh Assembly Government which would promote bioenergy. Actions 1 – 13 and 26 – 34 are specifically concerned with the promotion and development of solid biomass, mainly wood fuel.

May 2009  
**One Wales: One Planet**  
The section on Environmental Strategy includes reference to biomass for energy from woodlands as a part of the sustainable forestry strategy through *Woodlands for Wales*, the Wales Woodland Strategy.

November 2009  
**Low Carbon Wales**, produced by the Sustainable Development Commission  
Chapter 6 outlines how renewable energy and in particular biomass boilers and district heating has potential to make a significant contribution to a Low Carbon Wales.

March 2010  
**WAG Energy Policy Statement**  
This states that there should be 20,000 micro-heating systems by 2012 and 100,000 by 2020. Most of these are likely to be solar hot water installations but some will be wood fuelled boilers. The potential impact of the WEBS programme is noted.

July 2010  
**Planning for Renewable and Low Carbon Energy - A Toolkit for Planners**  
Guidance and worked examples for planning for renewable energy at county and community level covering all types of renewable energy. Biomass is included alongside other renewables and technologies such as district heating in an integrated package. Prepared by AECOM for the WAG.

September 2010  
**Biomass Action Plan for Wales: progress report**  
Reports against actions identified in 2009, notably through WEBS2 programme and Carbon Trust Biomass Heat Accelerator. Actions by NHS Wales, the search for community led biomass district heating ad CHP. On supply: support for improved woodland management, tree planting campaigns and training for forestry practitioners are all noted.

More locally within SE Wales the Heads of the Valleys (HoV) programme has been a focus for many activities including in the forestry sector. Forestry can contribute to achieving some of the goals set out in the 2006 strategy for the area (*Turning Heads . . . A Strategy for the Heads of the Valleys*). The HoV comprises almost half the area of the six County Boroughs comprising the study area. The Heads of the Valleys Woodland Plan was completed in October 2010 and included a section on woodfuel which provided valuable guidance when considering the woodfuel potential of the wider SEWEP area.

In addition woodfuel heating has been encouraged in new builds by BREEAM and the Code for Sustainable Homes.
2 The available wood resource

This report considers only virgin timber, that is timber that has not been treated with chemicals or used for any purpose. It includes aboricultural arisings and by-products from primary processing such as sawmill offcuts and chips. In some circumstances virgin timber can be regarded as waste (e.g. where garden arisings are collected at a civic amenity site). Exemptions in the waste management regulations allow this to be processed in the same way as non-waste virgin timber. Virgin timber may be used in all boilers.

The available wood resource excludes timber from woods that cannot be harvested due to physical inaccessibility, is not cost effective to harvest, or should be retained for its ecological, cultural and social values. The consultants did not consider the expansion of the wood supply through new planting of woodlands or energy crops where the balance between energy production and other land uses such as food production needs to be carefully considered.

Non-virgin waste timber is not considered in this report, despite there being a considerable quantity available in SE Wales. This is because:

- the regulatory regime for waste timber is much more rigorous than for virgin timber and unless it can be clearly demonstrated that the timber is uncontaminated it has to be used in Waste Incineration Directive (WID) compliant boilers. These are fitted with flue gas monitoring and pollution prevention equipment which are only cost effective at large scale.
- different processing equipment is required so virgin and non virgin timbers cannot easily be processed in the same facilities.
- a supply chain for waste timber already exists supplying reclaimed timber to panel board mills, large power stations and niche markets such as horse bedding.
- there is competition from panel board producers who do not require such a clean product as fuel producers.

The local authorities in the SEWEP area control or can access supplies of locally grown virgin timber. Managing local woods and trees brings environmental and economic benefits to local communities so using virgin timber is seen as a high priority. It is well documented that well managed woodlands produce a wide variety of social, environmental and economic benefits, and management often increases the productivity of the woodlands themselves.

2.1 From woodlands

2.1.1 Potential yield from all woodlands

For consistency this study has adopted the growth rates and reduction factors for other uses, site constraints etc. used to give available volume in the HoV woodland plan – Appendix 6. This is a recent document, and covers approx 50% of the SEWEP area; all of the HoV area is within the SEWEP area.

There is an argument that the composition & structure of woodlands further down the valley is significantly different to the HoV woodlands, in particular that they contain more broadleaves and have easier terrain. If this is true the estimates included in this report for the SEWEP area as a whole would err on the conservative side.

No woodland area data was available from the Forestry Commission for the SEWEP area, and so estimates were used. Overall, however, it should be noted that because timber moves very easily in and out of the area, there are much larger timber resources within economic transport distance of the SEWEP area.

Woodlands within the SEWEP area

The area of woodlands in the study area was unavailable from the Forestry Commission (FC) and so was estimated, to include both Forestry Commission and private woodlands. In general, access constraints are less in FC woodlands than privately owned woods and FC woodlands are already actively managed with existing markets for the timber produced. The greatest potential for additional production is from private woods.
The estimation of potential wood fuel availability in this report has adopted the assumptions for the mid-range estimate in the Heads of the Valleys Woodland Plan. These reflect current constraints to management, the pull of existing markets and current woodfuel prices. The yield class estimates are those agreed in consultation with the FC for the HoV Woodland Plan and are conservative, particularly as areas at lower elevation than the HoV area are included in the SEWEP area. The estimate is given in Table 4.

<table>
<thead>
<tr>
<th>Woodland type</th>
<th>Total Woodland (ha)</th>
<th>Yield class estimate (m³/ha/yr)</th>
<th>Annual woodfuel (Green tonnes)*</th>
<th>Annual woodfuel (green tonnes) after access constraints (50% accessible)</th>
<th>Annual woodfuel (green tonnes) after other markets (30% conifer, 80% broadleaved &amp; mixed available)</th>
<th>Annual seasoned tonnes (30% mc)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broadleaved</td>
<td>3,195</td>
<td>3.5</td>
<td>11,183</td>
<td>5,591</td>
<td>4,473</td>
<td>3,195</td>
</tr>
<tr>
<td>Conifer</td>
<td>9,076</td>
<td>13.0</td>
<td>117,989</td>
<td>58,994</td>
<td>17,698</td>
<td>12,642</td>
</tr>
<tr>
<td>Mixed</td>
<td>2,774</td>
<td>5.5</td>
<td>15,256</td>
<td>7,628</td>
<td>6,102</td>
<td>4,359</td>
</tr>
<tr>
<td>TOTAL:</td>
<td>15,045</td>
<td>144,427</td>
<td>72,214</td>
<td>28,274</td>
<td>20,195</td>
<td></td>
</tr>
</tbody>
</table>

* assumes 1 solid cubic metre of timber = 1 green tonne.

**NOTE** – 1 seasoned tonne is equivalent to approx 4 bulk cubic metres of finished woodchips. Confusion between solid cubic metre and bulk cubic metre of finished chip is very easy.

Table 4  Estimate of timber availability from woodlands within the SEWEP study area

20,000 tonnes represents 70,600 megawatt hours of energy, sufficient for 4 or 5 large industrial applications; 20-30 schools; or the heat used by approximately 4,700 households.

**Timber from woodlands outside the SEWEP area**

Table 4 shows the timber available from the 6 county boroughs belonging to SEWEP. However, timber is commonly transported over quite long distances and so it is not realistic to include only woodlands located within the study area. For wood fuel this can be justified as the energy used in transport on an articulated lorry is only a small proportion of energy embodied in the timber (Figure 2).

![Carbon cost of wood chip production & delivery](image)

**Figure 2**  Effect of increasing transport distance on CO₂ emissions savings.

---

July 2010, Land Use Consultants for FC Wales, Woodfuel potential and opportunities in the Heads of the Valleys Region, Appendix 6 of the HOV Woodland Plan.
In its 2008 report for the SEWEP partnership AEA Technology\(^3\) used a radius of 100 miles to assess the availability of wood. This includes almost all Wales and much of SW England and the Midlands. It does not consider competing uses and users of the wood so does not give much insight into how much is likely to be available to wood fuel users in the SEWEP area.

The large areas of forest planted in the south of the old areas of Powys and Dyfed and in Glamorgan and Gwent are potentially available to the SEWEP area which contains the largest centre of population in Wales (Source: National Inventory of Woodlands & Trees, Forestry Commission. Note old administrative districts were used in the Inventory). The total area of woodland used in estimating the available wood fuel resource is shown in Table 5. Table 6 shows the likely availability of woodfuel using the same assumptions on accessibility and competing uses as for the SEWEP area in Table 4.

### Table 5
Area of woodland in SEWEP and surrounding areas. Source: Adapted from National Inventory of Woodlands & Trees, Forestry Commission

<table>
<thead>
<tr>
<th>Woodland type</th>
<th>Glamorgan (ha)</th>
<th>Gwent (ha)</th>
<th>Powys (25% of total ha)</th>
<th>Dyfed (10% of total ha)</th>
<th>Total (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broadleaved</td>
<td>15,910</td>
<td>9,781</td>
<td>10,738</td>
<td>3,517</td>
<td>39,946</td>
</tr>
<tr>
<td>Conifer</td>
<td>19,067</td>
<td>5,425</td>
<td>5,575</td>
<td>3,217</td>
<td>33,284</td>
</tr>
<tr>
<td>Mixed</td>
<td>3,388</td>
<td>2,928</td>
<td>1,266</td>
<td>522</td>
<td>8,104</td>
</tr>
<tr>
<td>TOTAL:</td>
<td>38,365</td>
<td>18,134</td>
<td>17,579</td>
<td>7,256</td>
<td>81,334</td>
</tr>
</tbody>
</table>

* assumes 1 cubic meter = 1 green tonne

### Table 6
Estimate of timber availability from both woodlands within the SEWEP study area and neighbouring areas

The potentially available woodfuel in the wider area around the SEWEP area represents 261,340 MWh of energy annually, enough to heat 17,450 homes at current consumption levels. Many more could be kept in comfort in homes built with high standards of air tightness and insulation.

Timber from nearby areas of England, for example the Forest of Dean or Hereford might also be available to users in the SEWEP area but there is increasing competition for fuel wood supplies as consumption rises across the UK.

**Additional woodland timber**
These estimates are based on the harvesting of stem wood. Some baling of brash for larger power stations already takes place but this will not produce the high quality chip required by smaller heating boilers.

\(^{3}\) AEA Technology, 2008, *South East Wales Energy Partnership Consultancy, Appendix 5: Biomass availability in SE Wales*
Whole tree chipping is used in other European countries to provide chip for heat only boilers and could increase wood fuel yields by up to 25% compared to harvesting only stem wood. Whole tree harvesting is particularly effective in increasing yields from early thinning operations. Increased removal of nutrients in whole tree harvesting has been reported to decrease yields in later harvest cycles and restrictions on the extent of whole tree harvesting may be appropriate - in SE Wales this would apply particularly to reclaimed coal spoil sites with poorly developed soils. In countries such as Finland whole tree harvesting is permitted on only a proportion of the area (25%) to maintain site productivity.

Similarly, stumps are commonly harvested in both Sweden and Finland for use in local heating and CHP schemes. They are now harvested in Scotland for use in large power stations. However, a decision has been made not to harvest stumps in Wales in view of drawbacks to the technique including:

- Increased soil damage due to compaction, rutting and disturbance leading to erosion and increased turbidity and siltation of local watercourses.
- Removal of essential major and micronutrients (e.g. nitrogen, phosphorus, potassium and boron), leading to lower soil fertility, and potential loss of tree growth in subsequent rotations.
- Removal of base cations (calcium, magnesium, sodium and potassium) reducing soil buffering capacity and leading to increased soil and stream water acidification.
- Increased carbon loss from disturbed soil after stump harvesting leading to reduced soil carbon stock.

Guidelines for stump harvesting are developing to ensure that soil disturbance and nutrient loss are kept to acceptable levels. Different processing equipment is required to achieve acceptably clean chip.

Woodlands in the southern part of the study area are at lower elevation, tend to be smaller and broadleaf rather than conifer, and are more integrated into the farmed landscape. Woodlands alongside streams and rivers are relatively common. Further down the valleys near the M4 the woods there are larger broadleaved woods on flatter land. Coed Cymru has worked with the owners to bring some of these woods into management. Further management of these types of woodland will increase the availability of timber in the area.

2.1.2 The Local Authority woodlands and timber resource
The 6 county boroughs of the SEWEP area control significant woodland and tree resources but their management is split between several officers in each borough. Woodland officers, tree officers, countryside managers, highways and street management departments all have an interest in trees. Technical support for woodland management is available from organisations such as Coed Cymru.

Only one borough (Torfaen) has a formal woodland management plan and the lack of consolidated information about the extent of the woodland, species planted and ages make it impossible to reliably estimate the potentially available timber from council woodlands in the SEWEP area.

Management does not have timber production as a main aim and woodland management is often looked at as a cost item, or at best as cost neutral. The principal objectives stated by woodland officers are biodiversity enhancement and to provide areas with good access for recreation and enjoyment. There is no recent history of management for timber production on a commercial basis, in part because many of the woodlands on reclaimed areas planted from the 1970s to 1990s are growing relatively slowly. They have not been profitable to thin and have depended on grant financing for management operations.

Several of those consulted reported that thinning was often done without extracting the timber due to poor accessibility. Very often forestry contractors find it uneconomic to extract felled timber because of site constraints even when it is available at no cost. Felling costs using motor manual methods are high because of the terrain and extraction is reported to cost £25/tonne in addition to the cost of felling. These costs are

---

4 see [http://www.forestry.gov.uk/fr/INFD-7PSJ7P](http://www.forestry.gov.uk/fr/INFD-7PSJ7P) for details
5 For example, Vaughan Lewis, Blaenau Gwent BC and Gareth Henson, Coed Cymru
6 Gareth Henson, Coed Cymru, personal communication
consistent with harvesting and extraction costs of £40 per tonne reported by the CLA\(^7\) for sites constrained by steep slopes and poor access.

The sale price for hardwood firewood (ash) stacked at ride side is reported to be £40/tonne, at the top of the price range reported from other UK regions. Where access is difficult for timber lorries or the site is remote extraction and use are often judged to be unviable.

Over time, increasing timber values will make extraction of timber financially viable from more sites.

When combined with the timber and chip resulting from management of trees in streets and parks and around public housing the 6 councils control or influence a significant timber resource. The concept of the councils using their own timber to make chip for use in their own boilers is very satisfying. However, it is impractical, at least at the moment since:

- the management of the resource is split between several officers in each council making planning difficult
- production costs in many council woodlands are high and little management is taking place whilst the replacement for previous grants are awaited.
- urban tree work is carried out by a large number of small contractors

Coordinated, planned management of local authority woodlands would enable easier access to grants when they are reintroduced and enable several objectives to be achieved (e.g. biodiversity and public access) while providing timber for woodfuel.

If council controlled timber is sold to a local wood chip production site and then chip bought from that site for use in the council’s boilers, a “closed loop” or virtuous circle is established that maximises benefits to the council. Management of the woodland can continue according to the management plan and not be unduly influenced by woodchip requirements – in years when the council’s timber supply is in excess of their boilers’ requirement, the timber can be used in other boilers; and in years when their timber production is low, the woodfuel hub can buy-in material from elsewhere to augment supply. Demonstrating use of their own timber for wood fuel production and then for local heating can engender a real sense of ownership for local communities. It also minimises transport requirements and environmental impacts.

### 2.1.3 Constraints to timber production for wood fuel

**Woodlands on contaminated land**

Details of the area and location of woodlands planted on colliery waste are not readily available (Gareth Henson, pers.comm.) although the area is known to be significant. Elevated levels of some metals may occur in soils in these areas. Bioaccumulation of these metals in trees can occur, particularly when they are growing in very acid soils which tend to mobilise the metals. The more mobile elements such as cadmium and zinc can accumulate in the above ground biomass of some species and so might enter the wood fuel supply chain\(^8\). Levels of accumulation are reportedly low but the extent of any contamination and its implications for use of timber as fuel should be assessed.

The current regulatory regime allows the unrestricted use of timber grown on reclaimed land. The Environment Agency’s position statement\(^9\) on waste wood states clearly that freshly harvested timber is virgin timber and that “virgin timbers are not waste and are not subject to waste regulatory controls provided they are certain to be used for purposes to which virgin wood is commonly put.” These uses include fuel. Harvested timber would not become waste unless discarded for any reason. Under the waste regulations an exemption is available for processing and sale of virgin timber.

---

\(^7\) CLA, November 2009, Stakeholder working group in preparation for RHI

\(^8\) Hutchings T, 2002, *The Opportunities for Woodland on Contaminated Land*, Forest Research information Note 44, Forestry Commission

\(^9\) Environment Agency Position Statement 005, Version 1.0, issued June 2008
However, in view of the possible levels of contaminants found in timber from reclamation sites further advice on its suitability for use as wood fuel should be sought. It is recommended that the area of woodlands on contaminated land be investigated and the degree of risk assessed in future work.

**Difficulties managing small woodlands**

There are particular problems in bringing small woodlands in SE Wales into active management. These include:

- no harvesting equipment appropriate for small woodlands. Most equipment is large and designed to work in extensive upland plantations. Suitable equipment is available and is beginning to be used elsewhere, for example tractor based timber harvesters suitable for use in small woodlands and early thinnings, see Box 4.
- a dwindling number of contractors doing motor manual felling as older contractors retire. Many newly qualified operators opt for arboricultural work rather than production work in the woodlands.
- when timber has been felled and extracted there is a lack of timber lorries able to reach the smaller woodlands where access is limited. With the growth of demand from biomass power stations almost all timber hauliers are engaged in this work and have bought large articulated vehicles
- higher costs due to small size in all aspects of woodland work from planning through to harvesting
- lack of knowledge and motivation from small woodland owners such as farmers for whom forestry is a small part of their overall business
- security for machinery and timber is a serious problem in the Valleys - both in a conventional vandalism and theft sense but also in terms of an embedded cultural attitude that many people genuinely believe piles of wood by the road are “free”. This increases the cost per tonne of timber delivered to the customer by an as yet unquantified amount.

2.1.4  Making more timber available

Market demand and increasing returns to woodland owners are the main drivers for increased timber production. Increased demand for fuelwood is the largest structural change in the timber market for a generation and follows 20-25 years of declining timber prices in real terms, see Figure 3. If the experiences of countries such as Germany and Sweden are mirrored in the UK recent price increases are likely to be sustained and enhanced as the wood fuel sector grows.

![Figure 3](image-url)  
**Figure 3**  Coniferous Standing Sales Price Index for Great Britain, (Fisher Index year ending September 2006 = 100, real terms).  

The Renewable Heat Incentive (RHI) will allow wood fuel users to pay more for fuel and still be competitive with fossil fuels. The details of the scheme were announced on 10\(^{th}\) March 2011 and it will be brought into operation in July 2011\(^{10}\). It is designed to lead to rapidly increasing demand for all types of locally produced woodfuel reinforcing the recent trend of increased prices and production. Just 1 pence per kWh from the RHI passed back

---

\(^{10}\) for RHI details see [http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/policy/incentive/incentive.aspx](http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/policy/incentive/incentive.aspx)
to the woodland owners would increase timber prices by £25 per green tonne. This would make management of many more woods viable. Further details of the RHI are given in Section Error! Reference source not found. and 5. The effect of increasing woodfuel prices on the area of woodland managed and thus potential wood fuel production is illustrated schematically in Figure 4.

![Figure 4](image-url)  
**Figure 4** The impact of increasing woodfuel prices on area of woodland managed. Illustrative only

Higher prices will also encourage additional production from other sources of woodfuel, for example from waste wood, increased processing of tree surgery arisings, or short rotation coppice. As production increases prices will stabilise and may fall back. Over the next 10 years wood fuel prices are likely to be volatile around an underlying trend for increasing real prices that may well match increases in fossil fuel prices.

While direct subsidies for wood fuel production are exceedingly unlikely, grants targeted to improve availability of woodfuel are possible. They can increase the capacity of woodlands and woodland owners to respond quickly to increased demand and so tend to reduce the price volatility that would otherwise result from supply bottlenecks. In England a grant scheme designed to increase woodfuel production (and gain other public benefits such as enhanced biodiversity) is planned. The Woodfuel WIG (Woodland Improvement Grant - see Box 1) will be introduced in 2011. It includes support for internal roads and access, and restoration of management such as coppicing and thinning where there has been long term neglect.

In Wales, the Welsh Assembly Government and FC Wales are developing a new Rural Development Programme Axis 1 scheme to complement the Glastir grant scheme for woodland establishment. The proposed scheme is designed to support economic woodland-related activities within and outside the forest. SEWEP could engage in discussions with those involved in the design of the scheme to express their views and ensure it delivers well targeted support that brings woodlands into management.
This new Woodland Improvement Grant (WIG) is being developed as part of the English Woodland Grant Scheme, and will be available from summer 2011 throughout England. The details and eligibility are still being worked and consulted on, but are believed to be as follows.

There are £10m of funds allocated for years 2011/12, 2012/13 and 2013/14. The funding is 100% EU money, from the Energy Crops Scheme under-spend. It is Axis 1 (Competitiveness) rather than Axis 2 (Environment & Countryside) as current EWGS grants.

The WIG will pay 60% of actual costs (not standard costs), against receipted invoices, for the following work.

1. **Wood Fuel Timber.** Work in undermanaged woods – which have missed at least 2 silvicultural interventions. Support is available for collation of management and volume date, which can possibly include marking and mensuration, preparation of tender and sales particulars, agreeing sales contracts and supervision of operations.

2. **Wood Fuels Roads.** Inaccessible woods – to improve access for commercial operations (funding for access is not available for reasons other than commercial timber access). Funding can cover Cat1a roads; loading bays; ditches, culverts gates etc.

Key criteria
- Woodlands must have an approved management plan
- The volume of additional timber which will be brought to market as a result of the Woodfuel WIG work must justify the investment.

The scheme is likely to be administered by Woodland Officers as part of their administration of the wider English Woodland Grant Scheme.
2.2 From urban trees and woods

Arisings from park and street tree maintenance are an important source of wood chip fuel in urban areas across the UK. Much goes to power stations but arisings are increasingly being used to produce wood chip for the higher value market for smaller heat only boilers. Normally seasoned cordwood and other timber is used for fuel chip production but brushwood chip is used in places such as Bristol City Council. This requires investment in equipment and greater processing to improve chip quality to meet the higher standards required by smaller boilers.

