Arisings of Waste Wood from the Scottish Waste Management Industry for the

Development of the Biomass Industry

Report to

Scottish Government

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Remade Scotland

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Executive Summary

This research into the quantity of waste wood available from the Scottish waste management industry for the development of the biomass market has concluded:

- The total quantity of wood waste presently recovered by the waste management industry in Scotland is estimated at 260,000 tonnes per annum
- It is estimated that this represents is a recovery rate of circa 35% (based on the theoretical maximum quantities in the waste stream)
- 92% of the recovered tonnage is supplied to the market by five companies
- MDF[1] recovery is minimal with only the larger market players showing interest for improving recovery rates
- There is a proportion of wood (circa 24%) supplied by the five leading players that is contaminated wood recovered at EON's biomass facility at Lockerbie and through landfill product development
- The board manufacture market accepts 73% of the recovered waste wood from the waste management industry. The biomass industry presently has a 16% market share with 11% distributed among landfill products, charity and animal bedding
- To compete with the board market, the biomass market would need to match or improve on the present average board mill prices of £31/tonne
- The board manufacturing sector alone will contribute in excess of £5.9 million of revenue into the waste management marketplace
- Mapped to the National Forest Inventory Reporting Zones, almost all activity in the market is in the South zone which includes the central belt
- Anecdotal evidence suggests that wood waste supply has reduced between 20% and 40% due to the construction industry downturn
- Anecdotal evidence suggests that there is a positive appetite for biomass development, although supply of material and balance of markets with the board industry has been raised as an issue

[1] Medium density fibreboard: A special type of tempered hardboard with a fine, smooth finish. It is man-made from wood fibres, which are compressed together with adhesive

1. Introduction

1.1. Background

The Wood Fuel Task Force (WFTF) was launched in June 2007 with the aim of increasing the supply of wood biomass for renewable energy production.

Although a range of commissioned reports to identify an accurate estimate of the quantity of wood waste for renewable energy production are available, a wide range of data and a number of disparities in both nomenclature and methodology have been reported.

As such a need was identified to accurately quantify the potential waste wood tonnage from the waste management industry that could assist in the development of the biomass market.

1.2. Research Methodology

This research sought to identify the quantity of waste wood arising in the waste management industry and identify the present management methods and costs for that resource.

Waste wood is supplied through three tiers and acknowledgement of this tiered approach can negate the issues of double, and on occasion triple counting:

Tier One:	Local Authority Recycling centres
Tier Two:	Private Skip Hire, Waste Management and Waste Transfer
Tier Three:	Private Waste Management and Reprocessor Supply

In this research it was not feasible to sample and interview all participants in the supply chain. In order to provide an accurate portrayal Remade Scotland utilised the SEPA Licensed site returns to identify the key players by market share in tonnage.

This approach yielded the following sample sizes to be interviewed:

Tier One:	None, data on supply already attained from Waste Data Flow
Tier Two:	50% of the “tier two” supply by quantity supplied into marketplace
Tier Three:	100% of “tier three” supply by quantity supplied to market

Tier Two Companies Surveyed

Company	Address
CMI Demolition	60A Clydeholm Road, Glasgow
Patersons	101 Kenmuir Rd Mount Vernon, Glasgow
Henry Waste Management	Henry Waste Mgmt TS,Coltswood Rd,Coatbridge
Buchanan Skip Hire	No 3 Arrol Square, Deans Ind Est, Livingston
Lowmac Alloys	Lowmac Alloys, Unit 22, Oldhall West, Irvine
Grays Recycling	Grays Recyc Serv TS,Nether Dallachy,Fochabers
Ramsay McBain	Ramsay McBain, Kirk Street TS, Lochee, Dundee
Delson Waste Management	Delson Waste Mgmt (Dundee),Wester Gourdie TS
Armstrong Waste Management	Armstrong Waste, Newton Rd Ind Est, Dumfries
Central Skips	Chatton Works Ind Est, Bonnybridge
Dow Waste Management	Dow Waste TS, Lenziemill Road,Cumbernauld
Stewart Melrose	Stewart Melrose (Bathgate)
Enviroco	Enviroco Ltd, Maitland Quay, Aberdeen

Tier Three Companies Surveyed

William Tracey	Wm Tracey, Burnbrae Road, Linwood
Viridor Enviroscot	Enviroscot, Langmuir Way, Bargeddie
Jenkinson Woodwaste	Jenkinson Woodwaste, Carriden Ind Est, Boness
Stevenson Brothers	Blackston Road, Avonbridge
DJ Laing	Petterden Waste Recycling/Tfr Stn, Petterden
Binn Skips	Binn Skips Transfer Station, Glenfarg

Representatives of these companies were interviewed on a broad range of supply chain issues in order to provide a comprehensive assessment on the present state of supply of waste wood to markets.

