Woodfuel scoping study

Increasing the use of woodfuel as a substitute for fossil fuels is important in contributing to UK climate change mitigation strategies. Sustainable use of currently unharvested material from woodlands will also help meet government targets for increasing the proportion of heat energy generated using renewables. Reviewing the available information on prices and costs of production is important in considering the likely cost of bringing currently unharvested materials from private woodlands into the emerging woodfuel supply chain. It is also important in identifying current knowledge gaps. This study focused primarily on England, and on woodfuel delivered for local heat generation and for small to medium sized boilers. The latter are thought to offer the greatest climate change mitigation benefits for woodfuel use sourced from currently under-managed woodlands (UMW).

Background

One of the key objectives of the Forestry Commission England (FCE) Woodfuel Strategy is to increase the amount of material made available through the woodfuel supply chain and create a viable and sustainable biomass industry. FCE has adopted a target of sustainably using an additional 2 million green tonnes of material a year from currently UMW in England by 2020.

New government subsidies for heat generation from renewables, renewable heat incentives (RHI), are likely to be introduced in the next few years. The study helps shed light on price levels required for woodland owners to provide additional material to the woodfuel supply chain.

Objectives

The project had the following main objectives:

- To review existing studies and available information on factors determining:
  - prices that buyers are willing to pay to woodland owners for raw materials for woodfuel;
  - prices that suppliers charge for woodfuel delivery;
  - net costs to woodland owners of providing currently unharvested material for woodfuel.
- To consider price levels required for woodland owners to provide additional material to the woodfuel supply chain.
- To identify knowledge gaps and ways to address them.

Methods

- Literature and web reviews of the UK woodfuel supply chain, including market segmentation issues associated with:
  - different input materials (e.g. thinnings, tree tops, stumps, timber, sawdust and wood residues);
  - different types of end-user technology, including size of boilers, with requirements for different forms (e.g. pellets, chips and firewood) and qualities of woodfuel products.
- Literature review of analyses of demand for raw materials for woodfuel, and the supply of woodfuel products.
- Investigation of relevant data sources that could be used to model supply and demand at the different levels in the supply chain.

Findings

The review revealed an absence of published information on the prices buyers pay to private woodland owners for raw materials used for woodfuel. Published information on prices is also very limited at every other stage of the emerging woodfuel supply chain. At present there is no single database on prices and no time-series data is available.

As shown in the table below, both price and cost estimates are subject to wide variation. For woodchips and firewood, the wide range in production costs stems partly from variations in harvesting conditions, including extent of existing forest management and woodland size, access and terrain, and choice of machinery. For both pellets and firewood logs, prices are heavily dependent upon the quantity purchased.

Table: Summary of woodfuel price and cost estimates (at 2008/9 prices)

Woodfuel			Pellets	Woodchips	Firewood logs
Prices (£/t)		min	114	26	24
		max	300	90	120
Costs (£/t)	Harvesting	min	n.a.	8	6
		max	n.a.	20	20
	Extraction	min	n.a.	3	3
		max	n.a.	8	8
	Processing	min	n.a.	8	2
		max	n.a.	44	13
	Transportation	min	n.a.	2	3
		max	n.a.	11	8
	Total	min	n.a.	21	14
		max	n.a.	83	49

Notes: Minimum and maximum cost estimates are from case studies for specific areas and do not necessarily reflect the breadth of the cost ranges at national level; n.a. indicates not available. Figures have been adjusted to current prices using the Treasury GDP deflator. Pellet prices may exceed the suggested maximum, especially where small quantities of individually bagged pellets are bought. Similarly, prices for small quantities of netted firewood logs can be higher and exceed the equivalent of £280/t. Sources: DTI (2007), Hall (2006), McAllister and Jones (2007), Webster (2008).

An indication of the magnitude of the price increase required for woodland owners to cover the costs of harvesting and extraction to roadside can be inferred from a comparison of prices paid for small roundwood for woodfuel from the public estate. The latter currently range from £18–26/t, whereas harvesting and extraction costs range from £9–28/t. Comparison of the extremes suggests that a price increase of up to £10/t may be needed, excluding any necessary infrastructure costs.

A comparison of total costs of production for woodchips and firewood from studies spanning the supply chain with corresponding prices for woodfuel products provides an indication of the level of RHI that may be needed if sufficient material from currently UMW is to be supplied. The comparison suggests that an increase in prices paid to suppliers of woodfuel products of at least £13/t may be needed for prices to cover the costs of production.

Recommendations

1. Data on prices, quantities and costs will need to be collected regularly if econometric investigation of woodfuel markets is to become feasible. Analysis of supply and demand relationships at different levels in the emerging supply chain would be necessary if the level of RHI consistent with woodland owners increasing supply, and with meeting existing woodfuel targets, were to be estimated. Investigation of potential impacts on substitution of material from other wood-using industries and on imports could usefully be included in a more comprehensive analysis.

2. As the spatial dimension is very important, GIS analysis of potential woodfuel resources and costs of supply from UMW is recommended to estimate price levels that are sufficient to cover costs of production more precisely. Such analysis could usefully take into account factors like UMW location, size, road access, risk of ground damage, terrain slope and potential biomass yield. Underpinning research is needed in some instances to estimate how costs vary with these factors.

3. Costs and earnings surveys could be undertaken for the main groups involved (including woodland owners, purchasers of raw materials for woodfuel, processors and woodfuel product suppliers) to try to fill knowledge gaps concerning production costs, prices for materials used and woodfuel products. Given the current lack of information on the prices buyers pay private woodland owners for materials used for woodfuel, a survey of first-hand purchasers may be especially beneficial. Where UMW owners are surveyed, questions concerning mark-ups required to supply materials for woodfuel could usefully be included.

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Reports and publications

DTI (2007). *UK Biomass Strategy.* Working Paper 1 – Economic analysis of biomass energy. Energy Technologies Unit, Department of Trade and Industry, May 2007, URN 07/950.

Hall, A. (2006). *The economic harvesting of woodfuel from small under managed woodlands.* Internal report to Corporate and Forestry Support, Forestry Commission, Edinburgh.

McAllister, F. and Jones, D. (2007). *Developing best practice guidelines to support local small to medium scale woodfuel production.* Forest Research, Technical Development, Internal Project Information Note 18/07, 500S/35/06. www.biomassenergycentre.org.uk/pls/portal/url/ITEM/778B5C01330C7818E04014AC08042990

Webster, P. (2008). *Woodfuel production from a thinning operation.* Forest Research, Technical Development, Internal Project Information Note 30/07, 500S/44/07 and FR07047. www.biomassenergycentre.org.uk/pls/portal/url/ITEM/778B5C0132F17818E04014AC08042990