No previous estimate of the quantity of arboricultural arisings has been made specifically for the SEWEP area. 66 companies engaged in tree work were identified ranging from sole traders who carried out a small amount of tree work to large specialist companies offering a full range of arboricultural services and branches of companies offering regional or national coverage.

Where possible, companies were contacted by phone to improve the response rate compared to unsolicited email or web based survey. 20 companies representing all scales of operation provided information – some from a mobile phone up a tree! A further 24 companies were contacted by email but no further responses were received. The total response rate of 45% was achieved comparing favourably with surveys of tree surgeons elsewhere.

Quantity of arisings

The quantity of chip and logs collected was estimated by the contractors when interviewed or in the survey responses. Many based their estimates on the size of vehicles used and frequency they are emptied. Others did not feel able to provide an accurate estimate of arisings. The respondents’ estimates were adjusted for the response rate to give an overall estimate of arisings. Much of the hardwood timber will continue to be used for firewood production so will not be available, leaving mostly softwood logs for wood chip production. Some brushwood chip will continue to be used as mulch or disposed of informally. The brushwood chip use for heat only boilers has to be screened to remove excessive fines, leaf material and oversize material. This reduces yields by approximately 25%. Fresh brushwood chip has a very high moisture content (over 50%) and is difficult to dry without external heat and specialised equipment. Step grate boilers are available which can burn screened brushwood chip.

The likely availability of wood chip from tree surgery arising is summarised in Table 7 but should be regarded as provisional due to the quality of available data. Nevertheless it indicates that a significant quantity of arisings could be available for wood fuel production. Further material will be available from the city of Cardiff.

<table>
<thead>
<tr>
<th></th>
<th>as wood chip (green tonnes/yr)</th>
<th>as logs (green tonnes/yr)</th>
<th>total arisings (green tonnes/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>17,054</td>
<td>2,924</td>
<td>19,978</td>
</tr>
<tr>
<td>Estimated other uses or</td>
<td>5,000</td>
<td>1,500</td>
<td>6,500</td>
</tr>
<tr>
<td>uncollected</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fines screened out from</td>
<td>3,013</td>
<td></td>
<td></td>
</tr>
<tr>
<td>brushwood chip (25%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Available for wood fuel</td>
<td>9,041</td>
<td>1,424</td>
<td>10,465</td>
</tr>
<tr>
<td>Quantity at 30%</td>
<td>7,103</td>
<td>1,119</td>
<td>8,222</td>
</tr>
<tr>
<td>moisture content</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 7 Estimated tree surgery arisings in the SEWEP study area.

The total production represents the equivalent of 13.37kg oven dry kg per head of population per year. Previous work showed that the per capita production of arisings in Wales is 5.86 oven dry kg/yr. The difference is large and our data may have been skewed by one large tree surgeon but the study area is one of the most densely populated in Wales leading to more tree work in gardens and streets. The higher figure in this survey is

Woodfuel Resource in Britain: Main Report, 2003, Forestry Contracting Association
consistent with production in more densely populated regions of England (e.g. SE England 13.64, East Midlands 15.03 od kg/person/yr).

Small amounts of similar quality chip are available from other public works such as footpaths & waterways maintenance. For example 20 tpa may be available from waterways maintenance by the Environment Agency. Maintenance of trees by major roads (including the M4) and railways potentially provides significant amounts of chip. No estimate of this is included as it is not currently extracted and significant changes would be required to enable extraction. Investment in additional equipment would probably be required for the railways; this and the cost of the extraction may make chip and timber collection unviable.

**Current uses**
Solid timber is more easily disposed of than brushwood chip. Most hardwood timber is converted to firewood logs and either used by the tree surgeons or sold. Often logs are left on site for domestic customers to use. The reported price for seasoned hardwood logs of between £60 and £150 per tonne delivered reflects the general market value. Softwood timber is less often sold as firewood. Some is used by the tree surgeons, some is chipped and mixed with brushwood chip, incurring a cost to the producers.

Most respondents are able to dispose of chip at no cost, although one reported paying £25/t to tip chip. Free disposal routes are often informal such as allowing people to collect chip for mulch from the tree surgeon’s yard or dropping it off at garden centres. Two of the larger firms have supplied the bulk biomass market and one still does, despatching around 150 tonnes of green chip each month. They receive £12 – 15/tonne from an aggregator.

**Potential for central collection and processing**
Interviewees were asked whether, in principal, they would use a central depot. The responses are summarised below.

<table>
<thead>
<tr>
<th>Would you use a central wood disposal site? (20 interviewees)</th>
<th>Yes</th>
<th>No</th>
<th>No opinion</th>
<th>Maximum driving distance to drop off</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>14</td>
<td>2</td>
<td>4</td>
<td>5 -15 miles most 10 miles</td>
</tr>
</tbody>
</table>

**Table 8  Attitudes to a central collection point**

No-one was prepared to pay to drop off chip and logs, unsurprising as most do not pay for disposal now; 7 would use a free site and all said they would use a site if a payment was offered. How much they would expect as payment was not clear but it would have to be competitive with sale to the biomass market for large users. The time taken for travel to a tip site is very important with a 3-man team & equipment charging-out at £75/hour and one respondent said they would spend no more than 20 minutes travelling to a tip site. In practice this points to a number of smaller local collection hubs where tree surgeons can drop material off, which would then feed into a central processing site.

Alternative approaches such as providing 30m³ hook bins for tree surgeons to fill with chip and timber have been employed elsewhere, with a cost saving for the tree surgeon, and the higher costs for the chip purchaser reflected in the price paid to the tree surgeon.

Interviewees commented that a central site would need to be easily accessible and would be best located either near the Heads of the Valleys road or the M4. Junction 32 was suggested as a good location as it would also give access to material produced in Cardiff.

At the stakeholder workshop it was emphasised that smaller local drop off points are required for tree surgeons feeding fewer, bigger processing hubs.
2.3 From sawmills and wood yards

There is one large sawmill within the SEWEP area, Gwent Timber Products, part of the Border Group of companies. This processes softwood logs producing approximately 50,000 green tonnes of co-product each year. Currently this is supplied to Aberthaw Power Station for co-firing. The company also recovers waste timber and uses this for process heat on site. Alternative uses for the virgin chip produced are being investigated by the company. These include production of wood pellets and premium grade wood chip which has been actively dried using renewable heat to 30% moisture content.

50,000 t of green chip produces 35,7000 t of chip at 30% moisture content.

Two other sawmills, Abergavenny Timber and the Cilfiegan Sawmill, are located near the border of the SEWEP area and are within economic supply distance of users in the SEWEP area. No detailed discussions were held with these companies.

There are several providers of mobile sawmilling services in the area but these produce only small amounts of co-product, scattered across the region which would be difficult to collect for wood chip or pellet production although much is probably used for fuel in log stoves. No estimate for the quantity produced has been made.

2.4 Existing and potential wood fuel suppliers

Although there are existing wood fuel suppliers operating in the area, the material they use cannot be included in this resource assessment without double-counting what is included elsewhere – they are processors of timber and agents for wood fuel rather than producers of raw timber.

Having a number of established suppliers will bring confidence to the specifiers and installers of wood heating systems as evidence of a functional and competitive wood fuel supply chain. There are already a number of suppliers who could service boilers in the six boroughs building experience and the ability to expand to meet new demand.

The report on wood fuel supply for The Works district heating project produced by Camco for Blaenau Gwent CBC\(^{12}\) identified 4 potential chip suppliers and 2 pellet suppliers in June 2010. These are not all within the study area but are near enough to supply to it. Work for this report found additional suppliers of wood chip which reflects the dynamic nature of an expanding industry. Notes on the main suppliers are given below.

Pellet

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Comments</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treenergy Woodfuels</td>
<td>Makes their own pellets and supplies both bagged and in bulk. Prices range from £255 for bagged pellets in a paper sack to £230 for blown delivery. Plans reported on website to expand production</td>
<td>operational</td>
</tr>
<tr>
<td>Clifford Jones Timber</td>
<td>Pellet producer in north Wales who holds WAG framework supply contract for all Wales. Pellet quality reported as variable at first but now improved. ‘Blazers’ brand.</td>
<td>operational</td>
</tr>
<tr>
<td>Biomass Wales</td>
<td>Concept is:</td>
<td>in development</td>
</tr>
<tr>
<td></td>
<td>• biomass CHP plant 1.1MW, 5MWth to provide excess of power for pellet plant; and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• process heat to dry incoming chip plus excess for sale as chip;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• initial sales to large scale power stations;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• then build up higher value local heat market</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Already have a large chipper but only work is 2000t chipped for power</td>
<td></td>
</tr>
</tbody>
</table>

---

Woodchip

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Comments</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anstee Firewood</td>
<td>Located on border of Bridgend and Vale of Glamorgan. Diversification from forestry contracting and firewood business. Have a large Heizohack chipper used mainly to supply power stations. Also chips on contract for Pathfinder (£6/t). The chipper could produce 50t/day of chip on a continuing basis, although to supply this material as finished chip would require a huge increase in stock-holding of drying timber. Feedstock is sawmill slabwood and forestry timber. Has storage barns and all necessary transport. Has considered drying chip over grain drying floor but too expensive.</td>
<td>operational</td>
</tr>
<tr>
<td>Biomass Wales</td>
<td>See comments above, plan to produce actively dried chip suitable for all sizes of boiler.</td>
<td>in development</td>
</tr>
<tr>
<td>Border Group</td>
<td>Border Forest Products and Gwent Timber Products. Actively investigating production of pellets and chip dried with heat from existing waste wood boiler system. Potential supplier of green chip if suitable boilers installed. Current market for 50,000 t/yr chip is large power station</td>
<td>in development</td>
</tr>
<tr>
<td>Forest Fuels</td>
<td>Well established company, supplying approximately 15,000 t/yr of Premium Grade chip largely in SW England. Have current supply contract for a number of boilers in S Wales so have established capacity in SEWEP area. Good levels of timber stocks drying.</td>
<td>operational</td>
</tr>
<tr>
<td>Merthyr Industrial Services (Biomass)</td>
<td>Have 1MWe gasification CHP with drying floor to use waste heat. Able to provide woodchip made from virgin timber dried to 20% moisture content. Also have delivery capacity in-house.</td>
<td>operational</td>
</tr>
<tr>
<td>Pathfinder Renewable Energy</td>
<td>Pathfinder is an established wood chip fuel supplier to the new Rhondda Hospital. They aim to offer a service to woodland owners and have set up a cooperative of timber producers and others such as tree surgeons.</td>
<td>operational</td>
</tr>
</tbody>
</table>

Although there are other producers of woodchip, this is low-grade wet woodchip which is sold into the power station market.

Logs
There are a large number of log producers in the area. Most are small and view log production as a way of adding value to arisings from other activities such as tree surgery rather than as part of their core business. There are several larger producers of logs who are well placed to expand production. Hardwood timber supplies are potentially available from the farm woodlands in the lower part of the valleys and coastal areas but significantly increased levels of woodland management are needed to achieve this.

It seems likely that the recent trend to increasing use of logs will continue but this is not considered in detail in this report. See Section 4.3.
2.5 Summary of woodfuel availability

Table 9 shows the virgin timber that could be available for wood fuel. This is not a precise estimate due to limitations on the data quality and uncertainty about the response of woodland owners to increasing demand and prices. However it gives a guide to wood fuel availability which the consultants believe to be robust.

<table>
<thead>
<tr>
<th>Source</th>
<th>Gross potential (green tonnes)</th>
<th>Available for wood fuel (green tonnes)</th>
<th>Potential wood fuel (30% moisture content)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEWEP woodlands</td>
<td>144,427</td>
<td>28,274</td>
<td>20,195</td>
</tr>
<tr>
<td>Aboricultural arisings</td>
<td>19,975</td>
<td>10,465</td>
<td>8,222</td>
</tr>
<tr>
<td>Sawmills</td>
<td>50,000</td>
<td>50,000</td>
<td>35,714</td>
</tr>
<tr>
<td>Woodlands in neighbouring counties</td>
<td>472,648</td>
<td>72,376</td>
<td>53,840</td>
</tr>
<tr>
<td>Total</td>
<td>687,050</td>
<td>161,115</td>
<td>117,971</td>
</tr>
</tbody>
</table>

Table 9  Virgin woodfuel availability for use in the SEWEP area

Not all the wood fuel has to be produced from within the SEWEP area and some woodfuel produced there will be used elsewhere. Development of local demand is the quickest way to stimulate wood fuel production and maximise benefits to the producers. Demand outside the SEWEP area can stimulate production but prices for producers will probably be lower, reflecting higher transport costs.

With proactive development of demand in the SEWEP area production of 50,000 tonnes per year of high quality woodfuel for use in heat only boilers by 2020 is not an unreasonable target.
3 Opportunities to add value to timber in the wood fuel supply

When thousands of tonnes of timber are used for wood chip production a small proportion of the logs are potentially useful for production of higher value products. Timber from woodlands is usually stored and seasoned away from the wood fuel production hub. Any higher value softwood logs would normally be selected as the timber is extracted and sold immediately. Whether the additional work required to do this is justified will be determined on a case by case basis. A similar argument applies to hardwoods which are subject to spoilage, such as sycamore.

For other hardwoods (e.g. oak and sweet chestnut) selection can be made as timber is received at the production hub. Higher value logs can be stockpiled until required or sufficient have accumulated to justify contracting in a mobile sawmiller. Opportunities for adding value to small dimension hardwoods have been highlighted by the work of Coed Cymru. For examples see http://www.coedcymru.org.uk/windows.htm

Timber from tree surgery and management of trees in parks offers larger log sizes from mature trees of a wide range of species, although mainly oak. This perhaps offers more scope for value adding than timber from woodlands. Several ‘tree stations’ utilising logs from arboricultural work have been established in the UK which can provide lessons for the Caerphilly Timber Yard as it develops its approach for tree surgery logs in the SEWEP area. The varied approaches are illustrated by the examples below.

Frankland Tree Services
Website http://www.ftstrees.co.uk

FTS are successfully processing arboricultural timber into a wide variety of products from structural timber to furniture and playground equipment, see Figure 5 below. The processing business has developed over many years as an adjunct to a successful tree surgery business. Acting in an environmentally responsible way and making best use of all arisings is fundamental to the ethos of the business.

Chris Frankland made the following observations on the use of arboricultural timber:

- arboricultural timber is a resource not a disposal problem;
- timber processing contributes to overall success of the business. It is a marketing and public relations tool;
- it is a motivational activity leading to retention of well qualified and experienced staff;
- people from a variety of backgrounds can contribute to adding value, for example two retired teachers are employed to make added value products;
- revised working methods have been introduced for felling trees to increase the yield of logs for processing;
- sawing timber for stock is expensive; an end use should be identified first. Finding secure dry storage for kiln dried timber can also be problematic;
- identify niche markets, for example large dimension ‘character’ timber for use in mantelpieces and playground equipment;
- timber for outside use should be pressure treated to ensure durability;
- metal in logs is a very significant hazard and can cause expensive damage. Use metal detectors and remove before sawing;
- timber sales to schools and local authorities are now FTS’s greatest source of income. It is profitable!

Figure 5 shows some of the products made from arboricultural arisings by FTS.
Based in the New Forest, Treet Timber and Furniture is run by Rob Dyer. He started as a tree surgeon but since 2001 has diversified his business. Seeing the opportunity to process logs from tree surgery activities he first took an agency for Alaskan chainsaw milling equipment. He now spends most of his time producing and selling firewood, planked timber and furniture made from arboricultural logs. Most timber now comes from other tree surgeons either delivered to the Treet yard or collected by Rob Dyer, either free or at low cost.
The increase in value from processing timber reported by Treet is shown below. It should be noted that most income comes from the sale of firewood at this stage in the company’s development. Examples of furniture sold by Treet are shown in Figure 6.

<table>
<thead>
<tr>
<th>Degree of processing</th>
<th>Value (£/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unprocessed timber</td>
<td>Nil</td>
</tr>
<tr>
<td>Firewood</td>
<td>95</td>
</tr>
<tr>
<td>Sawn timber, green</td>
<td>575 – 800</td>
</tr>
<tr>
<td>Sawn timber, air dried</td>
<td>1000 – 1500*</td>
</tr>
<tr>
<td>Furniture</td>
<td>Varied but at least twice as high as dried timber up to £2800/m³ for species such as walnut</td>
</tr>
</tbody>
</table>

However note that there are very significant processing costs required to generate this uplift in value, and also an increasing proportion of low value co-product (e.g. slabwood) which is produced. The figures shown could therefore easily be misleading.

Table 10 Increasing value of timber with processing at Treet

Figure 6 Furniture produced by Treet Furniture

'Treet Seat' made from single black poplar log, £1,800

Cedar dining table, £600

Walnut dining table, £800

Wall hanging, £120
Innovative marketing has helped Treet succeed. The timber forum, an on-line market place set up by Treet has helped to sell sawn timber but is still not very active. Many mobile sawmillers have a close working relationship with a local joinery or furniture maker whereas Treet have chosen to make their own furniture.

The latest promotion is through supply of furniture for use in a café where it is used and sold with a 10% commission paid to the café owners. Key points made by Rob Dyer about his success are:

- Sell direct wherever possible, retailers often put 200% mark up on furniture
- It is difficult if not impossible to compete on price with imports for ‘standard’ products such as hardwood flooring
- Some mobile sawmillers have developed close relationships with local joiners and furniture makers as a way to sell more sawn timber
- Traditionally timber framers used a range of timbers, not just oak. Curved sections made from a range of species are particularly useful in traditional greenwood construction.
- The café is a good shop window for the furniture. 2 coffee tables and 3 wall hangings have been sold since it opened in late 2010, the time of year when the number of visitors to the New Forest is at its lowest.

**The Norbury Park Sawmill**
Website: [http://www.norburyparksawmill.org.uk/](http://www.norburyparksawmill.org.uk/)

The Norbury Park Sawmill was established in the late 1970s by Surrey County Council and in 2002 was taken over by the Surrey Wildlife Trust when they took responsibility for management of SCC’s Countryside Estate. Considerable investment has been made in the sawmill since then, increasing the range and quantity of products made. The sawmill is now profitable.

They do not use timber from arboricultural work but buy in timber, mostly oak from across SE England. A wide range of products are made that might also be of interest to a timber yard in SE Wales. Prices for many of these are given on the website. These include information boards, outdoor furniture, gates and fencing, bollards, waymarkers and other products made from both green and seasoned timber.

**A Woodfuel ‘supermarket’**

The Wood Heat Solutions ([http://www.woodheatsolutions.eu/](http://www.woodheatsolutions.eu/)) study tour to Austria in 2010 highlighted the development of Biomass Trade Centres (BTCs) at which all forms of woodfuel are available. Alongside logs, wood chip and pellets the centres offer energy services and a guarantee of quality. A significant factor in their success is that they make it obvious that wood fuel is available rather than relying on the informal word of mouth systems that have been the main way of marketing wood fuels to date.

The biomass trade centres provide a route to market for small woodland owners who bring processed logs and wood chip to the centre and are then paid according to quantity and moisture content. Typically there are 50 woodland owning members for each trade centre.

The BTCs are owned by local farmers and woodland owners who have joined together to supply wood fuel as either logs or wood chip and serve a radius of approximately 10 miles. A 30% grant was given to help setup the BTCs supported by European Rural Development funding.

This model may be applicable in SE Wales but would be more difficult to start in a region without the strong tradition of woodland management found in Austria. It could perhaps be developed alongside an established wood chip production facility.

It should be noted that a much higher density of wood users than is currently present in SE Wales are required to support a BTC.
The Caerphilly Wood Yard

The Caerphilly Timber Yard is located in Aberbargoed and managed by Mike Winterfeld, Caerphilly CBC’s Timber Operations Manager. The aim of the yard is to add value to local timber that would otherwise not be processed and ideally not to turn any timber away.

It is developing its facilities using grant funding from the EU Rural Development Programme. It now occupies 3 business units and has limited external storage for timber. Wood working machinery and other equipment has been obtained, some passed on by the previous Siren project at Rhymney. A yard for storing logs is being rented near to the timber yard. A second hand Unimog fitted with a timber crane and front mounted chipper and timber trailer will be delivered around the end of February 2011.

This will allow the Timber Yard to offer a timber collection service for local tree surgeons and small woodland owners who now find it difficult to find transport for small loads of logs. It will also facilitate the management of log stocks held in country parks and similar locations. The Timber Yard has approximately 300 tonnes of logs stockpiled around the local area. It should be noted that chippers mounted on Unimogs have been tried in other projects without much success.

Current management of wood chip is informal. A site has been established where chip can be tipped and collected without charge. This may not be satisfactory as it becomes better known and used by local tree surgeons.

The Timber Yard is not yet in full operation although the limited production so far is creating interest from a range of customers including schools, local authorities and charities. Current products include:

- kits for footbridges made from naturally durable timber
- signs and waymarkers produced in oak with lettering routed in a nearby workshop
- rustic outdoor benches and tables, some carved from a single log

Among future products under consideration are:

- items which use small quantities of small dimension timber and can be produced with a simple template. For example, an interpretation of a traditional gardener’s trug has previously been made at the Timber Yard for sale at the Prince of Wales’s Highgrove House.
- laminated small section hardwood window frames developed by Coed Cymru which allow the use of standard small dimension timber cut from small diameter logs
- heat treated timber. Investigations by Coed Cymru show that this improves stability, machining properties and resistance to rot, potentially increasing the range of uses that can be made of species such as beech, sycamore, birch and ash. For details see [http://www.coedcymru.org.uk/heattimber.htm](http://www.coedcymru.org.uk/heattimber.htm)

The Groundwork charity cooperates with the Timber Yard and uses the timber workshops as a carpentry and joinery skills training facility.