Following a review of the results of the survey the tonnage arising at the Stevenson Brothers facility in Avonbridge has been discounted as this material was found to be sawmill co-product and not waste – the company stated clearly that they are a transfer business for sawmill products.

1.3. Data Consistency

Data for this project has been taken from three key sources:

- SEPA Licensed Waste Management Site Returns 2007
- SEPA Business Waste Survey 2006
- Remade Scotland Waste Wood Management Survey 2009

Estimates of wood waste arisings and management in this report are, however, approximate as data on the composition of wood in the waste stream is limited.

All datasets have been normalised to 2007 data in order to maintain consistency.

2. Arboriculture Arisings

This project has sought to establish the supply of waste wood from the waste management industry and has been referred to as “waste wood”.

There are however, a number of other sources of wood waste that are not mentioned here, predominantly as these do not arise as waste at a regulatory level.

For clarity the definition of how resources are defined as “waste” can be found in the SEPA guidance note “Is It Waste?”[2]

More specifically arboriculture arisings from the management of woodlands and roadside in the form of chippings, solid log and brash are not included as these are not presently reported as wastes.

2.1. Roadside Maintenance

The maintenance of Scotland’s trunk road network is undertaken by three companies, BEAR Scotland in the North East and South East, Amey in the South West and Scotland TranServ in the North West. Each of these three companies is subject to an independent Annual Report on performance by the Performance Audit Group comprising Transport Scotland, Halcrow and Pricewaterhouse Coopers.

The report for 2007/2008 (http://www.performanceauditgroup.co.uk/pagrep08.pdf) showed that each company had an environmental management system and that management of waste was an aspect of the contract.

BEAR for example have a national contract with Biffa to manage their waste for them (albeit much of the waste are being recycled in situ). In addition through initial discussions it is understood that the volume of waste wood to be managed under the contract is minimal.

It is also understood that arboriculture arisings are unlikely, at this moment, to be retained for the purposes of biofuel feedstock due to low volumes, economics of material movement, and utilisation of in-situ recycling.

2.2. Woodland Management

There is little information available on the waste wood arisings from Scotland’s management of woodlands. Projects of this type have already been completed for Merseyside and the M62 Corridor. The Merseyside report, a combined effort from The Mersey Forest, Red Rose Forest and Coombe Forestry to the Forestry Commission identified that of the 9,047 tonnes of arboriculture arisings around 74% of material was chipped, with 25% remaining as solid log and 1% brash.

An assessment needs to be undertaken to assess the total arisings and management of these materials in order to provide a full economic assessment of the potential for biomass in Scotland.

[2]“ Is it Waste” http://www.sepa.org.uk/waste/waste_regulation/idoc.ashx?docid=6d388f08-ab71-49d7-948f-5c7d3e4cef1d&version=-1

3. Results

3.1. Supply of Wood Waste from Waste Management Facilities

Wood waste is passed from one company to the next with additional wood waste from collection and sorting activities supplementing an increasing provision to the marketplace. As such there is a total quantity supplied to the market of approximately 260,000 tonnes through a complex supply chain.

Wood waste arises as either municipal arisings at Recycling Centres, packaging wood, construction and demolition woods, or woods similar to household wastes.