The timber yard is funded by grants which continue until 2013. The challenge is to establish products and markets which will allow it to operate as a fully viable commercial company after the end of external funding. If the current facilities and staffing levels are to be maintained a gross profit of £170,000 per year will be needed to cover staff costs, rent and rates. This challenge is made more difficult by the restrictions imposed as a condition of the grants. These stop the Timber Yard from selling any products making it very hard to manage a transition from grant funding to commercial operation.
Lessons from other Tree Stations for the Caerphilly Timber Yard

The Caerphilly Timber Yard has a similar aim to the other examples above: to make best use of locally available timber of all species and varying quality and avoid waste. Common factors that have helped the other projects succeed are:

- they have grown as an extension of an existing business, often over an extended period. This allows a high degree of experimentation and adaptation to fit the local situation at small scale before expansion;
- everything is used wherever possible, zero waste is the aim;
- a wide range of products takes advantage of the qualities of individual logs;
- bespoke & niche markets are sought, not competing on ‘commodities’ such as sawn timber or floorboards;
- products are made for sale direct to customers and often to order avoiding retail mark ups;
- a high public profile based on product quality & public interest;
- low cost or free raw materials are used, mostly tree surgery logs; and
- a passionate, committed individual drives the business forward using their previous experience in developing a successful enterprise.

Allying a timber yard with a specialist and separately run wood fuel production hub could bring mutual benefits and maximise value from all sources of timber but:

- there is no established wood fuel hub to act as a “parent” or supporter of a timber yard; and
- the Caerphilly Timber Yard is already set up with established workshops and management and funding until 2013.

Cooperation between two independent organisations (the wood fuel hub and Caerphilly Timber Yard) to maximise the value obtained from the timber might be the best way forward. This should be done in a way that is transparent, based on commercial practice and does not impose additional risks on either party. For example, the timber yard could sell excess softwood logs and brushwood chip collected from tree surgeons to the wood fuel hub for further processing while the woodfuel hub makes higher value logs available as required to the timber yard rather than chipping them. These logs, which it would not be possible to sell into the conventional timber trade, would be sold at a rate which provides a better return than processing into wood chip fuel.

A timber yard using tree surgery arisings needs to be innovative in using such a varied feedstock developing rural niche markets, and continually trying new products to see what goes down best in local conditions. For success it must be led by the market and promote its products and services through as wide a variety of media as possible.

Although in principle there are synergies between the Caerphilly Timber Yard and a new woodfuel hub, the report recommends a careful search for all other possible sites and opportunities.
4 Woodfuel end users

4.1 Current woodfuel use

A map showing distribution of wood boilers identified during preparation of this report is shown in Figure 7.

Figure 7 Wood fuel boilers in the SEWEP area

http://maps.google.co.uk/maps/ms?hl=en&ie=UTF8&msa=0&msid=203543508543916896441.0004a05a302532191d15&ll=52.008555,-3.565063&spn=1.011012,2.90863&z=9&iwloc=0004a072of50ceae54e6a
4.1.1 Household and domestic

Logs
Domestic use of firewood may be the largest part of the woodfuel heating market in the SEWEP area. Without exception firewood suppliers and tree surgeons reported strong and growing demand for logs.

Due to the large number of generally small producers across the region it was not possible to estimate the quantity of logs currently used by contacting producers. Nor is any information available about how the logs are used. The extensive gas network in the area suggests the number of properties where logs are the primary heating source is small.

Wood pellets
No information is available about domestic use of wood pellets for heating, or how many pellet stoves and boilers have been installed in the SEWEP area. The domestic use of wood pellets is unlikely to be large since stove installers report that less than 5% of stoves installed are dedicated pellet stoves\textsuperscript{13}. The introduction of the RHI may increase the rate of uptake of pellet boilers in the domestic sector.

4.1.2 Local authorities

Local authorities are the largest users of wood pellets in the area and are quickly increasing consumption, rising from 213 tonnes in 2008 to 645 tonnes in 2009\textsuperscript{14}. The report of the amount used in 2010 is not yet available. The speed of adoption varies between councils and current and planned wood boiler installations as reported by Energy Managers are summarised in Table 11. These are overwhelmingly pellet boilers, with the material sourced through the framework agreements in place, and coming from outside of the region.

Bridgend
Two pellet boilers have been installed in schools, one of 800 kW. Both sites formerly had coal boilers so pellet was a relatively easy alternative. Hoval boilers were used in both installations.

Bridgend CBC is actively looking at installing additional biomass boilers with pellet the likely fuel for schools and wood chip for the proposed boiler in the country park made from timber produced during management of woodlands in the park.

Rhondda Cynon Taf
Early adopter of pellet boilers with an active installation programme. 1 Binder (caused problems so subsequently taken out and replaced by gas), 1 Hoval and 6 Ashwell boilers have been installed with a total capacity of 3MW. There is a mix of retrofit and new build projects.

Pellet was chosen initially because ready availability from a local supplier (Welsh Biofuels, now owned by Land Energy). Other reasons for choosing pellet rather than chip are:

- ease of delivery
- modest storage requirements;
- reliable quality; and
- easy replacement of coal boilers.

No one has questioned the higher cost of pellets compared to wood chip. Most boilers have run without problems but there have been two explosions caused by a blocked flue in one case and overloading of the hearth on re-ignition which impeded air flow.

RCT has an active biomass boiler installation programme but is not currently contemplating installing any chip boilers, instead relying on established supplies of wood pellet.

\textsuperscript{13} Stove Industries Alliance, personal communication
\textsuperscript{14} Information supplied by Gerald Israel
Merthyr Tydfil
Merthyr Tydfil CBC installed pellet boilers in 2 schools. It was not possible to discuss the council’s forward programme for wood fuel or assess attitudes to biomass heating.

Caerphilly
Caerphilly CBC installed pellet boilers in 2 schools in 2008 but none since then. The consultants were not able to obtain any information about the current wood fuel boiler programme in Caerphilly.

Other public sector organisations have installed wood fuel boilers in the borough with boilers installed at the Ystrad Fawr hospital and Coleg Gwent Crosskeys Campus.

Blaenau Gwent
Biomass has not been favoured by Blaenau Gwent CBC in the past and no biomass boilers have been installed on their properties. New schools have relied on other measures to achieve the BREEAM Excellent standard. Concerns over security of supply have been expressed.

However, the council led redevelopment of the former steelworks at Ebbw Vale includes a 2.4MW wood chip fuelled district heating system. The boiler has been specified to accept wood chip with moisture content up to 60% which will allow it to use the full range of fuels available in the area including screened arboricultural brushwood chip. Depending on how the boiler is used chip demand will be between 2,600 and 6,100 tonnes per year by 2015.

Torfaen
Two pellet boilers have been installed by the Council, so far, in a primary school and the other in a health/community centre. The Carbon Trust has assisted the Council with evaluation of low carbon energy options in 4 further schools. In two primary schools the recommendation is that gas CHP is the best option in view of the high quality gas network.

Biomass heating has been identified as an option at 2 secondary schools. Wood chip could be considered but concerns remain about obtaining consistently good quality chip and the space required for chip storage. The benefits that wood chip use would bring to the local economy are an important consideration for the Council, especially as locally sourced wood chip could contribute to HoV employment.

Local Authority demand summary

<table>
<thead>
<tr>
<th>Council</th>
<th>Location</th>
<th>Size (kWh)</th>
<th>Fuel</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridgend</td>
<td>Pencoed Secondary School</td>
<td>800</td>
<td>pellet</td>
<td>operational</td>
</tr>
<tr>
<td></td>
<td>Careau School</td>
<td>150</td>
<td>pellet</td>
<td>operational</td>
</tr>
<tr>
<td></td>
<td>Pen-y-fai Primary School</td>
<td>pellet?</td>
<td></td>
<td>planned</td>
</tr>
<tr>
<td></td>
<td>Mansion/Visitor Centre in Country Park</td>
<td>chip?</td>
<td></td>
<td>planned</td>
</tr>
<tr>
<td>Rhondda Cynon Taf</td>
<td>9 boilers in schools and 1 in country park listed. All pellet.</td>
<td>3MW</td>
<td>pellet</td>
<td>operational</td>
</tr>
<tr>
<td></td>
<td>Cardinal Newman Comprehensive School</td>
<td>500</td>
<td>pellet</td>
<td>planned</td>
</tr>
<tr>
<td></td>
<td>Hawthorne Comprehensive School</td>
<td>500</td>
<td>pellet</td>
<td>planned</td>
</tr>
<tr>
<td>Merthyr Tydfil</td>
<td>Greenfield School</td>
<td>pellet</td>
<td></td>
<td>operational</td>
</tr>
<tr>
<td></td>
<td>St Aloysius School</td>
<td>pellet</td>
<td></td>
<td>operational</td>
</tr>
<tr>
<td>Caerphilly</td>
<td>Pontllanfraith Comprehensive School</td>
<td>pellet</td>
<td></td>
<td>operational</td>
</tr>
<tr>
<td></td>
<td>Ysgol Ifor Bach</td>
<td>pellet</td>
<td></td>
<td>operational</td>
</tr>
<tr>
<td>Blaenau Gwent</td>
<td>The Works</td>
<td>2400</td>
<td>chip</td>
<td>under development</td>
</tr>
<tr>
<td>Torfaen</td>
<td>Padre Pio RC Primary School, Pontypool</td>
<td>pellet</td>
<td></td>
<td>operational</td>
</tr>
<tr>
<td></td>
<td>The Life Station, Trevethin</td>
<td>50</td>
<td>pellet</td>
<td>operational</td>
</tr>
<tr>
<td></td>
<td>2 secondary schools</td>
<td>chip?</td>
<td></td>
<td>CT feasibility study</td>
</tr>
</tbody>
</table>

Table 11  Wood fuel use by County Boroughs in the SEWEP area
4.1.3 National Health Service

Aneurin Bevan Health Board
Ysbyty Aneurin Bevan, the new Local General Hospital for Blaenau Gwent opened in December 2010 and includes a 400-450kW Hoval pellet boiler providing baseload heat and hot water. Fuel consumption is expected to be 500 t/yr. It is located on the old Ebbw Vale steelworks site.

The next project under consideration is a 1MW wood fuel boiler at the new £172m Ystrad Fawr hospital in Caerphilly. The final choice of pellet or chip boiler has not been made. Use of chip could support the establishment of a wood chip production unit nearby.

Cwm Taf Health Board
The second Rhondda Hospital (Ysbyty Cwm Rhondda) has a 1MW Binder wood chip boiler supplying baseload heat and hot water. A fault with the distribution system led to the boiler being unused for approximately 1 year. There were also problems with the refractory lining of the boiler soon after it was commissioned. It is now working satisfactorily using a coarse, unseasoned chip (G120 W50). This could be supplied from low cost resources such as arboricultural arisings screened to remove fines and leaf matter and could provide a model for other boilers.

The Cynon Valley Neighbourhood Hospital is due to open in April 2011. It is equipped with a wood chip boiler of around 450kW. No further projects are planned by the Cwm Taf Health Board.

4.1.4 Industrial and commercial users

The Carbon Trust has a programme of assistance to the private sector aimed at carbon reduction including the use of wood fuel as a renewable energy source. One project has been identified that is very likely to go ahead as funding has already been committed for detailed design work. This will provide either 2MW or 4MW of process heat to a defence industry company. Although the site is outside the SEWEP area it is close enough that it could be supplied from a hub in the study area.

The Works at Ebbw Vale includes provision for offices and the potential to serve commercial buildings on the site. The choice to connect to the district heating system will be for the owners of the new buildings so it is difficult to predict the scale of demand at this stage.

4.1.5 Biomass power

A large commercial power project has been proposed for a site in the Heads of the Valleys but is still at an early stage of development. This would generate between 20 and 30MW of electricity and could require over 200,000 tonnes of wood fuel annually.

4.2 Choosing between pellet and chip

Wood pellet has been preferred by Council energy managers as:
- it is relatively easy to replace a coal systems with a pellet boiler, switching to wood chip would be more expensive larger project
- a record of successful pellet installations and the existence of a frame work supply agreement for pellet for Wales have reduced the perceived risk of wood pellet heating. Pellet has been chosen even for new builds as a low risk option, despite higher fuel costs

For larger boilers and new buildings the NHS has chosen wood chip and trusted the market to supply the required chip. Despite higher initial investment costs chip provides heat at lower cost over the lifetime of the boiler as chip is at least 30% cheaper than wood pellet in terms of heat delivered (p/kWh). In addition chip allows the NHS to maximise its support to the local economy as wood chip is a produced by local companies, particularly small businesses. In contrast wood pellets are produced in large centralised facilities. Many are imported.
The lead taken by the NHS in SE Wales should help build confidence in the wood fuel supply chain over time. However, at present wood chip is not seen by the market as readily available.

Both approaches are valid and pellet will continue to be the fuel of choice in many situations, particularly with smaller boilers. Wood chip will be selected for more boilers as experience with it grows and a more robust supply chain is established.

There has been a disproportionately high number of pellet systems installed in South Wales compared to elsewhere in the UK. In the future, one might expect a higher proportion of chip boilers particularly on new-build sites, larger boilers over 150kw, and sites currently heated by oil in rural areas where space is not a constraint.

4.3 Growth in demand

Logs

The Stove Industries Alliance reports that there is continuing strong demand for new wood stoves in the UK though the figures do not indicate how many of these stoves were sold in the SEWEP area.

<table>
<thead>
<tr>
<th>Year</th>
<th>Stoves Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007-8</td>
<td>186,000</td>
</tr>
<tr>
<td>2008-9</td>
<td>140,000</td>
</tr>
<tr>
<td>2009-10</td>
<td>160,000</td>
</tr>
</tbody>
</table>

Table 12 New stove installations reported to the Stoves Industry Alliance. N.B. There are additional stoves directly imported from overseas manufacturers.

Stoves are not expected to qualify for RHI payments so the introduction of this incentive will have only a marginal impact on stove sales. Log boilers which replace fossil fuel boilers will most probably be eligible for the RHI so increasing numbers are expected to be installed, mostly in rural areas away from the gas grid. Given the extensive gas network in the valleys only a limited number of log boilers will be installed. On average each boiler will require 4 – 5 tonnes of logs annually so they may still drive increased demand for logs.

Boiler installation

Table 13 summarises the probable growth in boiler capacity for both wood pellet and chip. Information on sizes of planned installations was not available in all cases and a ‘best guess’ based on the sort of building where the boiler is sited was made by the consultant. In some cases a decision has not been made to definitely proceed with biomass or a choice has not been made between chip and pellet. A ‘low’ and ‘high’ estimate of capacity growth has therefore been made. The table is inevitably incomplete but provides an indication of the scale of growth expected in the public sector over the next 2 – 5 years.

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Pellet (kW)</th>
<th>Wood Chip (kW)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>low</td>
<td>high</td>
</tr>
<tr>
<td>Bridgend CBC</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>RCT CBC</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>Merthyr Tydfil CBC</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Caerphilly CBC</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Blaenau Gwent CBC</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Torfaen CBC</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>NHS Trusts</td>
<td>400</td>
<td>1400</td>
</tr>
<tr>
<td>The Works, Ebbw Vale</td>
<td>0</td>
<td>150</td>
</tr>
<tr>
<td>Industrial process heat</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>1550</td>
<td>2700</td>
</tr>
</tbody>
</table>

Table 13 Probable additional boiler capacity by 2016
The large commercial development proposed for the Head of the Valleys is of a scale that would require chip of a similar quality to power stations so was not included in the summary above.

Other projects are at an early stage of development and ultimately might not proceed. The largest of these is a 20-30MWe biomass power station which, if it goes ahead, could use up to 200,000 t/yr of wood fuel. This would probably require creation of new wood resources, for example through energy crop planting. As this project is not yet confirmed it has been omitted from the demand estimate.

**Fuel demand**

The demand at The Works is expected to build over a number of years (Tim Crozier-Cole, pers comm.) as the site is developed. The biomass boiler will be used only once a minimum load has been reached, probably in 2013 (Nashon Msumba, pers comm.). The scale of demand will depend on how many buildings are connected to the system and the proportion of heat that is derived from biomass. Table 14 summarises the predicted demand growth.

<table>
<thead>
<tr>
<th>Year</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomass consumption (35% biomass)</td>
<td>348</td>
<td>2,231</td>
<td>2,529</td>
<td>2,667</td>
<td>2,667</td>
</tr>
<tr>
<td>Biomass consumption (80% biomass)</td>
<td>796</td>
<td>5,100</td>
<td>5,779</td>
<td>6,095</td>
<td>6,095</td>
</tr>
</tbody>
</table>

**Table 14** Expected wood chip demand growth at The Works, Ebbw Vale

The growth in boiler capacity indicated in Table 13 is still uncertain and whether the boilers will be fully utilised is also uncertain. An indication of the demand for wood fuel can still be derived (Table 15) and although this has a large margin of error it gives an indication of the scale of demand.

<table>
<thead>
<tr>
<th></th>
<th>Existing boilers (t/yr)</th>
<th>Planned boilers</th>
<th>Total (all boilers)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>low uptake (t/yr)</td>
<td>high uptake (t/yr)</td>
</tr>
<tr>
<td>Pellet</td>
<td>1,460</td>
<td>870</td>
<td>2,170</td>
</tr>
<tr>
<td>Chip</td>
<td>1,000</td>
<td>5,770</td>
<td>13,250</td>
</tr>
</tbody>
</table>

**Table 15** Predicted demand for wood fuels in the SEWEP area by 2016, based on interviews and pellet purchase records.
5. Developing a wood fuel supply chain

This section of the report identifies requirements for a wood fuel production hub and sets out the different options available in terms of size and location. It then presents options for the commercial operation of the hub and makes recommendations.

5.1 Existing (and developing) wood chip fuel suppliers

In Section 2.4 six significant suppliers of chip were identified producing material within the study area. Together they have a potential supply capacity of over 100,000 tonnes per year so at first sight there is no need for a new production hub. Most of the fuel is now sent to the power stations.

However this is not organised into a robust supply and contract management facility. It is important to recognise the difference between sources of wood (or chip) and robust, strong wood fuel supply companies able to operate smooth running long-term Premium Grade fuel contracts.

There is a pressing need to:

- be ready for a rapid increase in demand now that the details of the RHI are known;
- build confidence in wood fuel supply through an obvious supply point demonstrating high quality, cost effective provision of wood chip fuel;
- provide an outlet that makes best use of timber arising from the management of trees and woods in the SEWEP area, much of which would otherwise not be harvested or processed;
- ensure security of fuel supply for boilers installed by the councils; and
- foster the development of a competitive wood fuel market.

Because of the apparent fragility of the supply chain – none of the identified suppliers has a long established record of supply to on-site boilers in the SEWEP area – the establishment of additional supply capacity is justified.

5.2 Basic requirements for a wood fuel production site

Wood chip must be kept free from contamination with soil, stones and other debris and kept dry. This can be achieved with very little investment and little equipment. For example, for several years Silvapower in South Yorkshire piled chip on a plastic sheet at the side of a field and covered it with ‘Toptex’ geotextile which prevented ingress of c.85% of rain whilst allowing the chip to release water vapour and dry.

Although used quite successfully this is not an ideal solution as it has an increased risk of contamination, and the requirement to uncover and recover the chip increases the time needed and hassle involved in loading and dispatching the chip to customers. Wet weather working can also be difficult. In addition, snow lying on top of the textile for any period of time will re-wet the woodchip, making it a totally unviable system this winter.

For a site that is to be used in the long term, in practical terms, the minimum infrastructure required is a covered storage area with a concrete floor and extensive concrete apron outside the barn. This allows chip to be easily loaded and minimises the chances of contamination with soil and grit. A timber storage area with all weather access is a great aid to security of supply and brings a good level of comfort to boiler operators. The infrastructure and equipment for which investment is required when setting up a site are listed below. Many potential sites will have some or most of the facilities needed and good site selection can keep the investment cost down.
Infrastructure and Equipment requirements

Infrastructure
Access improvements for articulated vehicles
Fencing and security
External concrete areas for chip handling and additional storage when barn is full
Timber storage area providing all weather access, to hold seasoning timber and reserve stocks in case woodlands are inaccessible
Chip storage barn including concrete floor and wall panels strong enough for use with a loading shovel. Ideally open along one long side for access, Yorkshire boarding from 2.5m on others, ideally oriented so prevailing wind can help dry chip.
Site office
Lighting for security and winter working
On-site bunded fuel store for loader/chipper etc.

Equipment
* Chipper, specified to deal with the expected throughput and size of timber received
* Tractor to drive chipper
* Crane for chipper tractor
* Log cracker
* Chip screener
Telehandler/loader/tractor for use on-site and make local deliveries with log forks and high capacity bucket (2m³ minimum) for loading chip
Grain trailer or similar for chip transport on site and local deliveries
Scissor lift trailer for local deliveries – if needed for local boiler installations
Hook bin trailer for tractor OR
* Hook bin lorry (2nd hand available)
* Hook bin(s) for deliveries
Moisture meter for wood chip
Timber stack protective cover (waxed paper, tarpaulin or similar)
Toptex fabric for covering external chip heaps

Note much of this equipment, particularly those items marked with an asterisk, could be hired, either daily or on longer term contract.

5.3 Production site location in the SEWEP area

A wood fuel hub anywhere in the SEWEP area could serve the entire area without exceeding the economic transport delivery distance. Similarly timber from forests around the region could be delivered to any location in the SEWEP area. Collection of arboricultural arisings is less easy as tree surgeons do not wish to travel more than 10 – 15 miles to drop off arisings. Alternative approaches, such as providing hook lift bins for tree surgeons to fill have been used successfully elsewhere. The increased convenience for the tree surgeon and added cost for the wood fuel hub would need to be reflected in the price paid (if any) for the arisings.

Choosing a site
Wood chip production on a commercial scale uses large, noisy equipment and involves transport of large volumes of material. Much of the equipment used is similar to agricultural machinery so a production hub can fit well into a farm setting. A production site could be located in either a rural area or in a suitable industrial zone. Wherever it is located some attributes are common to all good production sites. These include:

- Good road communications for timber deliveries and for distribution of the finished chip.
- Excellent access onto the site to avoid problems when deliveries are made by articulated lorry.

15 for example in Gloucestershire and South London
• Within 10 miles of population centre for tree surgeons.
• As near as possible to larger users or cluster of smaller users of wood chip so delivery costs are minimised.
• Large enough for the expected throughput. Sufficient area should be available for storage of timber in the round to guarantee chip availability during periods when weather prevents timber transport from forest areas. A buffer stock for 2 months of peak winter demand should ensure continuity of supply.
• Chip store sized to allow effective use of hired-in chippers, i.e. big enough to hold chip from at least 3 days chipping.
• Far enough away from any neighbours who might be disturbed by the noise of chipping or dust from chip screening and handling.