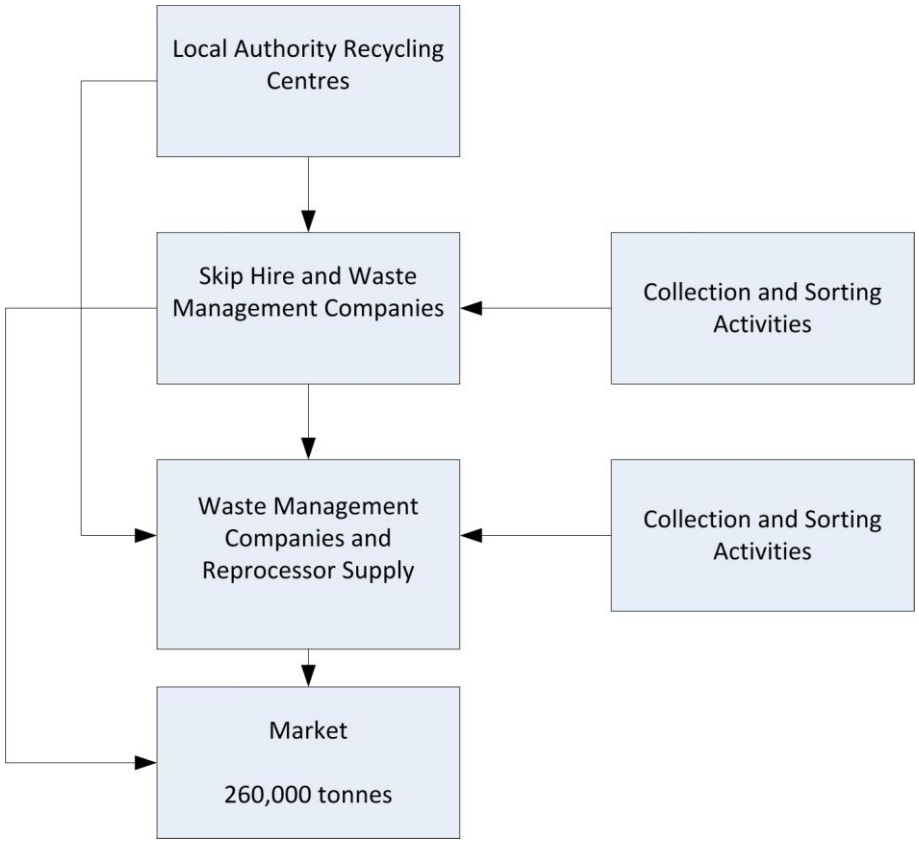

Figure 1: Supply of Waste Wood (Survey Data)

Approximately 92% of all supply of waste wood to the marketplace presently comes through five companies:

1. William Tracey Limited
2. AW Jenkinson
3. DJ Laing
4. Viridor
5. Binn Skips

The remaining 8% is directly supplied to the market by second tier companies to the market.

3.2. Recovered Wood Waste vs. Total Arisings

It is estimated from the Welsh Waste Analysis that wood comprises approximately 2.8%[3] of the total municipal waste stream – giving a potential total tonnage of 95,221 tonnes[4]. SEPA's waste data on municipal arisings reported from the total wood recovered in that year was 46,693 tonnes with 35,403 tonnes recovered in Recycling Centres.

The only compositional analysis present in Scotland for commercial and industrial wastes is the SEPA 2006 Business Waste Survey.

Across all NACE Codes the quantity of non hazardous wood is predicted at 292,770 tonnes. It is predicted that there is a further 74,802 tonnes within the mixed waste fraction giving a total potential commercial and industrial wood tonnage of 367,572 tonnes.

A report by WRAP[5] estimated the total tonnage of wood arising in the construction and demolition waste stream to be approximately 290,000 tonnes.

Based on these theoretical maximum quantities in the waste stream there is an apparent theoretical recovery rate of circa 35%.

Table 1: Recovered Waste Wood and Theoretical Arisings

Sector	Theoretical Maximum (est.)	Recovered	Theoretical Unrecovered Wood Waste (est.)
Municipal Waste	95,221	46,693	48,528
Commercial/Industrial Waste	367,572	213,307	444,265
Construction and Demolition Waste	290,000		
TOTALS	**752,793**	**260,000**	**492,793**

Based on 20%[6] moisture content in the "green" wood, this would give an oven dry tonnes (ODT) of recovered wood of 208,000 tonnes and an unrecovered total 394,234 tonnes.