In the SEWEP area wood fuel production sites near either the Heads of the Valleys road or the M4 could meet these requirements. The geography of the SEWEP area means that a site situated in the middle is probably not the best option as considerable distances have to be travelled from one valley to another. In the north of the area a potential site has been identified near Rhymney which is owned by the Welsh Government (Mike Winterfeld, pers comm). To the south a location near Junction 32 of the M4 was suggested as being convenient for tree surgeons serving Cardiff but no specific site was identified. Sites on the outskirts of other built up areas could also be considered.

5.4 What type and size of hub?

Three variations of the wood fuel supply chain were selected for analysis of their likely financial performance.

i) A larger scale production facility producing up to 10,000 tonnes of seasoned wood chip annually from woodland timber and tree surgery arisings. One or two sites of this size could serve the entire SEWEP area.

ii) A smaller scale production site making up to 4,000t/yr of seasoned chip from woodland timber and tree surgery arisings. Up to 5 sites would be required, established periodically in response to demand. They would be located near centres of demand to minimise transport.

iii) Chip production based in the woodlands. In this model the timber is seasoned where it is felled and the chipper and delivery vehicle travel from timber stack to timber stack. In this model it is not possible to make use of arboricultural arisings.

Financial modelling

The Woodchip Supply Business Viability Calculator developed by SAC Consulting and Steve Luker Associates for the Forestry Commission’s WEBS2 was assessed as a potential tool for financial evaluation of the options for SEWEP wood fuel hubs. The WEBS2 model is simple to understand and useful for initial evaluation of projects. It is easy to vary the inputs, for example to find out how much wood chip is required for a project to cover its operational costs. Using it, a good ‘feel’ for the relative importance of key inputs such as timber price can be developed.

However, the model does not include depreciation, loan repayments, VAT or tax. Nor does it cater for multiple years of operation in which the volume of chip sold changes. The monthly cash flow requirements are not modelled, yet these are important as timber is often bought in the spring but not sold until the winter. This lack of detail makes the WEBS2 model easy to use but limits its usefulness for more complex projects such as a large production hub serving the SEWEP area.

The consultants used a financial model developed by South East Wood Fuels to assess the likely performance of different types of wood fuel production. The SEWF model provides for:

• inputs of both woodland timber and arboricultural arisings with different prices and processing costs;
• a multi-year analysis over 5 – 10 years which allows the growth in output in the early years of operation to be captured;
• monthly phasing of cash flow & timber purchases;
calculation of an internal rate of return; and
evaluation of changes in the key assumptions and their impacts on viability.

Assumptions in evaluation of financial performance of wood fuel production
The main assumptions for the base case are:

<table>
<thead>
<tr>
<th>Description</th>
<th>Assumption</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulpwood or equivalent green timber, £/t delivered</td>
<td>Conservative estimate, based on expected timber price increases in next 3-4 years. Current prices c. £28</td>
<td>35.00</td>
</tr>
<tr>
<td>Green arboricultural arisings, £/t delivered</td>
<td>Conservative estimate, based on expected timber price increases in next 3-4 years. Current prices c. £10</td>
<td>15.00</td>
</tr>
<tr>
<td>Chip sales delivered to user, £/t</td>
<td>Based on current market price. Increases in feedstock prices will push this up. The conservative feedstock price assumptions above make this sale price under-stated (ie conservative)</td>
<td>90.00</td>
</tr>
<tr>
<td>Moisture content % incoming</td>
<td>Reasonable seasonal average although likely to be wetter in the (busy) winter</td>
<td>45%</td>
</tr>
<tr>
<td>Outgoing moisture content %</td>
<td>Very conservative – most boilers will take 35%, and some 40%</td>
<td>30%</td>
</tr>
<tr>
<td>Chipping cost for 16” capacity drum chipper, £/t</td>
<td>Current market price. Expected to increase broadly with inflation and exceptional diesel price increases</td>
<td>8.75</td>
</tr>
<tr>
<td>Chipping cost, large chipper, £/t</td>
<td>Current market price. Expected to increase broadly with inflation and exceptional diesel price increases</td>
<td>6.94</td>
</tr>
<tr>
<td>Screening cost (including loader and operator) £/t</td>
<td>Current market price. Expected to increase broadly with inflation and exceptional diesel price increases</td>
<td>7.50</td>
</tr>
<tr>
<td>local delivery, tractor-trailer (22m³) £/t</td>
<td>Current market price. Expected to increase broadly with inflation and exceptional diesel price increases</td>
<td>14.96</td>
</tr>
<tr>
<td>local delivery, hook bin lorry (30m³ tipper) £/t</td>
<td>Current market price. Expected to increase broadly with inflation and exceptional diesel price increases</td>
<td>17.83</td>
</tr>
</tbody>
</table>

The model assumes that a bare site with only basic access is available and that chipping will be carried out on a contract basis. This is increasingly common in the sector. Data input includes the costs for developing the site including building a storage shed, concreted areas for chip handling and an area with all weather surfacing for storage of timber sufficient for 2 months winter supply. A range of mobile equipment can be included in the model as required and additional equipment added in later years. For the base case it was assumed no grants were available to the project.

5.4.1 Option 1 - A large central hub
A hub with a design capacity of 10,000 tonnes output annually was modelled so one or two hubs would be sufficient to serve the whole of the SEWEP area for the next 5 years (even with a rapid increase in adoption of wood fuel heating and small CHP). The predicted growth in chip demand is based on the known projects such as the Second Rhondda Hospital and proposals for The Works at Ebbw Vale with the addition of a series of smaller projects expected after the introduction of the RHI. The annual demand estimate used for the first 5 years of site operation is given below.
Table 16  Wood chip sale growth used in modelling financial performance for a large scale chip production site.

<table>
<thead>
<tr>
<th>Year</th>
<th>Tonnes per year at 30% moisture content</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1770</td>
</tr>
<tr>
<td>2</td>
<td>3700</td>
</tr>
<tr>
<td>3</td>
<td>5450</td>
</tr>
<tr>
<td>4</td>
<td>8000</td>
</tr>
<tr>
<td>5</td>
<td>9700</td>
</tr>
</tbody>
</table>

For years 6 – 10, 5% annual growth in site throughput assumed

Indicative investment costs for setting up a large (10,000 t/yr) production hub is around £370k. This includes equipment as well as infrastructure.

As identified, tree surgery contractors are unwilling to drive significant distances to a hub to drop off material. In order to capture this material into one central hub, local collection points would be needed. These could be in municipal tips, where clean concrete could be provided for contractors to tip material onto for onward loading and delivery to the Hub in large vehicles. Alternatively, this could be achieved by the provision of hook bins (either on municipal tips or in tree surgeons’ own yards) which once full can be transported back to the Hub. Having the involvement of local authority sites for these smaller collection points will make a considerable difference to the volume of arboricultural arisings which come into the Hub, and will also provide a benefit to the local arboricultural sector.

Using the base case conditions the internal rate of return (IRR) is -4.9% after 5 years and +19.7% after 10 years illustrating how setting up a woodfuel hub is a (very) long term investment. The initial outlay is recouped in year 6. Setting up a woodfuel production hub from scratch is not particularly attractive financially and carries significant risk without secure long term supply contracts. Many people entering the business do so as a diversification from an existing related business such as tree surgery, compost production or based around the desire to use their own woodlands as a source of fuel for their own use. Very often some of the infrastructure and equipment is already available and can be shared with the existing business in the early stages of development.

Grants would improve returns, perhaps substantially, and could make the project viable under base case conditions. For example, for the base case with a grant of £100,000 (approximately 30% of the total investment needed) the IRR improves to +3.2% after 5 years and 27.4% after 10 years.

Sensitivity analysis

Key factors that influence the financial performance include the price for which timber is bought, the price for which it is sold as chip, how much chip is sold and the quantity and price of arboricultural arisings that are used. A sensitivity analysis was performed varying these factors using the IRR at 5 and 10 years. How the changes made in the assumptions affect IRR is summarised in Error! Reference source not found..
This demonstrates just how significant the risks are and helps justify support through grants or provision of facilities in the early years of operation until demand has built to viable levels. Prices for timber bought and chip sold are clearly the most important factors influencing the site's viability and the proportion of arboricultural arisings used also has a significant effect. It should be noted that after 10 years there was a positive return on investment for all variations in adverse conditions except with a timber price of £45/t (it is the consultants view that it is inconceivable that timber prices would increase this much without a corresponding increase in sale prices).

If no arboricultural arisings are used for fuel the performance of the site deteriorates. IRR at 5 years is -20.1% and only +9.1% at 10 years. The original investment is not paid off until year 8. A strategy which facilitates the use of tree surgery chip, such as specifying boilers that can utilise green chip, would support the development of a commercially viable wood fuel production site.

### Table 17  Impact of changes in key variables on IRR for a large site

<table>
<thead>
<tr>
<th></th>
<th>Variation</th>
<th>Negative impact on IRR</th>
<th>Base case IRR %</th>
<th>Positive impact on IRR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IRR after 5 years</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timber price</td>
<td>£35 +/- £10/t</td>
<td>-32.8</td>
<td>-4.9</td>
<td>12.7</td>
</tr>
<tr>
<td>Chip price</td>
<td>£90 +/- £5/t</td>
<td>-17.0</td>
<td>-4.9</td>
<td>5.0</td>
</tr>
<tr>
<td>Volume of chip sold</td>
<td>+/- 15%</td>
<td>-9.6</td>
<td>-4.9</td>
<td>-0.6</td>
</tr>
<tr>
<td>Overheads &amp; expenses</td>
<td>+/- 20%</td>
<td>-7.8</td>
<td>-4.9</td>
<td>-2.0</td>
</tr>
<tr>
<td>Arboricultural arisings</td>
<td>+/- 1000 t/yr</td>
<td>-11.1</td>
<td>-4.9</td>
<td>0.4</td>
</tr>
<tr>
<td><strong>IRR after 10 years</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timber price</td>
<td>£35 +/- £10/t</td>
<td>-2.2</td>
<td>19.7</td>
<td>33.7</td>
</tr>
<tr>
<td>Chip price</td>
<td>£90 +/- £5/t</td>
<td>10.3</td>
<td>19.7</td>
<td>27.5</td>
</tr>
<tr>
<td>Volume of chip sold</td>
<td>+/- 15%</td>
<td>16.1</td>
<td>19.7</td>
<td>23.2</td>
</tr>
<tr>
<td>Overheads &amp; expenses</td>
<td>+/- 20%</td>
<td>17.6</td>
<td>19.7</td>
<td>21.8</td>
</tr>
<tr>
<td>Arboricultural arisings</td>
<td>+/- 1000 t/yr</td>
<td>16.9</td>
<td>19.7</td>
<td>22.3</td>
</tr>
</tbody>
</table>
5.4.2 Option 2 - A smaller local hub

The scale of production for a smaller hub was set at a planned maximum throughput of 4,000 t/yr reached by the fourth year of operation. The capital investment required for a smaller hub is estimated at £195,000 compared to £370,000 for a larger hub, or 30% more per tonne of capacity. Some services, for example chip screening are better done on contract rather than with in-house equipment and labour. The growth in sales assumed for the smaller hub is shown in Error! Reference source not found..

<table>
<thead>
<tr>
<th>Tonnes per year at 30% moisture content</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>For years 6–10, 5% annual growth in site throughput assumed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 18 Wood chip sale growth used in modelling financial performance for a smaller chip production site.

The base case used similar assumptions to the larger site with the exception of the cost for arboricultural arisings. This was reduced by £3/t to £12/t received to reflect supply from a more local area. The base case showed an IRR of -23.4% over 5 years and a return of just 2.3% over 10 years. There was a positive cash flow from year 2 onwards. There is obviously a high risk of failure with production on a new, bare site at this scale of operation. Operations at this scale, such as at Bristol City Council’s Blaise Nursery have succeeded by accessing grants for capital works or have established an economic case for wood fuel production through consideration of other benefits such as:

- avoided disposal costs for tree arisings;
- security of wood fuel supply;
- demonstrating commitment to carbon reduction; and
- regarding chip production as part of a larger project to produce and use wood chip fuel as part of a strategy to reduce carbon emissions.

A similar analysis of sensitivity to changes in the main variables was made as for the larger site. The results are summarised in Error! Reference source not found..

<table>
<thead>
<tr>
<th>IRR after 5 years</th>
<th>Variation</th>
<th>Negative impact on IRR</th>
<th>Base case IRR %</th>
<th>Positive impact on IRR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timber price</td>
<td>£35 +/- £10/t</td>
<td>loss making</td>
<td>-23.4</td>
<td>-3.0</td>
</tr>
<tr>
<td>Chip price</td>
<td>£90 +/- £5/t</td>
<td>-47.7</td>
<td>-23.4</td>
<td>-11.2</td>
</tr>
<tr>
<td>Volume of chip sold</td>
<td>+/- 15%</td>
<td>-27.4</td>
<td>-23.4</td>
<td>-10.2</td>
</tr>
<tr>
<td>Overheads &amp; expenses</td>
<td>+/- 20%</td>
<td>-27.9</td>
<td>-23.4</td>
<td>-19.2</td>
</tr>
<tr>
<td>Arboricultural arisings</td>
<td>+/-750 t/yr</td>
<td>-31.2</td>
<td>-23.4</td>
<td>-16.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IRR after 10 years</th>
<th>Variation</th>
<th>Negative impact on IRR</th>
<th>Base case IRR %</th>
<th>Positive impact on IRR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timber price</td>
<td>£35 +/- £10/t</td>
<td>loss making</td>
<td>2.3</td>
<td>18.8</td>
</tr>
<tr>
<td>Chip price</td>
<td>£90 +/- £5/t</td>
<td>-13.3</td>
<td>2.3</td>
<td>12.1</td>
</tr>
<tr>
<td>Volume of chip sold</td>
<td>+/- 15%</td>
<td>-0.9</td>
<td>2.3</td>
<td>4.2</td>
</tr>
<tr>
<td>Overheads &amp; expenses</td>
<td>+/- 20%</td>
<td>-1.1</td>
<td>2.3</td>
<td>5.5</td>
</tr>
<tr>
<td>Arboricultural arisings</td>
<td>+/-750 t/yr</td>
<td>-3.0</td>
<td>2.3</td>
<td>7.0</td>
</tr>
</tbody>
</table>

Table 19 Impact of changes in key variables on IRR for a smaller local site.

Error! Reference source not found. indicates that after 5 years the site has yet to recoup its investment costs even with favourable changes in key inputs. The breakeven point is approached only when the timber price is
reduced by £10/t. However, it is likely that timber prices will rise rather than fall in the medium term as global
demand for wood fuel and other products increases.

There are ways which might improve the financial performance of a smaller production site:

i) The financial model assumes that timber is seasoned to 30% enabling it to be used in almost all boilers.
Customers could specify step grate boilers to burn chip up to 55%. This would reduce the time stock
has to be held, reducing stock levels and the financing required. It would allow arboricultural arisings to
be used soon after receipt saving on storage space required on site. However although this would
speed up the cashflow, the sale price would be likely to be reduced.

ii) Specialise in processing the cheaper arboricultural arisings and maximise their use. If the entire
demand were supplied from arisings the model shows an IRR of 2.6% after 5 years and 20.0% after 10
years. This assumes the price paid for arisings is raised from £12 to £15 per tonne received as material
will have to be delivered from further afield. Whether sufficient arisings (up to 7,500 t/yr\textsuperscript{16}) could be
gathered on a single site is doubtful, given that tree surgeons indicated they would travel a maximum
of 15 miles to drop them off.

5.4.3 Option 3 - Woodland based supply
Transport of timber and wood chip is expensive and a woodland based chip supply seems to offer real benefits
from reduced transport costs. The key features of the system are:

- Timber is extracted and stacked so that it is in a good drying location with access for lorries.
- Once seasoned, it is chipped as required and dispatched directly to the final customer;
  a lorry mounted chipper and delivery vehicle are required together on site. Timber is chipped straight
  into the delivery lorry.
- A central covered chip store is still needed as a buffer stock of chip must be held in case of winter
  weather or any other reason preventing access to the woodlands.

The advantages and drawbacks of a woodland based system are summarised below.

Advantages
- there are lower costs for fixed infrastructure
- the cost of stock is lower and payment may be made later if timber is left on the owner’s land
- there is an apparent reduction in transport and CO\textsubscript{2} emissions
- the system is flexible and it is easy to respond to increasing demand. The only requirement is to secure
  supplies of timber in a timely way to allow seasoning
- consistently high quality chip is produced from woodland timber

Drawbacks
- coordination of deliveries to several boilers is required to make best use of the chipper. At an early stage of
  market development this is hard to achieve.
- waiting for chip delivery vehicles to arrive on site can lead to more non-productive time
- still need a buffer stock held in a covered store so costs are not as low as at first sight.
- the chipper lorry has high levels of non-productive time when it is travelling to and from sites and when
  waiting for delivery vehicles to arrive.
- although it is possible to process small loads this increases travelling time and cost
- The system cannot accommodate arboricultural arisings

\textbf{Error! Reference source not found.} compares CO\textsubscript{2} emissions from transport associated with production of 100
tonnes of wood chip in a woodland based system and production site based near to the centre of demand.
Transporting round timber takes fewer lorry loads than an equivalent amount of finished chip (5.2 loads
compared to 12.88 loads, for 100t) and therefore the emissions calculation is very sensitive to distance from

\textsuperscript{16} assuming 25% loss as fines on screening and drying to 30% moisture content
woodland to customer. If this is relatively short, the less-efficient transport of finished chip direct from woodland to customer produces lower carbon emissions than hauling to a hub for processing before onward delivery to the customer. However as distance increases the increase in lorry movements transporting finished chip rather than round timber results in greater levels of emissions. Table 21 indicates that there is a saving in CO₂ emissions in the hub based system, using the assumptions in the table.

It should be noted that 100t of woodchip avoids 59 t of CO₂ emissions compared to using natural gas.\(^{17}\)

### ASSUMPTIONS

<table>
<thead>
<tr>
<th>Distances</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Production site to forest (miles)</td>
<td>50</td>
</tr>
<tr>
<td>Forest to customer (miles)</td>
<td>65</td>
</tr>
<tr>
<td>Production site to customer (miles)</td>
<td>25</td>
</tr>
<tr>
<td>Vehicle home to hub</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fuel consumption</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Artic lorry (mpg)</td>
<td>7.6</td>
</tr>
<tr>
<td>Hook loft lorry (mpg)</td>
<td>9.7</td>
</tr>
<tr>
<td>CO₂ emissions from diesel (kg/litre)</td>
<td>2.63</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Timber</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>100t softwood @ 35% moisture content (MC)</td>
<td>130t at 50% MC</td>
</tr>
<tr>
<td>Bulk density of softwood chip @ 35%</td>
<td>3.862m³/t</td>
</tr>
<tr>
<td>30m³ chip in a tipper lorry</td>
<td>7.768 tonnes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TRIPS REQUIRED for 1.00t at 35% MC</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Artic load of timber 25t</td>
<td>5.20 trips</td>
</tr>
<tr>
<td>Tipper lorry finished chip</td>
<td>12.88 trips</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Forest to hub to user (&quot;depot model&quot;)</th>
<th>Forest to user (&quot;woodland model&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td>round timber haulage</td>
<td>chipper to site</td>
</tr>
<tr>
<td>artic - home to forest</td>
<td>50 miles</td>
</tr>
<tr>
<td>artic - forest to hub</td>
<td>50 miles</td>
</tr>
<tr>
<td>artic - hub to home</td>
<td>10 miles</td>
</tr>
<tr>
<td>total distance for 5.2 trips</td>
<td>572 miles</td>
</tr>
<tr>
<td>litres diesel</td>
<td>343 litres</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>finished chip haulage</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>tipper - home to hub</td>
<td>10 miles</td>
</tr>
<tr>
<td>tipper - hub to customer</td>
<td>25 miles</td>
</tr>
<tr>
<td>return journey</td>
<td>35 miles</td>
</tr>
<tr>
<td>total distance 12.88 trips</td>
<td>902 miles</td>
</tr>
<tr>
<td>litres diesel</td>
<td>423 litres</td>
</tr>
<tr>
<td>total distance</td>
<td>1474 miles</td>
</tr>
<tr>
<td>total litres diesel</td>
<td>766 litres</td>
</tr>
<tr>
<td>Emissions of CO₂</td>
<td>2014 kg</td>
</tr>
<tr>
<td>Emissions of CO₂</td>
<td>2358 kg</td>
</tr>
</tbody>
</table>

N.B. Information on fuel consumption from Dept for Transport website, emissions factors from The Carbon Trust

**Table 20** Comparison of CO₂ emissions from transport of wood and wood chip

The experience of Forest Fuels Ltd. in operating a lorry based chipper shows that using a lorry mounted chipper on site is not particularly efficient for deliveries direct to smaller boilers. This is because coordinating a full day’s chipping with deliveries to enough boilers to haul away all of that finished chip on the same day is very difficult. What tends to happen is that the chipper only has part of a day’s work to do. With a high output chipper it is better to chip a large quantity of timber at one time to minimise non-productive travelling – and this points towards a hub where the chip can be stored undercover before being delivered. The assumptions used in the evaluation of the financial performance of a woodland based chip production system were:

\(^{17}\) Calculated using emissions factors of 0.20322 kg CO₂/kWh for natural gas, 0.020 kg CO₂/kWh for wood chip published by DEFRA in 2010 Guidelines to Defra / DECC’s GHG Conversion Factors for Company Reporting
Pulpwood or equivalent green timber, £/t at rideside 25.00
Chip sales delivered to user, £/t 90.00
Moisture content % incoming 45%
Outgoing moisture content % 30%
Buffer stock of chip for which covered storage needed, tonnes 200
Delivery cost including waiting time for chipping & filling, £/t 19.33
Chipper hired in on contract, output 300 t/day, cost £2000/day

For the reasons of chipper efficiency described above, although these outputs are theoretically possible, until the market is much bigger than currently they will not be achievable.

The minimum quantity recommended for chipping with a lorry based system is 100 tonnes (source, Daniel Upton) and then only if the chipper does not have to travel far. If there are several users each taking one of two articulated lorry loads daily such a machine would be fully justified and chipping in the woodlands could be effective.

<table>
<thead>
<tr>
<th>IRR after 5 years</th>
<th>Variation</th>
<th>Negative impact on IRR</th>
<th>Base case IRR %</th>
<th>Positive impact on IRR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timber price at ride side</td>
<td>£25 +/- £10/t</td>
<td>-14.5</td>
<td>7.1</td>
<td>24.0</td>
</tr>
<tr>
<td>Chip price</td>
<td>£90 +/- £5/t</td>
<td>-5.6</td>
<td>7.1</td>
<td>18.2</td>
</tr>
<tr>
<td>Volume of chip sold</td>
<td>+/- 15%</td>
<td>-7.7</td>
<td>7.1</td>
<td>18.7</td>
</tr>
<tr>
<td>Cost of chipping</td>
<td>+/- 20%</td>
<td>-0.4</td>
<td>7.1</td>
<td>13.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IRR after 10 years</th>
<th>Variation</th>
<th>Negative impact on IRR</th>
<th>Base case IRR %</th>
<th>Positive impact on IRR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timber price at ride side</td>
<td>£25 +/- £10/t</td>
<td>18.5</td>
<td>32.1</td>
<td>43.8</td>
</tr>
<tr>
<td>Chip price</td>
<td>£90 +/- £5/t</td>
<td>23.8</td>
<td>32.1</td>
<td>39.7</td>
</tr>
<tr>
<td>Volume of chip sold</td>
<td>+/- 15%</td>
<td>22.7</td>
<td>32.1</td>
<td>40.2</td>
</tr>
<tr>
<td>Cost of chipping</td>
<td>+/- 20%</td>
<td>27.6</td>
<td>32.1</td>
<td>36.4</td>
</tr>
</tbody>
</table>

Table 21 | Impact of changes in key variables on IRR for woodland based chip production

The cost of purchasing a chipper is approximately £460,000\(^\text{18}\) so although owning a lorry mounted chipper may make it easier to chip smaller quantities of timber for local deliveries there is a significant capital cost to meet and it would only work the equivalent of 1 or 2 days per month. The financial model indicates buying a lorry extends the simple payback time from 5 to 9 years. To make buying a lorry mounted chipper viable it would have to be hired out to chip for other producers.

The base case shows an IRR of 7.1% over 5 years and a return of 32.1% over 10 years. There was a positive cash flow from year 1. \textbf{Error! Reference source not found.} shows the effect of variation in the main factors affecting production costs and revenues.

Although the results of modelling suggest that this is a viable option for local production of wood chip the practical difficulties encountered by Forest Fuels in supplying small boilers directly from chipping in the woods means that the consultants cannot recommend this approach.

\(^{18}\) Information from Daniel Upton, cost in January 2011 for a Jenz truck mounted chipper with belt out-feed and blower discharge. Throughput 80-100t/hr.
5.5 Operation of the Hub

The three models described above could be run by either the public or the private sector. However the consultants view, based on experience elsewhere in the country, is that there are a number of constraining factors for either of these to happen successfully in reality:

- The private sector will be unwilling to invest in infrastructure before there is a clear market for woodchip – this won’t help unlock the current “chicken and egg” situation.
- Successful operation of a woodfuel hub means offering secure woodfuel supply contracts to customers to build the credibility of woodfuel – and taking the commercial risk on these contracts is a crucially important part of that credibility. This risk does not sit well with local authorities.
- The public sector have traditionally not had the commercial experience and skills to operate long-term successful & profitable (and therefore truly sustainable) businesses.

In order for each party to play to their strengths and achieve – in partnership - fast and successful establishment of a viable hub, there is an interesting Partnership model where a local authority invests in the site infrastructure and rents it (on a commercial basis) to a private sector woodfuel business.

This is a model which has been used successfully elsewhere:

- South Yorkshire: Various pieces of equipment were purchased by a public body in Yorkshire (chipper, tractor, trailers) and their operation tendered to the private sector. Silvapower Ltd won this tender and have operated the equipment for several years, paying for it on a profit share system. The injection of new, high-quality equipment into the supply chain made a step-change difference to woodfuel in the South Yorkshire area. This model is identical to that proposed here – public sector invests, private sector operates and pays a hire charge, and the market is developed.

- Local authority depots are very often provided to a private sector arboricultural or grounds maintenance operator for the duration of their contract with the local authority.

See also box 2 re: Bristol City Council

5.5.1 Advantages to the local authority

- Excellent financial case – good level of return from site rental without the risk of operating woodfuel contracts.
- Enables a wood chip hub to be facilitated without having to make the commitment (possibly difficult in the current climate) to operate it and take the risk.
- Removes the need to run the site and take the commercial risk – pass this responsibility and risk to the private sector who are comfortable with it.
- Use private sector skills and commercial experience which are required to successfully operate the woodfuel supply contracts – success is about significantly more than supplying fuel.
- Ensures establishment of the right sort of Hub in the right place.
- Kick-starts local woodchip production.
- Builds confidence and credibility amongst customers, which is needed to encourage woodfuel installations.
- Investment in the infrastructure will ensure that local boilers are supplied with local woodchip, rather than material being brought in from out of the region.
- Fully leverage private-sector knowledge, experience and the expertise required to successfully operate wood fuel hubs.
- Makes use of the existing private sector presence in the area. There are existing and emerging private sector wood fuel operators in the area and, to avoid duplication, making use of their expertise and equipment would be a very efficient way of expanding the industry. Currently, their appetite for further
investment in development and infrastructure is constrained by a lack of demand (customers). Is it really right for a public sector operated hub to compete with existing private sector operators?

- A private sector operator would have the ability to offer 3 or 5 year contracts to end users (see section 5.9) which a public sector operated hub may not. Such contract lengths will be invaluable in building confidence in the supply chain.
- Avoids the well-intentioned but ultimately not successful situation of making large investments in infrastructure and equipment, and being out-competed by a more nimble and commercially focussed private sector (for example the Croyden tree station does not supply Premium Grade woodfuel as originally intended; various local authorities have tried to self-supply and returned to the private sector for more robust and reliable woodfuel supplies).

As discussed elsewhere in this report (particularly section 4.2), the evolution of the market in the SEWEP area toward pellet rather than chip systems is unusual. In reality, based on experience elsewhere, one would expect a higher proportion of woodchip systems on certain sites (eg new-build sites, larger boilers over 150kw, and sites currently heated by oil in rural areas where space is not a constraint). This is because for sites like these wood chip has significant advantages over wood pellet (not least a significantly cheaper cost / kWh). This situation has evolved because the market had more confidence in pellet product quality and security of supply than it did for chip.

Woodchip has much more local benefit than traditional pellet – increased management of local woodlands, reduced transport distance, increased employment in the woodlands and in woodchip production. The establishment of a secure and robust woodchip hub will provide the credibility that is currently lacking, and facilitate more woodchip boiler installations.

The current situation is a market failure, and there is an opportunity to correct it for significant local benefit if the right steps are taken.

5.5.2 How operation of the hub would work

The local authority would set up the site, invest as necessary in its infrastructure and rent it to the private sector operator. The infrastructure investment might be grant aided as detailed in section 5.8.

It is suggested that the initial terms should be 5 years with an option for extension, with 18 – 24 months notice required for termination thereafter. This long termination period will give the operator the confidence to invest and build stock (both of which will be crucial in building the market), confident in the knowledge they have the site for a reasonable period of time. The initial five year term of the lease would allow the local authority to manage the site in a similar way to other contracted out services with periodic re-tendering to ensure best value. As landlord, the local authority will have an infrastructure facility that matches the expected life of boilers. The private sector operator will have a contract for operation which matches the expected lifetime of much of the equipment.

When the initial term is complete the local authority may extend the contract or may decide to re-tender the operation of the site. If the hub has proved successful and profitable for the private sector partner, the tender for the rental is likely to increase, so providing further benefits to the local authority.

The operator would be responsible for running the site, and purchasing or hiring appropriate equipment as necessary.

The rent could be charged on a site basis (£/sq ft) or on a throughput basis (£/cu.m of woodchip dispatched from the site). The latter provides support during the start up period to the operator who, on day one, will have no customers serviced from the site and encourages use of this depot rather than an existing depot further away. It also gives the landlord a benefit of a successful depot with a high throughput and can result in higher payments taken over the whole rental period.
The woodfuel depot site might be owned by a third party, for example a farmer. In this case it is likely to be difficult for either the owner or the site operator to justify the capital infrastructure upgrade needed to create a first class hub. The partnership model can unlock this, by the public sector body taking, say, 20 year lease on the site, and making the investment in infrastructure. They can onward sub-let to a hub operator as described above.

NOTE the length of contracts offered to boiler owners by the operator of the hub does not need to match with the length of Public/Private contract to operate the hub. Indeed the supply chain will be much stronger if a private sector operator builds a basket of long term contracts and, if he loses the contract to operate the hub in 2016 for example, he simply continues to operate these existing contracts from a new hub/depot elsewhere while the new Hub operator develops new contracts. It would not be appropriate to tie the customer contracts to the Hub as this would not solve the current market failure, simply create a new one.

5.5.3 Financial case
The results of a financial analysis for this model are summarised below using the same assumptions of costs and growth in demand as the base case for the previous examples.

For landlord

a) 10,000 t/yr capacity site

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment cost in site infrastructure</td>
<td>£154,550</td>
</tr>
<tr>
<td>Grants at 50%</td>
<td>£77,275</td>
</tr>
<tr>
<td>Expected site life</td>
<td>20 years</td>
</tr>
<tr>
<td>Administration and liaison per year</td>
<td>£1,000</td>
</tr>
<tr>
<td>Annual maintenance responsibility of occupant</td>
<td></td>
</tr>
</tbody>
</table>

With an annual fixed rate of £15,000, payback after grants is achieved in 5.6 years and IRR over 20 years is 16.1%

With a fee of £1.75 per tonne payback is in 6.8 years and 20 year IRR is 14.0%. The rental paid over the first 3 years is £19,110 compared to £45,000 with a fixed rent, assisting with the establishment of the business.

b) 4,000 t/yr capacity site

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment cost in site infrastructure</td>
<td>£113,245</td>
</tr>
<tr>
<td>Grants at 50%</td>
<td>£56,622</td>
</tr>
<tr>
<td>Expected site life</td>
<td>20 years</td>
</tr>
<tr>
<td>Administration and liaison per year</td>
<td>£1,000</td>
</tr>
<tr>
<td>Annual maintenance is the responsibility of occupant</td>
<td></td>
</tr>
</tbody>
</table>

With an annual fixed rate of £6,000 as suggested for the site near Rhymney, payback after grants is achieved in 11.4 years and IRR over 20 years is 5.8%

With a fee of £1.75 per tonne payback is in 10.3 years and 20 year IRR is 7.3%. The rental paid over the first 3 years is £10,850 compared to £18,000 with a fixed rent.

If the site is successful and profitable, a second tendering for operation of the site after 5 years should result in a higher rental income to the public sector site owner increasing the returns from the levels shown above.

For site operator
With no need for investment in site infrastructure the borrowing requirement for the site operator is reduced.

a) 10,000 t/yr capacity site

The payback period using base case assumptions and fixed rental of £15,000/yr and allowing for use of cheaper second hand equipment is 3.9 years. The IRR after 5 years is 19.3% and after 10 years, 41.2%, showing that commercial returns are possible.
With the price per tonne set at £1.75 the site makes a better return for the operator. Payback is achieved after 3.8 years with an IRR of 27.1% after 5 years and 46.8% at 10 years.

b) 4,000 t/yr capacity site
The payback period using base case assumptions and fixed rental of £6000/yr and allowing for use of cheaper second hand equipment is 5.7 years, meaning that at least a 10 year period would be needed for the site operator to make an acceptable return at this scale of operation. The IRR after 10 years is 18.1%.

With the price per tonne set at £1.75 the site makes a slightly better return for the operator with an IRR of 19.3% at 10 years.

The advantage of larger scale of operation is again clearly seen.

5.5.4 Characteristics of the private sector partner

In order to achieve the objectives of providing credibility to the market and facilitating more woodfuel installations, the private sector operator will need to be chosen carefully. Their role is only partly to be tenant in the woodfuel hub – the other part (arguably the more important) is to develop the woodchip market in the area. The operator will need to have the following:

- Track record and expertise in Premium Grade woodfuel. New operators or suppliers of low-grade “power station” woodchip are unlikely to have the expertise to be successful.

- Enough financial strength to give confidence in their future (to both the local authority as hub landlord; and to customers).

- Good understanding of the woodchip market.

- Ability to facilitate demand-creation and encourage boiler installation by, for example, undertaking market development work, hand-holding new projects, undertaking consultancy for potential customers.
5.6 Recommendations and next steps

Scale is important. Based on the financial analysis the best returns and lowest vulnerability to risks is provided by larger sites. One or two would be sufficient to serve the SEWEP area.

The quicker that the throughput increases to the planned capacity, the better - and so coordination between setting up a production hub and installing boilers is important. A large development such as The Works provides the opportunity to establish a viable hub relatively quickly.

The financial analysis of different hub configurations shows clearly that larger hubs are more profitable but still take a long time to make a return on the investment. This makes it relatively unattractive to set up a hub from scratch. The model where a landlord such as a council or group of councils invests in the infrastructure and can accept return over the long term (up to 20 years) and the hub operator works over a shorter time scale of around 5 years can work well for both parties.

Woodland based production appears to be an option from this analysis but experience shows there are real difficulties in practice in supplying small boilers. A direct supply from woodland requires a large user or concentration of small users who take fuel on the same day so best use can be made of mobile chipping equipment.

Any wood fuel hub should be able to take advantage of low cost and locally available feedstock including arboricultural arisings. Increasing the use of arboricultural arisings can help to keep production costs down and make a significant contribution to a site’s viability. A chip screen is essential for processing arisings. Whether sufficient arisings can be brought into a central yard economically is unproven. The example of Bristol City Council basing their fuel supply on arboricultural arisings highlights some of the opportunities and pitfalls of this approach (see Box 2).

The mixed public/private model may allow better use to be made of available grants and financing, particularly if the landlord is in the public sector.

Therefore the consultant’s recommendation is that the local authorities in the SEWEP area should invest in the fixed infrastructure of a site and rent the site to a private sector wood fuel company who would provide the mobile equipment and personnel to operate the site and take the commercial risk.

The next steps should be to:
- Identify a suitable site and;
- Identify a suitable private sector partner for the initial phase of the project.
Box 2  Bristol City Council’s wood fuel supply

Bristol City Council’s Blaise Nursery produces the majority of plants for municipal use around the city. The nursery site also receives arisings from management of trees in parks and streets. In the past disposal of these arisings was at best cost neutral.

In 2006 a 400kW wood chip boiler was installed at the nursery to provide heat for the greenhouses and make use of the chipped tree surgery arisings. At the same time a well ventilated storage shed was constructed to allow the chip to start drying before use. A step grate boiler was specified to enable use of the undried chip brought into the yard by tree surgeons. Initial attempts to run the boilers using material as delivered into the yard by tree surgeons showed that the sophisticated fully automated boiler required a higher quality chip with fewer leaves and less fine material. Oversized chip also blocked the fuel feed auger. Similar difficulties were experienced with other boilers the council had installed.

The second phase of the project was construction of a well-ventilated storage shed and the installation of a specialist wood chip screen. Fitted with 35mm and 10mm or 6mm screens this screen removed oversized material and much of the fine material including most of the leaf matter.

![The Blaise Nursery chip screener and chip store](image)

This improved the chip quality and performance of the boilers reducing breakdowns, eliminating excess smoke production and increasing efficiency. There were still problems including the storage of chip on a gravelled surface leading to collection of gravel with the chip when it is being screened.

The latest phase of development at Blaise is designed to address these problems and increase throughput at the site to 3,000 t/yr or more. Higher production will allow the site to accept arisings from additional tree surgeons and the employment of a full time staff member. Logs coming into the yard will be chipped for use in the Council boilers. Brushwood chip will be accumulated and sold to large power stations. An additional source of fuel will be clean dry waste timber from Woodwise timber recycles.

Improvements include:

- extension to the area of concrete hardstanding to avoid contamination of chip with gravel
- a second wood chip storage shed
- purchase of a MusMax high capacity chipper
- a telehandler for handling chip and logs
- a scissor lift trailer and tractor for local deliveries into above ground chip stores
- a wood chip test centre equipped with sieves and moisture meters for quality assurance

The total planned expenditure is approximately £440k.

By 2011 BCC had installed 10 boilers in its own buildings plus a further 4 in PFI schools. All but one are wood chip boilers, the other uses pellet. A further 2 boilers will be installed in 2011. The aim is to make best use of the available timber and wood chip and full use of the increased production capacity at Blaise.

**HOWEVER** the private sector is currently supplying woodfuel on long-term contracts to 10 of the boilers in Bristol.
5.7 Risks

The recommended public private model limits risks to both parties and enables them both to meet their objectives. It provides a long term secure fuel supply for the site owners (local authorities) and a long term secure market which justifies investment in production equipment for the private sector wood fuel producer. Both parties make a financial return, and have a risk profile which is likely to sit comfortably.

The commitment to invest in woodfuel production made by both sides will, by itself, reassure potential installers of wood chip boilers that the fuel supply is secure.

There are risks associated with establishing a new woodfuel hub. These have been split between risks to the local authority (effectively the landlords) and the private sector operator. It is clear from the details below that the public / private model pushes the risks very clearly onto the private sector operator.

For the local authority the risks are:

<table>
<thead>
<tr>
<th>Risk</th>
<th>Evaluation and mitigation measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>No interest in operating the hub from the private sector.</td>
<td>Very unlikely given existing interest in wood fuel production and particularly if there is a clear programme of boiler installations. Mitigate by identifying and appointing partner early in the process, before significant investment is made.</td>
</tr>
<tr>
<td>Cannot get sufficient funding/grants for initial investment in the site.</td>
<td>This is a medium risk to the development of a hub in view of the restrictions on public finances. However, a number of potential sources of funding have been identified and new sources of funding are developing, see Section 5.8. However no site acquisition or investment would start until the funding was in place.</td>
</tr>
</tbody>
</table>

BOTH OF THE RISKS ABOVE CAN BE REMOVED BEFORE SIGNIFICANT INVESTMENT IS MADE. THEY ARE NOT ONGOING RISKS

<table>
<thead>
<tr>
<th>Risk</th>
<th>Evaluation and mitigation measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower than predicted rent if paid on a through-put basis</td>
<td>This is a risk-reward decision for the landlord. If absolute certainty is required a fixed site rent could be charged (although, as described, this will not enable a sharing of the benefit as a through-put model would).</td>
</tr>
</tbody>
</table>

For the private sector site operator the risks include:

<table>
<thead>
<tr>
<th>Risk</th>
<th>Evaluation and mitigation measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of demand in early years due to few boilers installed</td>
<td>This is to be expected to some extent but may well be exacerbated by delays in boiler installation which have often been encountered. The risk can be managed to some extent by: • paying rent on the basis of wood chip delivered from the site or using the site to provide wood chip to other hubs managed by the site operator • using contractors to carry out chipping, loading of outgoing vehicles and other operations • the development at 'The Works' gives the chance of a rapid increase in demand soon after start up. Any experienced private sector operator will understand this and be able to mitigate against it.</td>
</tr>
<tr>
<td>Operational problems on site</td>
<td>Machinery breakdown may halt production or demand may outstrip supply of suitably seasoned chip from time to time. Although this is very likely to happen chip can be brought from elsewhere and delivered in bulk. This will be particularly easy if the site operator has a network of production hubs. Hold a buffer stock of chip to meet demand during production difficulties. Any experienced private sector operator will understand this and be able to mitigate against it.</td>
</tr>
<tr>
<td>Risk Area</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
</tr>
</tbody>
</table>
| Rising prices for wood fuel & timber | The risk from rising timber and wood fuel prices is that:  
  i) Wood fuel will become uncompetitive against fossil fuels; and  
  ii) If timber prices rise faster than fossil fuel prices the operation of the production site may become unviable.  
The risk is low as all predictions are that fossil fuel prices will rise faster than woodfuel prices.  
  • Careful consideration of contract terms can limit the users’ exposure to price volatility.  
  • Retaining ownership of Council timber and paying a service fee to the site operator for processing and delivery is another option; and  
  • including a clause in tree work contracts that arisings have to be made available at no cost to the Council for wood fuel production. |
| Wood fuel uncompetitive with fossil fuels - budgetary impact | More likely to occur with pellets than chip, unless competition from power stations intensifies greatly.  
The introduction of the RHI for boilers installed after 15th July 2009 means that this is a very low risk. Costs should be evaluated against the alternative fossil fuel. |
| Not enough timber available | The resource assessment shows that sufficient timber for a minimum of 28,000 t/yr of seasoned wood chip is available in the SEWEP area. This is enough for approximately 25MW of heating or two large wood fuel production hubs.  
If competition for timber reduces availability the production site could be used differently. For example it could be used as a distribution point for screened chip from SRC or with different machinery the site would be suitable for processing clean waste timber. |
| Insufficient timber available/competition for timber | Demand rises across the region leading to shortages of low quality timber.  
Competition from panel mills, power stations and other wood fuel producers. This could be managed since:  
  • distances for delivery of timber and wood chip to the final customers are short, so transport costs less than for many bulk users  
  • the RHI will enable higher prices to be paid for small scale heating  
  • expected higher fossil fuel prices will lead to increased wood fuel prices and so allow more to be paid for timber  
  • as prices rise farmers will plant SRC which will tend to moderate timber prices |
| Poor quality fuel causes operational problems | Any experienced private sector operator will understand this and be able to mitigate against it.  
The site operator would have to meet agreed fuel specification just like any other supplier – arguably the private sector are better at recognising the commercial imperative of keeping quality standards high. |
| Competing suppliers of wood fuel in the area undercut prices from wood fuel hub | To ensure best value local authorities may wish to tender for wood chip fuel supply despite the existence of a production hub in which they have an interest. However:  
  • scale of operation reduces costs. Securing of an initial, large core supply contract (such as The Works) is important to keep costs down.  
  • an ‘open book’ policy between the hub operator and councils could improve understanding of costs and benefits and make council customers more likely to use the hub  
  • a commitment to use the hub could be made with the condition that prices are benchmarked against other producers and regions  
  • the hub should actively pursue all woodfuel contracts in the area, not just those for the public sector. |
Being part of an integrated programme that includes a planned series of boiler installations by local authorities and being linked to these through the involvement of local authorities reduces the risks compared to setting up a hub speculatively. However, to succeed it still has to be run as a very commercially focussed-business.