Table 2: Recovered Waste Wood and Theoretical Arisings in Oven Dry Tonnes

Sector	Theoretical Maximum ODT (est.)	Recovered ODT	Theoretical Unrecovered Wood Waste ODT (est.)
Municipal Waste	76,177	37,354	38,822
Commercial/Industrial Waste	294,058	170,646	355,412
Construction and Demolition Waste	232,000		
TOTALS	**602,234**	**208,000**	**394,234**

[3] Welsh Waste Analysis, Welsh Assembly (2004)
[4] Based on a total MSW of 3.4 million tonnes
[5] A Review of Wood Waste Arisings and Management in the UK, WRAP (2005)
[6] Based on values from Wood for Good / TRADA

3.3. Composition of Wood Waste

This research identified that there is a marked difference in the composition of the wood arising and supplied from the different tiers of the supply chain. Tier two companies have a far higher percentage of wood waste segregated from mixed waste skips and a higher percentage of contaminated wood disposed of to landfill.

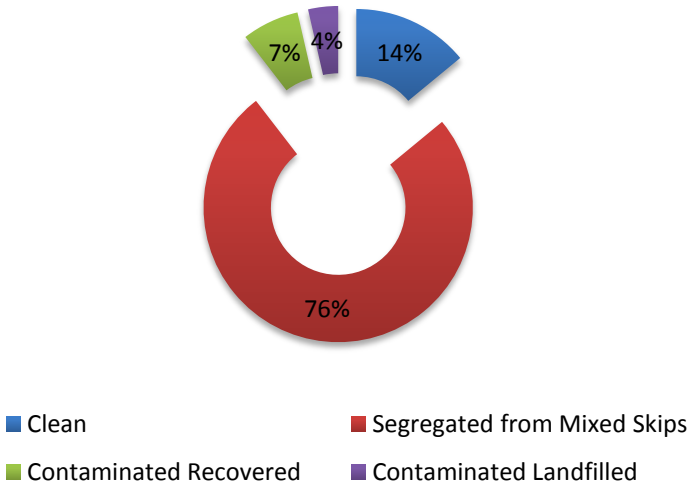

Figure 2: Tier Two Composition of Wood

Tier three companies have a higher proportion of clean, wood most probably because it has been delivered clean and/or because it is delivered segregated from tier two companies. Significantly the proportion of contaminated wood waste that is recovered is high at almost a quarter with the vast majority of this coming from AW Jenkinson and recovered as biomass feedstock at EON Lockerbie.

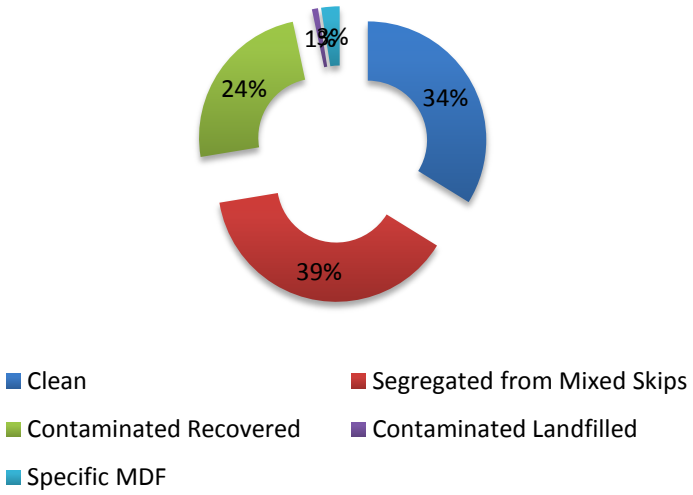

Figure 3: Tier Three Composition of Wood

The 260,000 tonnes supply into markets from the third tier of the supply chain is therefore:

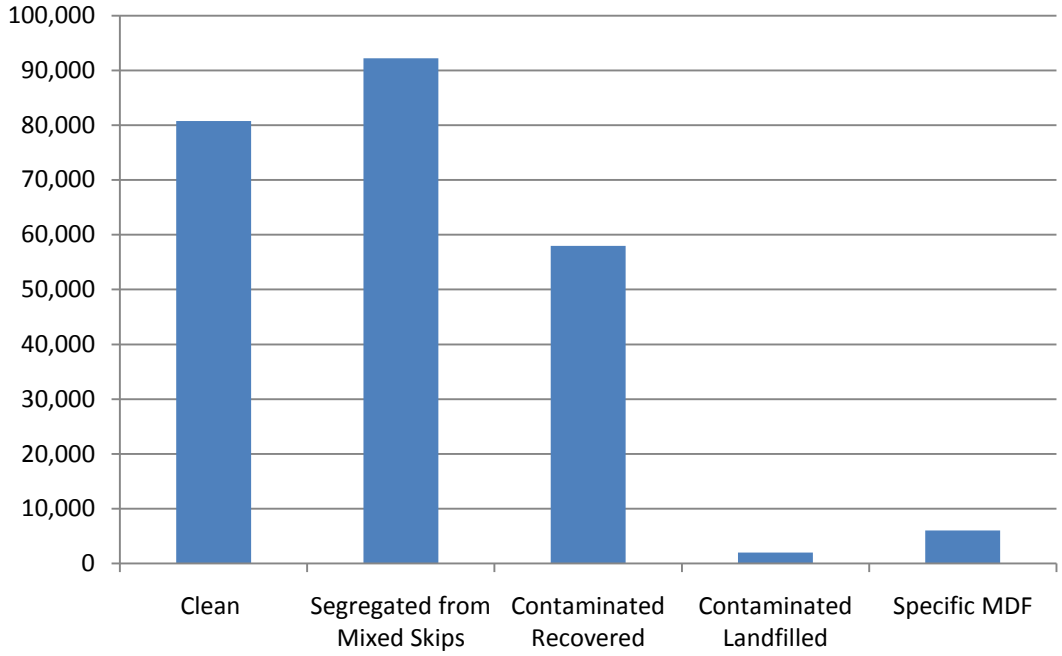

Figure 4 Composition of Waste Wood Material Supplied to Market

3.4. Markets Supplied

The dominant market supplied is board manufacture which attracts 73% of the wood waste supplied from the waste management industry in Scotland.

Energy recovery at the EON facility in Lockerbie accounts for 16%.

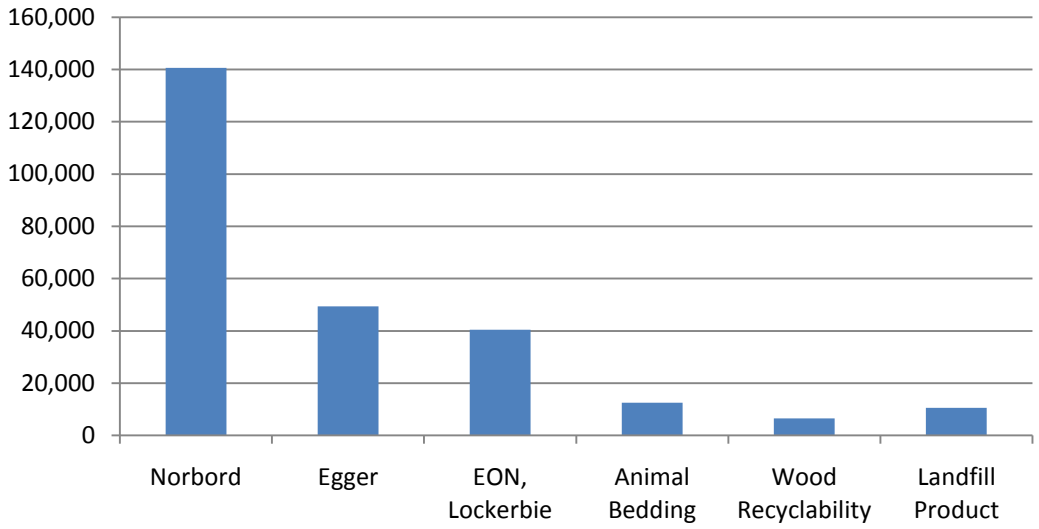

Figure 5: Markets Supplied by Waste Management Industry

The wood charity, Wood Recyclability takes all wood from Enviroco in Aberdeen. Viridor utilise approximately 35% of their waste wood to make a landfill road and engineering product.

4. Prices and Economic Value

4.1. Prices

Prices vary for the different waste management options for waste wood.

The revenue from board manufacture is between £26/tonne and £31.50/tonne ex works. The highest price recorded in the survey for board manufacture was £35/tonne with a low of £17/tonne.