5.8 Financing a woodfuel hub

Funding to support the development of a wood fuel production site may be available from both public and private sources. The ownership, management structure and administrative arrangements of the site may affect eligibility for some grants. For example, if community benefits and perhaps ownership of the site can be clearly demonstrated then grants from charitable trusts and other sources of community project funding may be available.

Presenting the production site as part of an integrated package that includes boiler installation and operation, or as part of an ESCO style arrangement may make it more attractive to funders. Applying collectively as SEWEP rather than as a single Local Authority may also be advantageous as it will increase the scale of operations and access to a wider range of support. A company jointly owned by the SEWEP partners could provide clear accountability focus.

Securing some grant funding for the woodfuel hub will increase the possibility of securing loans or other financing for the production site. A number of providers might support the establishment of a woodfuel production hub. Some may require a particular structure or emphasis, for example providing community benefits or addressing fuel poverty. Sources of financial support include:

*Rural Development Programme*

The RDP Wales is an important source of support for rural communities and businesses not directly involved in agriculture. It can support rural communities, SMEs based in rural areas and diversification of farm enterprises. Under Axis 1 this includes support to process timber into a range of products, including woodfuel. Grants are mainly for capital works and a larger project, such as the wood fuel production site, would fit well with the RDP Wales priorities.

*WEBS II*

The Wood Energy Business Scheme II is administered by FC Wales, funded from European sources and is designed to support the developing wood fuel industry. Woodfuel processing businesses, such as the proposed site in the SEWEP area are eligible for support but this cannot be extended to public sector bodies\(^{19}\). A company operating a wood fuel production site established by local authorities may be eligible for support for the capital equipment required to work the site.

Support for boiler installations is also offered through WEBS II. For details see [http://www.forestry.gov.uk/forestry/INFD-7NIG2E](http://www.forestry.gov.uk/forestry/INFD-7NIG2E).

*South East Wales Community Economic Development Programme*

The new South East Wales Community Economic Development Programme is a £13.5 million initiative designed to help third sector organisations to grow and provide better services for their communities. It aims to encourage organisations to become less dependent on grants and better equipped to tender for procurement contracts.

This fund does not appear appropriate as a funding source for the wood fuel production site but might provide support for other elements of the supply and use chain, for example management of woodland by a third sector organisation or a boiler installed by a charity providing community services. In the latter case it should be borne in mind that grant funding from public sources may make the boiler ineligible for the RHI. Identifying aspects of the project that are not directly connected with the boiler installation for funding would avoid any conflict with the RHI.

Carbon Trust/Siemens loan fund
A new scheme has been announced by The Carbon Trust to replace the zero percent loans previously available. The £550m funding stream is to be made available by Siemens Financial Services for 3 years from April 2011 and is branded as "Energy Efficiency Funding". Funding will be for as little as £1,000 and is available to all sorts of organisations with repayments funded by savings in energy costs. Whether biomass boiler systems will be eligible for support is not confirmed but in combination with the RHI the repayment from savings test could certainly be met.


Utilities companies’ green energy funds
The major gas and electricity suppliers have statutory obligations to reduce CO₂ emissions under the CERT (Carbon Emissions Reduction Target) scheme. The current third phase of CERT came into force in April 2008 with more ambitious targets than hitherto. Although the emphasis is on domestic properties most of the utility companies have established green funds which support projects in charities and community organisations either with CERT funding or directly from consumers through specific green tariffs.

Biomass heating projects and their associated infrastructure have been supported in the past. This funding can be a good source of match funding for UK government and European funded grants such as the RDPE Leader. Most larger energy suppliers have green funds aimed at supporting renewable energy projects by communities and charities country wide. The criteria can be more flexible than with public sector funding. They can be difficult to track down so some persistence is needed. Examples are:

~ Scottish Power Green Energy Trust [http://www.scottishpowergreentrust.co.uk](http://www.scottishpowergreentrust.co.uk)
~ British Gas Green Streets has closed for this year but may still be able to offer support. See [https://www.britishgas.co.uk/GreenStreet/Home/](https://www.britishgas.co.uk/GreenStreet/Home/)

Npower have linked their green tariff with the National Trust and Scottish & Southern with the RSPB.

WRAP
WRAP (the Waste Resources Action Programme) has previously offered a series of capital grant schemes for the waste industry, including waste wood reprocessors. Most capital grants were withdrawn in mid 2010 although some targeted schemes, including one for SMEs involved in recycling in Wales were maintained. In April 2011 WRAP will launch a new type of financial assistance for the waste reprocessing industry but details of the scheme are not yet available (Mark Collinson, pers comm.). This may be an appropriate source of support to a wood fuel production site, particularly if processes arboricultural arisings which might otherwise end up in landfill.

For details contact WRAP [http://www.wrap.org.uk/wrap_corporate/funding/index.html](http://www.wrap.org.uk/wrap_corporate/funding/index.html)

Centrally distributed European funding: ‘baby ELENA’
Funding for wood fuel production hub infrastructure may be available by including it as part of a larger integrated programme to install biomass boilers and other renewable energy measures such as solar PV, solar hot water and energy efficiency. In February 2011 the EU announced a new assistance to local authorities implementing their Sustainable Energy Action Plans.

The structure of the support is similar to that offered for large projects with capital requirements of over €50m supported by the European Investment Bank coordinated ELENA Facility. Negotiations are underway with the German development Bank KfW for the introduction of the KfW-ELENA facility. The key features of this are:
- assistance provided to single local authorities or groups of local authorities with a population of at least 200,000
- technical assistance given to consolidate smaller projects (if necessary) and prepare them so that they form a ‘bankable’ project. The KfW-ELENA facility will work with banks in the UK so there is a local contact point for funding delivery but there is no restriction on funding sources. For example, the project could be taken to the Cooperative Bank which announced increased funding for renewables projects early in 2011.20
- the project size is required to be at least 15 times the size of the technical assistance provided


**InterReg IVC**

Priority 2 of the Interreg IVC programme is Environment and Risk Prevention. The general purpose is to enable regional and local authorities and other stakeholders at the regional level to improve their policies, methods and capacities in the areas of environment and risk prevention. It aims to link environmental protection with the economy.

The development of the wood fuel supply chain in SE Wales could be supported under the sub-theme for Energy and Sustainable Transport. Specifically this seeks to assist in

- moving to a low carbon economy, including information to industrial customers, service providers and citizens on issues such as ‘how to reduce energy consumption’
- transferring knowledge concerning long-term targeted energy efficiency campaigns, including efficiency in buildings, notably public buildings
- exchanging and transferring of knowledge on mechanisms to stimulate investment in production of renewable energy as well as in energy efficiency projects

Past Interreg projects have included support for forests and climate change. The 4th call for the programme closed on 1st April 2011. Details available at [http://i4c.eu/](http://i4c.eu/).

**Community Generation Fund**

Launched initially in England by Finance South East a national rollout is planned for the Community Generation Fund.21 The fund will provide loans or both the feasibility and construction stages of community led renewable energy projects, including biomass. The fund will allow communities to access private sector finance that might not otherwise be available to them. Finance SE is also looking for local authority partners, again initially in SE England. For more details see [http://www.financesoutheast.com/ourfunds/index.aspx?id=1778](http://www.financesoutheast.com/ourfunds/index.aspx?id=1778)

**Renewable Heat Incentive**

The details of the Renewable Heat Incentive were announced on 10th March 2011. Incentive payments are available for ground and water source heat pumps, solar thermal, biomass and biomethane. At this stage the RHI is only available for non-domestic installations. An announcement of the final details of the tariff arrangements for domestic installations is expected in October 2011 with implementation the following year.

Boilers installed in single household before then will qualify for a single, non-returnable Renewable Heat Premium Payment details of which will be announced in May 2011.

For biomass there are 3 payment bands based on the size of the boiler. All non domestic boilers will have to be fitted with a heat meter and the payment rates are shown in Error! Reference source not found.. The scheme will be administered by Ofgem and will start operating in July 2011. All boilers commissioned after 17th July 2009 will qualify for the grandfathered, index linked (to RPI), 20 year tariff.

More detailed information about the RHI is provided in Appendix 5.

---

20 see [http://www.co-operativebank.co.uk/servlet/Satellite/1197273362930_CFSweb/Page/Corporate-SpecialistTeams](http://www.co-operativebank.co.uk/servlet/Satellite/1197273362930_CFSweb/Page/Corporate-SpecialistTeams)

### Biomass Boiler Size (non-domestic all require heat meters)

<table>
<thead>
<tr>
<th>Biomass Boiler Size (non-domestic all require heat meters)</th>
<th>Tier 1 Tariff (p/kWh) above 1,314 peak load hours</th>
<th>Tier 2 Tariff (p/kWh) above 1,314 peak load hours</th>
<th>Average Tariff (p/kWh) for 3,000 peak load hour operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic below 45kW non-metered</td>
<td>One-off RHI Premium Payment for 2011-2012, long-term Tariff clarified for 2012-2013</td>
<td>Not relevant</td>
<td>Not relevant</td>
</tr>
<tr>
<td>&lt;200kW</td>
<td>7.6</td>
<td>1.9</td>
<td>4.44</td>
</tr>
<tr>
<td>200kW-999kW</td>
<td>4.7</td>
<td>1.9</td>
<td>3.13</td>
</tr>
<tr>
<td>1000kW and above</td>
<td>2.6</td>
<td>2.6</td>
<td>2.6</td>
</tr>
</tbody>
</table>

**Table 22** RHI payments for biomass boilers (source DECC, [http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/policy/incentive/incentive.aspx](http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/policy/incentive/incentive.aspx))

The impact of the RHI on uptake will depend in part how quickly the £860m allocated to the RHI in the October 2010 spending review for the period to 2015 is used up.
5.9 Procurement of woodfuel by end users

If woodfuel is procured in the usual way that other materials are bought (e.g. desks or gas) then most or all of the local benefits that woodfuel can bring will be lost. In order to maximise these for the region, a different procurement methodology is needed.

This report has identified a number of ways that procurement of woodfuel could help stabilise and encourage a supply chain:

1. Conditioning and processing of material into premium grade wood chip is a lengthy process. This is due to both the processing time, and the management and nurturing that the local feedstock supply chain requires to be a reliable supplier of raw material (woodland owners and tree surgeons are generally conservative, and long-term relationships are the best way of a wood chip producer building a reliable supply chain).

Without knowing with a good degree of certainty what the market is for wood chip, a supplier at this fledgling stage of the industry is unlikely to take the risk of building significant stocks of material – and will be probably be unable to supply to specification at very short notice. This creates a chicken and egg situation – wood chip does not develop as a fuel (or if it does, it is shipped in from outside the region) because new woodfuel installations cannot see a secure supply chain. At the same time, wood chip suppliers do not build up the secure and reliable supply chain that is needed because they have no certainty of a market.

Long term contracts (3 years plus), with start dates 6–9 months after tender award, would enable timely planning of feedstock supply by woodfuel suppliers (in contrast to short term contracts where material supplied under the contract must all have been purchased and the conditioning process started before contract award – i.e. stock built speculatively).

2. Call-off contracts actively discourage woodchip for the reasons in 1, although they work well for wood pellet. (By call-off contracts we mean a contract where the customer is able to order a load of fuel from a number of different suppliers, and gives no contractual commitment to a single supplier that they will be the sole supplier to an installation). Not using call-off agreements, but instead tendering and appointing a single supplier to a boiler for a reasonable period of time will encourage wood chip operators into the sector and the region. (As the market matures with many established wood chip suppliers all supplying high volumes of material, this will become less of an issue). If framework agreements are used, they should be used to identify a pool of suppliers from which a single supplier can be chosen for a given installation for a reasonable period of time.

3. The private sector in other areas of the country is willing and able to give wood fuel supply contracts for 3 or 5 years. This time period gives certainty to the client (boiler owner) as well as the wood fuel supplier. (Such security of supply is unlikely to be available from a public sector operated Hub, given the risk management issues for local authorities).

4. As detailed in 5.5.2, in order to build a stand-alone and viable supply chain the length and finish dates of fuel supply contracts between boiler owners and a wood chip supplier operating a Hub should be unrelated to the contract to operate the Hub. It is not appropriate to match the length or finish date with the contract to operate the Hub.

ESCOs / Operate & Maintain contracts

One concern raised by many of the consultees in this study (and well known elsewhere in the UK) is the perceived risk and hassle of operating the "new" technology of woodfuel. There are a number of models where the hassle and to varying degrees the risk of a woodfuel installation can be borne by the supplier rather than the organisation needing heat.
1. ESCO – the boiler is owned and operated by an ESCO Provider who pays for its capital cost, undertakes all operation, maintenance, and fuel supply, and charges for the heat produced. It is likely that the RHI payment would go to the ESCO provider. This contract would be for a long period (perhaps 20 years) and would need to include appropriate safeguards for the ESCO provider should the customer stop taking heat or go bust. All of this is entirely possible, and there are a number of entrants into this market offering ESCOs. Charges are likely to be on the basis of a standing charge plus a tariff per kWh of heat used.

2. Operate and maintain contract, where the boiler is installed and paid for by the client but an organisation operates it for say 5 years and undertakes all of the fuel supply, servicing and maintenance. In many ways this is the same as an ESCO on a day to day basis, but has the site owner funding the capital cost and more of a traditional “contractor” relationship with the operator. The operator could be a fuel supplier or boiler installation company – or indeed a facilities management company, although in this early-stage of the industry technical knowledge and experience is of crucial importance.

ESCOs are developing – for example Torfaen CBC is investigating a community led renewable energy CIC/ESCo.

5.10 Price trends for wood fuel
An analysis of future trends for wood fuel prices was prepared by E4Tech and published alongside the consultation document for the RHI\textsuperscript{22}. Their predictions for 2020 are shown in Error! Reference source not found. along with the effect of a 1p/kWh increase in fuel prices. This may occur quite quickly after the introduction of the RHI for G50/G30 wood chip and logs. The price predictions for 2020 inevitably have a large margin of error so should be treated with caution. The consensus is that wood fuel prices will rise in real terms along with fossil fuels. Volatility in wood fuel prices may occur as the supply chain grows to meet increasing demand.

<table>
<thead>
<tr>
<th>Fuel type</th>
<th>Moisture content %</th>
<th>Current prices</th>
<th>2020 prices (E4Tech)</th>
<th>1p/kWh increase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>£/t</td>
<td>p/kWh</td>
<td>£/t</td>
<td>p/kWh</td>
</tr>
<tr>
<td>Low quality chip for power stations</td>
<td>45</td>
<td>25</td>
<td>0.95</td>
<td>61*</td>
</tr>
<tr>
<td>Woodchip (G50 or G30)</td>
<td>35</td>
<td>87.50</td>
<td>2.71</td>
<td>112</td>
</tr>
<tr>
<td>Wood pellet, bulk</td>
<td>10</td>
<td>180</td>
<td>3.80</td>
<td>233</td>
</tr>
<tr>
<td>Wood pellet, bagged</td>
<td>10</td>
<td>225</td>
<td>4.76</td>
<td>270</td>
</tr>
<tr>
<td>Logs in SE Wales av. survey price**</td>
<td>35</td>
<td>107</td>
<td>3.31</td>
<td>136</td>
</tr>
</tbody>
</table>

* E4Tech prediction for cost of UK energy crops which is lower than the price predicted for imported chip
** Log price for 2020 increased by same proportion as wood chip

Table 23 Future price predictions for wood fuels

Once the wood chip prices reach a level at which its profitability exceeds alternative crops or returns from grazing it is expected that farmers will plant increasing areas of lower grade land to energy crops such as short rotation coppice. As supply from energy crops increases it will tend to moderate further wood fuel price rises.

Some energy crops have been planted. For example, miscanthus and SRC energy crops were planted by farmers in Pembrokeshire working together to supply the 1.6MW boiler at the Bluestone holiday park. However this was supported by a 50% grant towards establishment costs from the rural development funding. A price in excess of £115 per tonne for G50 W35 chip delivered to the boiler would stimulate energy crop planting by providing competitive gross margins to farmers, see Box 2.

\textsuperscript{22} Jan 2010, E4Tech, \textit{Biomass prices in the heat and electricity sectors in the UK}, for DECC
The expected rise in the price received for wood chip may increase the viability of a production hub, but competition for timber supplies may mean that most of the increased price is passed back to the woodland owners with little improvement in margins for chip producers and suppliers.

**Box 3. Viability of short rotation coppice for use in smaller boilers**

Historically SRC was established principally as a source of biomass for co-firing in power stations but planting has been far below target rates as farmers have seen the prices on offer as insufficient to justify investment in what is still a high risk crop which only provides a return in the long term taking almost 8 years to recover the initial investment. Long term supply contracts for most of the projected crop may be necessary to encourage planting. However development of SRC agronomy and harvesting capacity has continued so planting rates could increase quickly in response to renewed demand.

Screening of SRC chip to ensure a G50 specification is met would be required for use in smaller boilers. This is an additional processing step compared to supply to power stations. Delivery is also more expensive as smaller vehicles are used.

An analysis of the costs for establishment, growing, harvesting and delivery of SRC chip to heating boilers was made based on the costs shown below. Establishment costs reported for a 4.29ha planting at East Midlands Airport in 2010 were used. Harvesting costs were supplied by SRC harvesting contractors (Kevin Lindegaard, personal communication).

<table>
<thead>
<tr>
<th>Operation</th>
<th>Cost (£)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cuttings (15,350 @ 5p), per ha</td>
<td>768</td>
</tr>
<tr>
<td>Planting, per ha</td>
<td>284</td>
</tr>
<tr>
<td>Cultivations, per ha</td>
<td>152</td>
</tr>
<tr>
<td>Sprays, per ha</td>
<td>350</td>
</tr>
<tr>
<td>Cut back, per ha</td>
<td>57</td>
</tr>
<tr>
<td>Fencing, per ha</td>
<td>334</td>
</tr>
<tr>
<td>Gapping up, per ha</td>
<td>20</td>
</tr>
<tr>
<td>Annual maintenance, per ha</td>
<td>50</td>
</tr>
<tr>
<td>Harvesting, per oven dry tonne (ODT)</td>
<td>35</td>
</tr>
<tr>
<td>Extraction &amp; stacking, per ODT</td>
<td>19</td>
</tr>
<tr>
<td>Dry matter loss in storage</td>
<td>15%</td>
</tr>
<tr>
<td>Screening, per t at 30% moisture content</td>
<td>7.50</td>
</tr>
<tr>
<td>Storage &amp; loading, per t @ 30% mc</td>
<td>8.24</td>
</tr>
<tr>
<td>Delivery, per t @ 30% mc</td>
<td>17.83</td>
</tr>
</tbody>
</table>

The analysis showed that, in the absence of establishment grants, a delivered chip price of £115 for chip at 35% would provide a gross margin of £218/ha/yr over a 12 year SRC crop cycle, although positive cash flow only starts in year 4. The crop is expected to remain productive for 30 years.

These returns are competitive as SRC can be grown on lower grade land; its price is unlikely to fluctuate as much as arable crop prices; and once established only limited interventions are required.

More details of the assumptions and calculations are given in Appendix.
Overcoming barriers to the growth of a woodfuel industry

Previous work, for example in the Heads of the Valleys Woodland Plan and its Appendices and similar studies for English counties and regions have identified barriers for both the supply side (timber from woodlands, arboricultural arisings and the waste stream) and the demand side (the uptake of woodfuel by end users). With its relatively high population density, the importance of urban trees and woodlands and multiplicity of small woodlands in private ownership (at least in the southern part of the study area) SE Wales has features in common with urban centres elsewhere in the UK. In contrast, its proximity to large scale forestry plantations and industrial heritage are similar to northern England. Therefore the consultants have drawn on experience from several regions in analysing the barriers to further development of the wood fuel sector and identifying actions to overcome them.

A significant factor in SE Wales is demand from existing large scale power stations such as Western BioEnergy’s power station at Port Talbot and co-firing with coal at the West Aberthaw power station. Several other large biomass power stations are planned in Wales and SW England (and may or may not be built) that will draw upon timber resources from S E Wales. Although these are, without exception, planning to use imported wood chip they often state an intention to use some chip from local sources.

Given the scale of some of these plants, obtaining even a small proportion of chip from local sources could have a profound impact on the availability of wood fuel for other users. Whether local sourcing will be a preferred option for the power stations depends largely on the price they have to pay for delivered wood or wood chip and the balance that is struck between Renewables Obligations payments for the power stations, Feed In Tariffs and the Renewable Heat Incentive for smaller boilers and CHP plants.

RHI payments may be set at a level that enables smaller heating boilers to pay more for wood fuel than large power generators, in which case competition for supplies will be limited.

It is the consultant’s view that there is very unlikely to be a problem of absolute timber supplies, but rather the real issue will be of timber price. Imported timber and the world market will supply enough timber to feed all of the wood users in the area without a problem, the issue will be at what price, and whether this price is viable given the financial incentives (RHI etc) and the value of the heat generated (which will be based on oil price at the time). This is likely to be a self-regulating situation, in that increasing timber prices will make it economically viable to harvest timber from currently un-managed woodlands, and so more timber will be brought onto the market. However, in a developing market supply bottlenecks and consequent price volatility are likely.

Experience at other local authorities

Suffolk County Council

Suffolk County Council has made a public commitment to support renewable energy technologies and biomass in particular addressing:

- the supply side through an active project to bring woodlands back into management; and
- the demand side by installing biomass boilers where appropriate to support the council’s commitment to reduce Suffolk’s CO₂ emissions by 60% by 2025

The property services department and woodland officer in Suffolk County Council worked together to prioritise wood fuel when considering replacement boilers in schools and other council properties. Wood heating was put at the head of their heating hierarchy. The aim was to reduce carbon emissions and make savings on running costs.