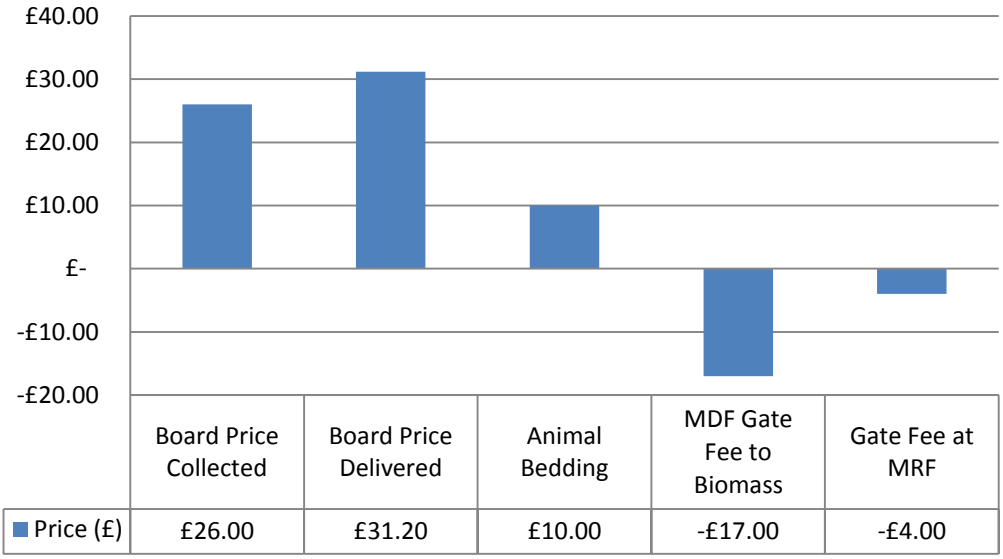

Figure 6: Average Prices for Waste Wood Options

MDF[7] gate fee costs for biomass treatment were recorded at £17/tonne with gate fee at MRF and other transfer station averaging £4/tonne.

4.2. Economic Value

Based on the prices, tonnages and end markets presented in this research the end market gate fee value of waste wood under its present options is in excess of £6 million.

Supply of waste wood into animal bedding is worth in excess of £125,000 per annum whilst the board manufacturing sector alone will contribute in excess of £5.9 million of revenue into the waste management marketplace (based on the delivered price).

[7] Medium density fibreboard: A special type of tempered hardboard with a fine, smooth finish. It is man-made from wood fibres, which are compressed together with adhesive

5. Mapping the Wood Waste Supply Chain

As per the requirements of the Forestry Commission Remade has endeavoured to map the key participants in the wood waste from waste management supply chain to National Forest Inventory Reporting Zones.

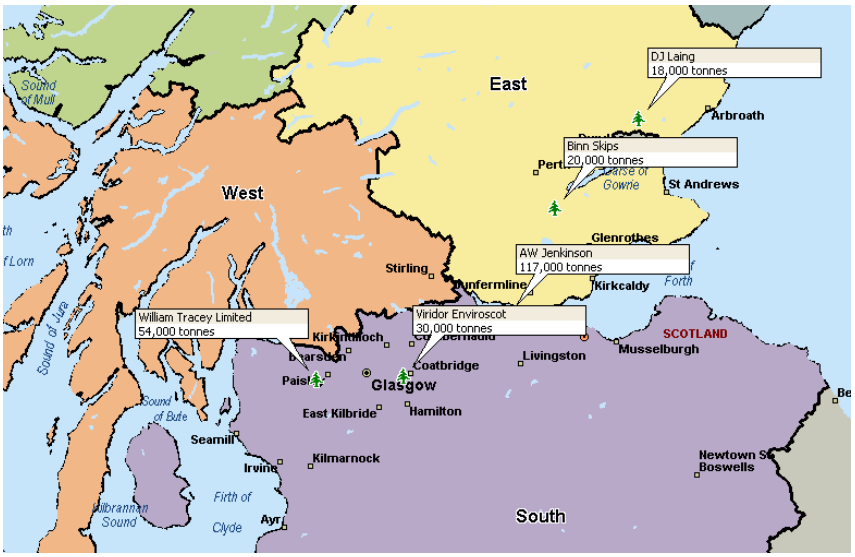

Figure 7: Location of Main Suppliers of Waste Wood

The key suppliers of wood waste to market are predominantly in the south region (77% by tonnage) with some wood waste supplied from the east region. The demand for this material is largely in the South region, particularly in the central belt with only specific and limited demand in other areas (i.e. for charity or other uses such as animal bedding etc.)

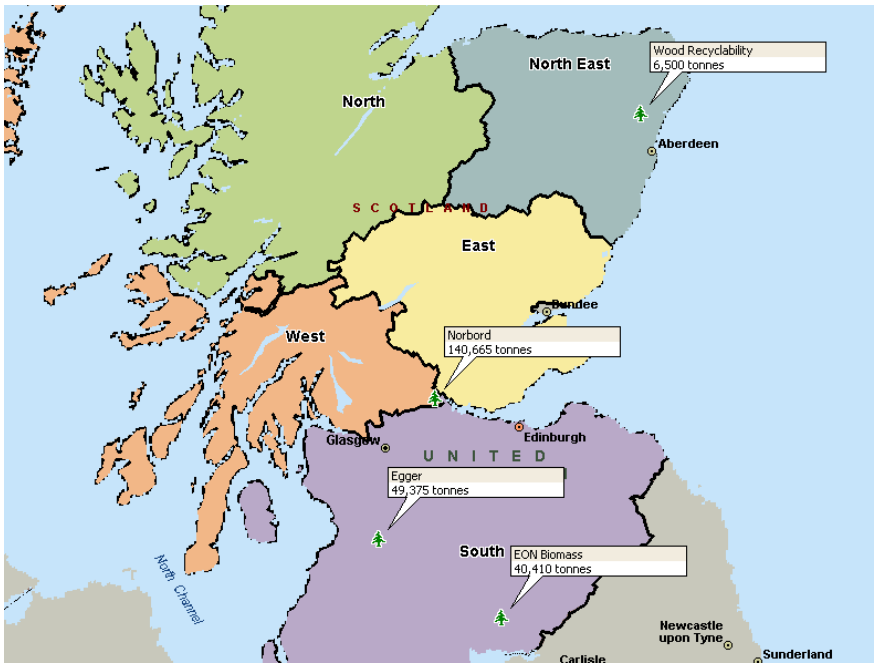

Figure 8: Location of the Main Utilisation of Waste Wood

6. Survey Responses

The survey undertaken by Remade Scotland identified a number of areas of interest concerning the supply of waste wood – and also the potential for development of a biomass industry.

6.1. Waste Wood Supply

Almost all participants responded that the supply of waste wood had reduced, with the percentage variations being most pronounced in the main suppliers to the marketplace.

The supply of waste wood has mainly been affected by the downturn in the construction market and has led to reduced supply by 20% to 40%.

6.2. View on Biomass

Participants responded positively to the potential further development of the biomass capability in Scotland.

There was some concern however on the balance of supply and demand. EON's plant at Lockerbie, the Norbord Biomass Plant at Cowie, Caledonian Paper's plant and the Egger WID compliant plant in Hexham will be competing for materials with Norbord and Egger board manufacture and supply may be an issue – although this will be beneficial for prices and could encourage additional recovery.

6.3. Extension of Recovery Operations to include MDF etc

Survey participants provided a mixed response to the question of extending recovery of wood wastes to include chipboard, OSB[8] and MDF.

Predominantly tier two respondents felt they could not extend recovery operations to include other waste woods due to plant size, the low volumes presented on site and also the fact there were no local markets for the materials.

Larger companies in tier three were more positive in recovering a broader range of waste woods. AW Jenkinson, William Tracey and Viridor stated that they currently recover MDF and other composite woods for biomass recovery. DJ Laing meanwhile hopes to begin recovery in the future.

[8] Oriented Strand Board

7. Conclusions

It would appear from this research that the waste management industry supplies approximately 260,000 tonnes of waste wood to the wood reprocessing markets. The board manufacture market is by far the most dominant market with market share in excess of 70%.

The total supply of wood is estimated to represent a recovery rate of approximately 35%, with greater recovery in the municipal stream (50%) and less recovery in the combined commercial, industrial and construction sectors (32%).

It is possible that further measures, such as increased recycling targets and potential landfill bans could increase the recovery of wood into the market.