---

The Council worked in partnership with a private sector wood fuel supplier, Eastern Woodfuel, to ensure that supply was in place to meet the growing demand. Between 2006 and 2009 the Council installed 20 boilers in council properties, 17 in schools. The target for 2009-11 is to install a further 15 boilers. The Council programme has stimulated interest in wood fuel heating from the private sector across the county, retains money in the local economy and removes some wood from the waste stream.

6.1.2 Barnsley Metropolitan Borough Council

In June 2004 Barnsley adopted a Biomass Implementation Policy committing it to considering biomass heating systems for all new and refurbished buildings. Many of the early installations replaced coal boilers and were pellet fuelled but as new buildings were developed wood chip was increasingly used. In 2006 the Council won an Ashden Award for its pioneering work which led to almost 2MW of installed wood boilers by the time of the award.

The MBC supported a new private sector wood fuel producer, Silvapower, who in addition to supplying chip to the council’s boilers also chip the council’s timber arisings from parks and trees at a specially constructed chip store at the Councils roads depot.

The commitment to biomass continues with biomass heating and absorption cooling specified as Barnsley replaces all its 11 secondary schools under the Building Schools for the Future programme.

6.1.3 Nottinghamshire County Council

Renewable Nottinghamshire Utilities Ltd (ReNU) is a ‘Not for Profit’ social enterprise developed from the Nottinghamshire County Council’s Wood Heat project. It was established in 2003 following the success of the Nottinghamshire Wood Heat Project. ReNU has a mix of public and private sector owners. Its main role is the development of the renewable energy market place and supply chains in Nottinghamshire and The East Midlands, developing locally owned capacity for producing heat and power. It sought funding for boiler installation projects in parallel with developing wood fuel supplies. With the support of the Council it was successful in quickly enabling 4MW of boiler installation.

The company’s aims are to:
- Develop other small locally owned social enterprises, stimulating local consumption of locally produced fuels, achieving local wealth retention.
- Strengthen rural diversification and attract investment into the region.
- Analyse the wood fuel supply and demand within the region.
- Raise awareness of the use of wood heat for generating electricity and heat.

6.1.4 Staffordshire County Council

In Staffordshire the council has followed a similar pattern to other local authorities by establishing a demand at the new council offices where 1500 people will receive heating and hot water from a wood chip boiler and at the same time setting up a wood fuel production company Staffordshire Wood Fuel24.

The company is owned by the council but seeks to provide fuel for both private and public sector customers. A free advice service is available as part of their offer and they are actively trying to develop the private sector market. This contrasts to some other examples where the demand is generated almost entirely from the council’s own needs.

6.1.5 Ashford Borough Council

Ashford Borough Council’s approach has been to embed carbon reduction through the planning system but with no specific measures to promote biomass. An energy hierarchy has been established:
- Reduce the need for energy through considering the site and maximising solar gain/cooling;

24 see www.staffordshire.gov.uk/environment/woodfuel
• Use energy efficiently through high standards for the building fabric, insulation and energy efficient appliances;
• Take advantage of existing sources of waste heat; and finally
• Use renewable energy.

The requirements are set out in the Council’s Sustainable Design and Construction SPD which was adopted in July 2009. This requires different levels of on-site renewable energy generation depending on location:
• 20% for town centre or brownfield sites
• 30% for urban extension or greenfield sites and
• 10% for villages

If it is impractical to meet this target developers are required to make a payment into the Ashford Carbon Fund. The Ashford Carbon Fund is managed and monitored by the council and will pay for “carbon savings through energy efficiency schemes, and tree planting as part of Ashford’s Blue and Green Grid.” A development is required to contribute to the fund in a one-off payment based on the shadow price of carbon set by DEFRA. However energy efficiency in development is preferred as it is seen as the most cost effective way of reducing CO₂ emissions.

The impact of the policy is only now becoming apparent. The smaller projects are making use of solar PV, solar hot water and ground source heat pumps to meet this stretching target. Larger projects are only now progressing through the planning system. Some are opting for gas CHP but others, such as a new supermarket have biomass as their preferred option. The policy does not seek to promote biomass specifically but as perhaps the most cost effective renewable heating source biomass should benefit significantly from it.

The successful pioneers in wood heating have provided demand in their own buildings and supported the development of supply. By leading the installation of boilers they hoped to stimulate uptake by the private sector. So far there has been only limited uptake of wood heating by private sector except in particular circumstances, for example where woodland is owned by the boiler installer. The alternative approach taken by Ashford (extending the earlier example of London) of requiring a significant level of on-site renewable energy production has proved slow to show results with biomass being considered only for the larger developments.

The RHI is expected to lead to a rapid increase in wood heating by the private sector, probably more quickly in areas where there is an established wood fuel supply.

---

25 The SPD is available at [http://ashford-consult.limehouse.co.uk/portal/planning/sdcsdpd?pointId=c135#section-c135](http://ashford-consult.limehouse.co.uk/portal/planning/sdcsdpd?pointId=c135#section-c135)

26 Katie Wiseman pers. comm.
### 6.2 Demand-side barriers to wood fuel development

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Ways to overcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance of current boilers – reputational damage to biomass sector of historical problems</td>
<td>Develop and promote “exemplar” installations. Provide a hand-holding service</td>
</tr>
<tr>
<td>Perception that fuel supplies are not secure</td>
<td>Demonstrable production hub</td>
</tr>
<tr>
<td>It is easier for energy managers and buildings managers to turn on the gas – no penalty – cheaper than woodfuel at the moment</td>
<td>Education (“it isn’t as difficult as you think!”) RHI/CRC and Climate Change Levy will change the economics of this</td>
</tr>
<tr>
<td>Capital costs of installation high, especially in a time of constrained budgets</td>
<td>Emerging models of financing where fuel suppliers own and operate the boiler and charge for the heat (ESCO) RHI/CRC will change the economics of this</td>
</tr>
<tr>
<td>Lack of understanding of the benefits (very cheap £/tonne of carbon saved cost)</td>
<td>Education &amp; development of a “wood fuel culture”</td>
</tr>
</tbody>
</table>

* The CRC is based around energy efficiency and focuses on reducing overall energy consumption rather than renewable generation. On-site generation of renewable electricity does not reduce liability for CRC but at the moment renewable heat does count against CRC targets and reduce CRC payments. This may change at the next CRC review if the logic used for FITs is applied. Renewable electricity and heat generation both reduce liability to Climate Change Levy.
## 6.3 Supply-side barriers to wood fuel development

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Ways to overcome</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FEEDSTOCK</strong></td>
<td></td>
</tr>
<tr>
<td>Competition from other markets –</td>
<td>• Develop other feed stock sources to bring additional material to market rather than compete with the traditional users&lt;br&gt;• The Market will prevail – competition will create a market price, and as long as that price is paid, material will be available.&lt;br&gt;• With RHI incentives wood fuel is likely to be able to pay more than other markets for raw material</td>
</tr>
<tr>
<td>• firewood (although this is woodfuel!),</td>
<td></td>
</tr>
<tr>
<td>• power stations,</td>
<td></td>
</tr>
<tr>
<td>• board mills</td>
<td></td>
</tr>
<tr>
<td>• sawmills</td>
<td></td>
</tr>
<tr>
<td>Arboricultural arisings</td>
<td>• Aggregation of material and processing with appropriate economies of scale&lt;br&gt;• Quality control is more difficult than with virgin feedstock – processing at a large-scale hub will enable the investment in equipment &amp; skills</td>
</tr>
<tr>
<td>A significant timber resource not currently</td>
<td></td>
</tr>
<tr>
<td>used in wood fuel in the area due to logistical issues</td>
<td></td>
</tr>
<tr>
<td>(produced by tree surgery contractors throughout area) and the difficulty of conditioning into Premium Grade fuel.</td>
<td></td>
</tr>
<tr>
<td>Waste / reclaimed wood</td>
<td>• Managing the waste stream – work with recyclers to maximise total value from waste wood e.g. evaluate/develop better &amp; more cost effective ways of selecting and sorting out clean waste timber: clean sold as fuel for non-WID boilers, contaminated timber used in WID compliant advanced process CHP&lt;br&gt;• Quality assurance is key – it is a difficult material with which to get this right, and the reclaimed wood industry is not used to high-specification products&lt;br&gt;• Reduce the market’s focus on “virgin only”&lt;br&gt;• Once there is a market, producers will invest in sorting &amp; cleaning equipment&lt;br&gt;• Higher prices for fuel will encourage investment in supply chain</td>
</tr>
<tr>
<td>The significant resource that is clean waste wood is not being used in boilers currently. This is a viable source of additional timber material. Regulatory environment is potentially a barrier.</td>
<td></td>
</tr>
<tr>
<td>Timber from currently un-managed (or under-managed) woodlands</td>
<td>• Restructuring of the woodlands is happening now and is a process that will continue for 20-30 years. The next rotation offers opportunity to truly integrate wood fuel production with other products. &lt;br&gt;• Ironically, the poor form/lack of thinning may lead to greater availability for fuel (including firewood) as less of the crop goes to higher-grade markets (sawlogs, fencing).&lt;br&gt;• In the (very) long term wood fuel may offer benefits as it encourages regular thinning, leading to higher quality final crop trees.&lt;br&gt;• Some areas could be converted to energy coppice or replanted to high yielding SRF species. Adaptation to the impacts of climate change for long term productivity/prosperity.&lt;br&gt;• Up and down the valleys constrains vehicle movements &amp; increases distances – consider production hubs by Heads of Valley road or M4; or very local production &amp; use&lt;br&gt;• Different extraction methods such as skyline or chutes – (Forestry Commission Technical Development Branch work)&lt;br&gt;• learn from experience in Scandinavia&lt;br&gt;• OVERRIDINGLY...Higher timber prices will make more</td>
</tr>
<tr>
<td>Prevailing mindset towards conservation/biodiversity reduces timber production from woodlands</td>
<td>Woodland management viable. It is likely the RHI will achieve this.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>“The largest urban forest in the kingdom” creates limitations due to public access/H&amp;S requirements, theft of material for firewood</td>
<td>Off site timber seasoning areas at hubs</td>
</tr>
<tr>
<td>On reclaimed spoil sites with heavy metal contamination there is a need to retain organic matter on site for nutrient conservation/soil enhancement</td>
<td>Education &amp; publicity of complementary nature of wood fuel production &amp; biodiversity enhancement</td>
</tr>
<tr>
<td>Education/publicity of complementary nature of wood fuel production &amp; biodiversity enhancement</td>
<td>If financially beneficial, let the money talk</td>
</tr>
<tr>
<td>Demonstration woodlands or visits to well managed multipurpose woods</td>
<td></td>
</tr>
<tr>
<td>Education/publicity of complementary nature of wood fuel production &amp; biodiversity enhancement</td>
<td></td>
</tr>
<tr>
<td>If financially beneficial, let the money talk</td>
<td></td>
</tr>
<tr>
<td>Demonstration woodlands or visits to well managed multipurpose woods</td>
<td></td>
</tr>
<tr>
<td>Off site timber seasoning areas at hubs</td>
<td></td>
</tr>
<tr>
<td>Education &amp; public notices, role for FC to assist</td>
<td></td>
</tr>
<tr>
<td>Contamination:</td>
<td></td>
</tr>
<tr>
<td>gather existing research information and assess likely impact</td>
<td></td>
</tr>
<tr>
<td>verify current regulatory position</td>
<td></td>
</tr>
<tr>
<td>impact assessment of use in non-WID compliant boilers</td>
<td></td>
</tr>
<tr>
<td>Nutrient loss:</td>
<td></td>
</tr>
<tr>
<td>investigate other remedial measures e.g. interplanting with legumes if coppiced</td>
<td></td>
</tr>
<tr>
<td>assess impact of harvesting stems only</td>
<td></td>
</tr>
<tr>
<td>On reclaimed spoil sites with heavy metal contamination there is a need to retain organic matter on site for nutrient conservation/soil enhancement</td>
<td></td>
</tr>
<tr>
<td>SUPPLY CHAIN INFRASTRUCTURE</td>
<td></td>
</tr>
<tr>
<td>Current wood fuel supply infrastructure poorly established. This includes equipment, skills, quality control / quality assurance</td>
<td>Increased demand from secure, long-term clients will resolve this problem by attracting more serious players into the market, more investment, and creating positive competition.</td>
</tr>
<tr>
<td>Increased demand from secure, long-term clients will resolve this problem by attracting more serious players into the market, more investment, and creating positive competition.</td>
<td></td>
</tr>
<tr>
<td>Create a woodfuel hub and make it available to a private-sector operator.</td>
<td></td>
</tr>
<tr>
<td>Beyond this, little direct stimulation is needed as there is a risk of distorting the market</td>
<td></td>
</tr>
<tr>
<td>Woodland management investment is focussed on equipment for large upland forests not smaller scale suitable for local authority woods</td>
<td></td>
</tr>
<tr>
<td>Increasing demand for timber will improve viability of smaller scale woodland management and so attract investment</td>
<td></td>
</tr>
<tr>
<td>Timber hauliers have responded to power station demand by moving almost entirely to artics – few 6 or 8 wheelers left – cannot access smaller woodlands</td>
<td></td>
</tr>
<tr>
<td>Grants for access improvements + markets</td>
<td></td>
</tr>
<tr>
<td>A Woodfuel WIG for Wales?</td>
<td></td>
</tr>
<tr>
<td>Assistance on road planning?</td>
<td></td>
</tr>
<tr>
<td>Aging workforce, fewer young recruits many of whom prefer to go into tree surgery</td>
<td></td>
</tr>
<tr>
<td>Decent timber price (led by firewood!) will help produce better wages</td>
<td></td>
</tr>
<tr>
<td>appropriate smaller scale harvesting/extraction equipment to improve working conditions and productivity</td>
<td></td>
</tr>
</tbody>
</table>
6.4 Measures to overcome barriers

For the woodfuel market to grow and become established there must be both supply and demand. The supply chain is being established and could quickly respond to a modest growth in demand. For there to be further investment in the supply chain to serve both public and private sector, a clear prospect of continuing growth is required.

The public sector can play a leading role in establishing a market which the private sector can then participate in with confidence. From the barriers identified above, the recommended actions to establish both demand and supply are show below:

<table>
<thead>
<tr>
<th>Section and action</th>
<th>Short term impact</th>
<th>Long term impact</th>
<th>Cost</th>
<th>Priority in section</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Stimulating demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A &quot;consider biomass first&quot; policy by Councils and other public bodies.</td>
<td>4</td>
<td>2</td>
<td>medium – high if more boilers installed</td>
<td>1</td>
</tr>
<tr>
<td>Assessment of building-stock to develop a clear pipeline of new/retrofit biomass boilers by Councils.</td>
<td>3</td>
<td>2</td>
<td>medium</td>
<td>4</td>
</tr>
<tr>
<td>Planning requirements insisting on say 20% on-site renewables for new developments, plus a fund for renewables supported by contributions where 20% on-site renewables is impractical. Get ahead of Zero Carbon targets.</td>
<td>4</td>
<td>3</td>
<td>low</td>
<td>7</td>
</tr>
<tr>
<td>Build confidence in the concept of wood fuel through promotion of best practice examples to the public and private sector.</td>
<td>3</td>
<td>3</td>
<td>low</td>
<td>2</td>
</tr>
<tr>
<td>Build confidence in the supply chain by</td>
<td>2</td>
<td>2</td>
<td>high</td>
<td>5</td>
</tr>
<tr>
<td>a. being an early adopter;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. facilitating the meeting of fuel suppliers and those considering boiler installation; and</td>
<td>5</td>
<td>3</td>
<td>low</td>
<td>6</td>
</tr>
<tr>
<td>c. publicising successful wood fuel boiler projects.</td>
<td>3</td>
<td>3</td>
<td>medium</td>
<td>2</td>
</tr>
<tr>
<td>Provide information on modern log &amp; pellet boilers for households.</td>
<td>4</td>
<td>4</td>
<td>low</td>
<td>8</td>
</tr>
</tbody>
</table>

2. Supporting woodland management

| | | | | |
| Cooperative woodland management for small woodland owners (e.g. Ward Forester project in Devon, see Box 3). | 4 | 2 | medium | 3 |
| Institute a Woodfuel Woodland Improvement Grant for Wales (FC Wales not local authorities). | 4 | 2 | medium | 1 |
| Appropriate smaller scale machinery for smaller, sensitive woods (e.g., see Box 4). | 4 | 3 | medium – high* | 2 |
| Research & demonstrate alternative extraction methods – point to the evidence that it works (impact for woods on steep slopes and by rivers, relatively small proportion of total area). | 5 | 4 | medium – high* | 4 |
### 3. Developing production and supply capacity

<table>
<thead>
<tr>
<th>Measure</th>
<th>Impact</th>
<th>Effect</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Councils provide a production site with basic infrastructure and appropriate planning permission for operation by private sector partner. May or may not need equipment. Move to full commercial basis as market develops. Identify operator by negotiation or by competitive tender.</td>
<td>1</td>
<td>high</td>
<td>1</td>
</tr>
<tr>
<td>Let long term fuel supply contracts (min 5 yrs; ideally rolling contracts) to allow suppliers to invest in appropriate sites and equipment, and to build stocks.</td>
<td>2</td>
<td>low</td>
<td>1</td>
</tr>
<tr>
<td>Develop a substantial pipeline of planned boiler installations by Councils and publicise it to build the market.</td>
<td>3</td>
<td>medium</td>
<td>3</td>
</tr>
<tr>
<td>Consider standardisation (at least in part) of chip delivery systems to enable suppliers to invest in specialist equipment.</td>
<td>4</td>
<td>low</td>
<td>4</td>
</tr>
</tbody>
</table>

* Costs fall on private sector contractors, not LAs
Impact scores: 1 = high effect; 5 = little effect.

**Table 24** Measures to encourage the rapid development of wood fuel production and use.
Box 3  The Ward Forester, bringing woodlands (and their owners) together

The Ward Forester project is 3 year pilot project a partnership between Devon County Council and the Forestry Commission and managed by the Forestry Commission. It started in 2010. The aim is to bring small and farm woodlands into management by developing and testing ways of coordinating their management, improving market access and reducing the cost of management through economies of scale. The project draws on experience in European countries such as France, Germany and the Scandinavian countries where there is a long history of small woodland ownership and cooperative management.

The idea of combining several neighbouring small woodlands in a group for management is not new but the Ward Forester way of working is successfully developing the organisation to enable this to happen in practice. The steps in the process are:

1. Create interest; get a core of woodland owners together. At this stage organised by the project forester, but could be adopted by forestry agent or other
2. Prepare woodland management plans, including a single work programme coordinated across the woodlands in the ‘ward’.
3. Manage the woods as a unit coordinating operations (thinning, felling, reestablishment etc) to give larger parcels of work which can be tendered to obtain better value than if the work was let for individual woods.
4. Tendering of work is key to transparency and achieving best value for woodland owners
5. Oversight and management by the Ward Forester – a professional woodland manager appointed by the group through a tendering process.
6. Oversight of the Ward Forester by woodland owners through a formal structure, perhaps a woodland owners co-operative.

Progress:
The project website [www.wardforester.org.uk](http://www.wardforester.org.uk) and implementation plans have been developed. The first group of woods with a Ward Forester has been set up in Teign Valley. By February 2011 86 woods totalling 1464ha had been enrolled in the Ward Forester programme

Benefits for woodland owners:
~ professional woodland management at significantly lower cost than if done for individual woods
~ the owners day to day involvement is low, minimising disruption to existing activities
~ better biodiversity values from structural diversity and light levels in managed woodland
~ income from timber sales on a regular basis, though this may be modest initially
~ an appreciating asset – protecting and enhancing timber value through good management, improving the quality and price per cubic meter if the final harvest
~ a transparent process, aimed at providing best value for woodland owners

Benefits for the Ward Forester:
~ increased income from having more woodland under management. Woodlands that would not otherwise be managed brought into production
~ easier marketing of timber in larger quantities on a regular basis
~ better prices through more attractive lots and increased competition when work tendered
~ increased income from grants & easier working (e.g. when preparing plans for similar small woods).

Public benefits:
~ woodlands managed that would otherwise be left unmanaged – biodiversity, rural economy gains
~ additional production (including wood fuel) as areas brought back into management

Issues:
~ The Ward Forester model needs and external stimulus, or champion to bring local woodland owners together and set up the initial group in an area. However, control should remain with the woodland owners to ensure transparency and best value.
~ The long term management structures and processes for groups of woodland owners in a ward has not been developed in the pilot project which is still in its early stages.
~ Several firms of forestry managers & agents competing to act as Ward Foresters are needed to achieve best value for woodland management.
~ The woodlands managed together in a ward should be similar in order to achieve the anticipated economies of scale on woodland management and timber marketing.
Box 4  Woodwise Forestry’s tractor based harvester

Working across South East England Woodwise Forestry needed a mechanised harvesting system to improve productivity. Conventional harvesters were too big, too expensive and just not suitable for the small woodlands found in the region so Nick Hilton designed his own.

Based on an a Valtra tractor fitted with an 8 meter reach Botex crane, a Keto 51 Harvesting head completed the design. All of these were available from a single supplier, Jas P. Wilson.

A grant was obtained from the Rural Development Programme England to meet part of the cost and the harvester obtained in early 2009. It has worked since then in a range of softwood and hardwood plantations as well as chestnut coppice. It has proved to be a reliable and productive piece of equipment.

The combination was evaluated in a project by Forest Research Technical Development Branch and results given in report reference FCPR040 in March 2011.

Figure 8  Woodwise Forestry’s tractor based harvester.
7 Workshop for fuel producers and users

A workshop for those involved in all parts of wood fuel supply and use was held on 18th February 2011 at the Eco Building, Cwmbran, Torfaen. It was attended by 27 people including wood pellet and chip producers, local authority Energy Officers and woodland managers.

After a brief introduction to woodfuel in general and the findings of this project the delegates were asked to consider 5 broad questions. These are:

1. Wood chip or wood pellet (or logs)?
   From a users/suppliers point of view what are the relative merits of each?
   - localness
   - investment/equipment required
   - profitability
   - ability to expand to meet growing demand
   - ‘fit’ with other activities e.g. farming or tree surgery

2. Barriers and opportunities
   - how do you see the market developing? Do you have confidence in it?
   - does planning affect your attitude (e.g. need change of use)
   - What is stopping you setting up production? Barriers similar to users questions plus:
   - supply and demand which is more important in getting the market to grow locally
   - What 2 things would help the most to develop your supply business?

3. Perceptions of fuel supply
   - is fuel supply secure and available?
   - views on contract length, how close the relationship should be with supplier – a partnership or 1 year contract
     - is local important or, for example, are imported pellets just as acceptable?

4. Can you meet demand in a rapidly growing market?
   - what are the limits to your growth? Are there sufficient timber supplies? Where would more come from? What do you see as your future output – if you want to tell us?

5. Standards and quality assurance
   - How important are these? Reaction to the HETAS solid biomass scheme? Chip and logs seen by customers as being variable. How can we introduce quality assurance? Would you sign up?
   - Different boilers need different specs of fuel. Would uniformity help you as producers?

4 groups of delegates were formed to discuss these topics. By chance each group had a majority of either wood fuel users, fuel suppliers or woodland managers giving a variety of perspectives from the different groups.

The outcome of the group discussion was used in the preparation of this report. The detailed responses are summarised in Appendix 2.
8 Recommendations to develop wood fuel use and supply

These recommendations are intended for the six County Borough Councils who are members of the SE Wales Energy Partnership as they continue to develop their use of wood fuel. An integrated approach should be taken which aims to minimise risk of downtime, increases the robustness of the boilers to variation in fuel quality, maximises the benefit to the local environment and economy and makes best use of the available wood resource. Specific recommendations are:

1. **Chip vs pellet**
   1.1 Current installations are predominantly wood pellet, but there are excellent reasons for the majority of new installations at an appropriate scale to be woodchip. Both chip and pellet have their place, and although there have been some bad experiences with woodchip, focusing almost exclusively on pellet is not the right thing for boiler owners, the region, or the fledgling wood fuel industry.

2. **A wood fuel production facility**
   2.1 Establish a single large production facility with a planned output of 10,000 t/yr, initially to serve the known demand from projects such as The Works district heating system. As demand grows a second similarly sized site may be required. The wood fuel hub should be capable of processing arboricultural arisings (logs and brushwood chip) and forestry timber. The hub should concentrate on wood chip production as there are already a number of local entrepreneurs planning to start wood pellet production a network of local log producers.

   2.2 The site should be owned by a local authority or other suitable public sector body who should make the initial investment in site infrastructure and lease the site to a private sector operator. This will allow the public sector to achieve security of supply and maximise benefits to the local economy while achieving an economic return over the planned life of the site infrastructure (20 years). The site operator will bring experience of wood fuel production and a business focus, aiming to make a return over the 3 – 5 year length of the operating lease.

   2.3 The wood fuel production facility should be kept with a single focus on supply of wood fuel and should not be combined with a timber yard that processes timber into value added products. They should operate as complementary parallel businesses.

   2.4 Consideration should be given to establishment of a Biomass Trade Centre to provide quality controlled firewood logs and pellets to domestic users and provide a highly visible outlet for smaller producers of firewood and pellets. This could share a site with the wood chip production facility.

   2.5 A production target of 50,000 tonnes per year of high quality woodfuel for use in heat only boilers by 2020 should be established. This is distinct from use in multi-megawatt power stations.

3. **Building demand**
   3.1 The local authorities to have a policy which considers biomass boilers first in both new buildings and when replacing boilers with a presumption in favour of biomass.

   3.2 Establish a planned programme of boiler installations for a 5 year planning horizon based on plans for new development and an assessment of properties where boilers are due to be replaced. This will allow fuel suppliers to develop capacity in line with planned installations and reinforce confidence in the developing market.

   3.3 Actively promote successful installations to encourage uptake of biomass heating in the commercial and industrial sectors. Include case studies where there were initial problems but are now working well, for example the new Rhondda Hospital. Emphasise the financial and carbon saving benefits and potential boost to the local economy and environment.

4. **Ensuring successful installations**
4.1 Provide assistance throughout the specification, design and installation of new wood chip boilers so installations are trouble free and this reinforces confidence in the performance of modern wood heating. Experience elsewhere shows fuel store design, wood fuel reception and on site storage, operator training and maintenance are topics of particular concern. For pellet systems there are already a good number of successful installations which can be used as exemplars and the technology is better known.

4.2 Make sure boilers can use available fuel, for example specify step grate boilers to take advantage of high moisture content arboricultural chip screened to G50 specification. Unless the specification of boilers is matched to the best available fuel, the advantages of arboricultural arisings in the local supply chain will not be maximised.

4.3 Use the Renewable Heat Incentive to develop financing models to overcome constraints to development of biomass heating due to the high capital cost of biomass systems. These could include:
   • borrowing against the income stream from the RHI to finance investment;
   • using providers of ESCO services who would finance the boiler and associated infrastructure and then sell heat to the users; and
   • take advantages of flexibility mechanism in council capital budgets to invest in wood fuel boiler projects which have a payback period of 4 or 5 years.

5 Increasing timber supplies from woodlands

5.1 Continue to work with the Welsh Assembly Government and FC Wales to introduce grants for woodland access and woodland management planning along the lines of the Woodfuel Woodland Improvement Grant (WIG) proposed for England.

5.2 Investigate a project to investigate the potential to improve management of small woodlands through bringing together groups of small woodland owners, perhaps adopting the Ward Forester model to maximise benefits to woodland owners. Probably best led by the Forestry Commission until the concept is well established.

6 Procurement

Individual wood fuel installations should develop long term fuel supply contracts with fuel suppliers, nominating a single fuel supplier for a given woodfuel installation for a reasonable period of time (3 years). Purchasing should not be via a call-off agreement as the supplier needs certainty that they will be the fuel supplier in order to build their own stocks and feedstock supply chains.

These supply agreements should not be related in length or finish date to any agreement to operate the woodfuel Hub.

7 Immediate actions

From experience elsewhere, the following have been identified as the immediate actions which will make the biggest difference to the development of wood fuel, for the smallest investment

7.1 Develop & promote good example projects – to encourage others to adopt wood fuel

7.2 Provide a mentoring/handholding service for local authorities for the first few projects from an experienced operator who has “done it before” (like Forest Fuels) to help ensure it goes right

7.3 Develop a wood fuel hub ready for ‘occupation’ to overcome perception that supply chain is lacking

7.4 Take a strategic approach to wood fuel development in local authorities in order to reduce the risk of ad hoc projects. Learn from the Bristol example:
   • Specify boilers to cope with high moisture content fuel
   • Establish a properly specified production hub (covered storage, hardstanding etc) which achieves economies of scale (1 or 2 for whole SEWEP area, 5,000t/yr min capacity)
   • Work in collaboration with experienced operator who has “done it before” (like Forest Fuels) to avoid relearning and ensure a commercial focus.
References

AEA Technology, Dec 2008, South East Wales Energy Partnership Consultancy
Ashford Borough Council, Draft Sustainable Design and Construction SPD, available at http://ashford-consult.limehouse.co.uk/portal/planning/sdcsdp?pointId=c135#section-c135
CAMCO, June 2010, Biomass fuel supply review for The Works, 2010, Camco Advisory Services Ltd, Corsham, Wiltshire
E4Tech, Jan 2010, Biomass prices in the heat and electricity sectors in the UK, for DECC, available at www.decc.gov.uk
Environment Agency, Regulatory position statement 005 on the environmental regulation of wood, version 1.0, issued June 2008
Forest Research, 2011, Tractor based mechanised harvesting in sweet chestnut coppice. Report reference FCRP40
Forestry Commission England, Jan 2011, Wood Fuel Woodland Improvement Grant, a presentation by Ewan Calcott
Forestry Commission, November 2010, Timber Price Indices, data to September 2010
Forestry Contracting Association, 2003, Woodfuel Resource in Britain: Main Report
Hutchings T, 2002, The Opportunities for Woodland on Contaminated Land, Forest Research information Note 44, Forestry Commission
Land Use Consultants, July 2010, for FC Wales, Woodfuel potential and opportunities in the Heads of the Valleys Region, Appendix 6 of the HOV Woodland Plan.
Staffordshire Wood Fuel, information at www.staffordshire.gov.uk/environment/woodfuel
WAG, May 2009, One Wales: One Planet  The Sustainable Development Scheme of the Welsh Assembly Government
WAG, September 2010, Bioenergy Action Plan for Wales Progress Report
WAG, September 2010, Written Response by the Welsh Assembly Government to the Sustainability Committee Report: Inquiry into the Supply and Demand for Woody Biomass Sustainability Committee SC(3)-19-10 Paper 3
Appendix 1  Costings and cash flow for a 30ha Short Rotation Coppice planting, wood chip price £115/t@ 35% moisture content

SE Wales: Short Rotation Coppice  
Prepared February 2011

General Assumptions
Energy Crop Scheme application: Total 30 ha assume 20% unplanted area in addition to this  
No Energy Crop Scheme or Annual Energy Payment  
Crop Sale Agreement and a Contracting Agreement assumed under which figures in italics below, once finalised, will be invoiced/credited for a 12 year period.  
Preparation of a turning/storage area to be undertaken by grower at own cost

<table>
<thead>
<tr>
<th>ITEM</th>
<th>YEAR 1</th>
<th>YEAR 2</th>
<th>YEAR 3</th>
<th>YEAR 4</th>
<th>YEAR 5</th>
<th>YEAR 6</th>
<th>YEAR 7</th>
<th>YEAR 8</th>
<th>YEAR 9</th>
<th>YEAR 10</th>
<th>YEAR 11</th>
<th>YEAR 12</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grant aid (ECS)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Crop Sales</td>
<td>16,788</td>
<td>16,788</td>
<td>16,788</td>
<td>21,591</td>
<td>21,591</td>
<td>21,591</td>
<td>23,512</td>
<td>23,512</td>
<td>23,512</td>
<td>23,512</td>
<td>23,512</td>
<td>23,512</td>
<td>185,671</td>
</tr>
<tr>
<td>Annual energy crop payment</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total revenue</td>
<td>16,788</td>
<td>16,788</td>
<td>16,788</td>
<td>21,591</td>
<td>21,591</td>
<td>21,591</td>
<td>23,512</td>
<td>23,512</td>
<td>23,512</td>
<td>23,512</td>
<td>23,512</td>
<td>23,512</td>
<td>185,671</td>
</tr>
<tr>
<td>COSTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil testing</td>
<td>500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4,560</td>
</tr>
<tr>
<td>Site preparation</td>
<td>1,520</td>
<td>1,520</td>
<td>1,520</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4,560</td>
</tr>
<tr>
<td>Incorporation of organic matter</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rabbit Fencing</td>
<td>2,000</td>
<td>2,000</td>
<td>2,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6,000</td>
</tr>
<tr>
<td>Haulage of planting machine</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4,500</td>
</tr>
<tr>
<td>Supply and Plant</td>
<td>10,520</td>
<td>10,520</td>
<td>10,520</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>31,560</td>
</tr>
<tr>
<td>Residual Herbicide</td>
<td>1,750</td>
<td>3,500</td>
<td>3,500</td>
<td>3,500</td>
<td>1,750</td>
<td>1,750</td>
<td>1,750</td>
<td>1,750</td>
<td>1,750</td>
<td>1,750</td>
<td>1,750</td>
<td>1,750</td>
<td>26,250</td>
</tr>
<tr>
<td>Maintenance</td>
<td>1,400</td>
<td>2,800</td>
<td>4,200</td>
<td>3,300</td>
<td>1,700</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>22,900</td>
</tr>
<tr>
<td>Cut back</td>
<td>572</td>
<td>572</td>
<td>572</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,716</td>
</tr>
<tr>
<td>Restoration</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insurance</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>1,140</td>
</tr>
<tr>
<td>Management fee</td>
<td>300</td>
<td>600</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>9,900</td>
</tr>
<tr>
<td>IRR (12 years)</td>
<td>13.93%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

£ 6,554 average £/site/yr received by the landowner  
£ 218 £/ha/yr gross margin
### Assumptions and costs for SRC, February 2011

<table>
<thead>
<tr>
<th>Cost Assumptions</th>
<th>£</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECS grant per ha. Covers inspection and technical backup. Previous ECS was £1000/ha</td>
<td></td>
</tr>
<tr>
<td>Annual energy payment - £/ha</td>
<td></td>
</tr>
<tr>
<td>£/Euro exchange rate 0.840</td>
<td></td>
</tr>
<tr>
<td>Restoration/Stump removal £/ha one off cost. Stools to be left on completion of the agreement.</td>
<td></td>
</tr>
<tr>
<td>Area planted yr 1</td>
<td>10.0</td>
</tr>
<tr>
<td>Area planted yr 2</td>
<td>10.0</td>
</tr>
<tr>
<td>Area planted yr 3</td>
<td>10.0</td>
</tr>
<tr>
<td>Perimeter (m) yr 1</td>
<td>600</td>
</tr>
<tr>
<td>Perimeter (m) yr 2</td>
<td>423</td>
</tr>
<tr>
<td>Perimeter (m) yr 3</td>
<td>801</td>
</tr>
<tr>
<td>Rabbit fencing £/m</td>
<td>5.50</td>
</tr>
<tr>
<td>Rabbit fencing £/ha</td>
<td>200.00</td>
</tr>
<tr>
<td>The crop grows for 3 years each cycle</td>
<td></td>
</tr>
<tr>
<td>1st harvest ODT/ha/yr</td>
<td>9.0</td>
</tr>
<tr>
<td>2nd harvest ODT/ha/yr</td>
<td>11.5</td>
</tr>
<tr>
<td>3rd harvest ODT/ha/yr</td>
<td>12.5</td>
</tr>
<tr>
<td>Purchase price £176.92 (£/ODT)</td>
<td></td>
</tr>
<tr>
<td>Harvesting cost £15.00 (£/ODT)</td>
<td></td>
</tr>
<tr>
<td>Loading £2.00 (£/ODT)</td>
<td></td>
</tr>
<tr>
<td>Haulage costs £17.00 (£/ODT)</td>
<td></td>
</tr>
<tr>
<td>Harvesting supervision and management £2.50 (£/ODT)</td>
<td></td>
</tr>
<tr>
<td>Screening of chip £11.54 (£/ODT)</td>
<td></td>
</tr>
<tr>
<td>Fires eliminated by screening £12.68 (£/ODT)</td>
<td>15% oversize rechipped</td>
</tr>
<tr>
<td>Chip delivery using 32 m³ vehicle £27.43 (£/ODT)</td>
<td></td>
</tr>
<tr>
<td>Standing price £88.62 (£/ODT = purchase price less harvesting, loading, haulage, screening, storage and delivery costs)</td>
<td></td>
</tr>
<tr>
<td>Dry matter losses in storage and drying 15%</td>
<td></td>
</tr>
<tr>
<td>Delivery of harvest machinery to site £500.00 (£/site - shared with other growers)</td>
<td></td>
</tr>
<tr>
<td>Soil testing £500.00 (£/site)</td>
<td></td>
</tr>
<tr>
<td>Soil preparation £152.00 (£/ha)</td>
<td></td>
</tr>
<tr>
<td>Incorporation of OM £0.00 (£/site)</td>
<td></td>
</tr>
<tr>
<td>Haulage of planting machine £500.00 (£/site)</td>
<td></td>
</tr>
<tr>
<td>Supply and plant £102.00 includes all material and operational costs</td>
<td></td>
</tr>
<tr>
<td>Residual herbicide - pre-planting £175.00 (£/ha)</td>
<td></td>
</tr>
<tr>
<td>Residual herbicide - post harvest/cut back £175.00 (£/ha)</td>
<td></td>
</tr>
<tr>
<td>Maintenance years 1-3 £140.00 (£/ha)</td>
<td></td>
</tr>
<tr>
<td>Ongoing maintenance £50.00 (£/ha)</td>
<td></td>
</tr>
<tr>
<td>Cut back £57.20 (£/ha)</td>
<td></td>
</tr>
<tr>
<td>Management fee £30.00 per ha/yr. Covers inspection and technical backup. £95.00 (£/site)</td>
<td></td>
</tr>
<tr>
<td>Average annual Insurance</td>
<td></td>
</tr>
</tbody>
</table>

**Notes**

- ODT = oven dry tonnes
- ha = hectare
- t = tonne

ECS grant rate (% of actual estab costs) 0%
Appendix 2  Workshop for wood fuel producers and users

Responses to topics discussed at the workshop held at the EcoBuilding, Cwmbran, Torfaen on 18th February 2011.

Different colours identify comments from different groups.

Chips, logs and pellets

Pellets
- concern about higher energy density in pellets (as chip supplier)
- pellet most popular? But could be most constrained by rapid growth
- markets must come first see example of pellets to power stations
- If you have products they will sell (e.g. Clifford Jones now has growing number of domestic installations nearby.
- high growth rate for next 10 years
- easy to use id little local woodland/woodfuel production
- double the price of gas
- economies of scale?
- quality & equipment good
- cost issues against 3 year budget

Chips
- even chips get stolen
- large power stations will have to lower quality standards, e.g. take brash bales
- not good in existing facilities
- needs too much (storage) space
- in retrofit cost of planning etc, OK in new build

Logs
- easy to produce
- easy to store but liable to be stolen
- quality dubious for some existing operations
- log market very active, but driven by stoves not boilers
- hard for LAs to actively sell logs – they just let it disappear
- hardwoods go to logs preferentially
- supply issues, aging workforce not being replaced so no contractors

Most important factor is confidence & quality guarantees, more important than localness (e.g. coal) Cost is more important than localness – customers not worried. Growers of trees are not focussed on the difference between chip, pellet & logs. Objective is to have a wide range of customers to sell everything

Barriers and opportunities
- LAs need help to understand if wood fuel will make money
- lots of interest but needs to be viable as fuel, and for value added products
- Community woodlands’ biggest barrier is getting stuff off
- “wood boot sale” bring wood fuel and others come to collect?
- depots to make selling small volumes easier - dump and run
- but couldn’t move timber too far
- 2 types of yard: drop off & sort; and process & store. (how would this work – transport??)
- No shortage of demand!
- logistical issues including road maintenance
- need more boilers for critical mass. Role for public sector.
- Chicken & egg for demand & supply
- lack of knowledge/need for support in planning
need impartial advise on supply chain (not from suppliers) and in design
installers lack expertise & skill, need standards/quality control
specialist training for installers, caretakers
bad examples known, need good new stories
ESCOs an opportunity in public sector
local authorities have 2 year budget – whole life costings a problem
retrofit issues for woodfuel
alternative harvesting methods an opportunity, make best use of local labour & infrastructure
national procurement framework for LAs can cause problems

2 key actions
- grants for woodland management
- Price for timber rising
- meetings for end users and producers to get together
- need whole building approach including energy efficiency
- LDP has renewable energy plan requirement for each borough. LAs need to join up!

Perceptions of fuel supply
- domestic market very ignorant of supply
- People perceive it’s freely available (wood like blackberries)
- Community woodland challenge. People want to help themselves for free.
- Public sector perception:
  - how big can we get?
  - Is it sustainable?
- Domestic will pay a lot
- Wood chip and pellet supply contracts not professionally operated
- SEWEP area different as not a ‘smokeless’ zone
- There is a local fire wood market
- Timber suppliers would rather sell to local processors (not power stations)
- long term contracts must work for all parties
- logs cannot keep pace with demand
- horror stories about current wood chip supply
- sustainability of supply??
- is all the supply available if market flourishes?
- round timber from the public sector sensitive to competition from other areas
- limit to yield from local woodlands
- more resources in Powys & Monmouthshire available for scale up
- 50MW potential from local woodlands, 10 large business sites or xx (100) schools. Its not much!
- UK wide concern regarding reliable supply
- What will happen when RHI kicks in?

Standards & quality
- Logs: it’s a quality product from a yard,
- many tree surgeons just sell what they have
- Not aware of local suppliers chasing quality
- storage is a big barrier – quality product requires (covered) storage
- demand is so strong, why wait to season
- investment costs is a barrier, time lag to payback of investment

Lots of building blocks in place
- EU standards tried & tested, seem to work
- sustainability standards (certification) and record keeping required are a big disincentive to small scale growers.
Summary

Small woods
- woodfuel market (boot sale) for small woodland owners
- security and storage, timber gets stolen from roadside
- depots & local drop off points useful
- opportunity for social enterprise?

Log fuel
- plenty of demand
- no quality service
- ad hoc sales – theft problems
- business and grant support
- driven by stove market, customers not well informed

Chip
- less potential from small woods
- needs aggregators
- needs sorted quality control
- needs depots and storage
- council does not have enough cash to set up yards, better for social enterprise or private company
- Business support should give training, capital grants or low interest loans
- need professional business support

Quality service is not just about the product
Support should focus on start up costs, council don't have funding to set up
Social enterprise grants available

LAs should work together on a (planned) programme for boiler purchase. Set target of 15 or 30 boilers?
Logs very important in rural areas, locally made briquettes a good option

Is competition for fibre from power stations, horse bedding, fibreboard & panels, competition from other land uses and between chip & pellet.

Future supplies inside the study area are small (28,000tpa) more available from nearby. Need to look at additional sources including recycled/recovered material.

Remember that woodlands are multiple objective, need to keep a balance between different products and outputs from woodland (including non-market benefits)

Education needed for woodland owners, installers, M&E contractors.

Short local supply chains required to minimise carbon footprint
Having a number of boilers ‘makes it tangible’ encourages more installations

- Target to use full 30,000mWh of available of heat and compete with gas at 2½ p/kWh
- New build using BREEAM standards is possible, difficulties in retrofit
- Chip has poor reputation, a few horror stories going around
- Pellet, high price often precludes use even with RHI in large projects
- Public sector are risk averse, insist on gas backup and may use this when gas price low
- Education needed for planners
- Questions about origins/sustainability of some pellets.
• ‘Cowboy’ installers seen as a problem
• Don’t forget energy efficiency as first priority
Appendix 3  The Renewable Heat Incentive

Briefing paper produced by Boyle Consulting and EnAgri (www.enagri.info)  Included with permission