



Creating markets for recycled resources

Review of wood waste arisings and management in the UK

SUMMARY REPORT

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Introduction

MEL Research was commissioned by WRAP to identify data on quantities and types of wood waste arisings in the UK and its waste management. All waste streams where wood waste arises were included, and the quantities being recycled by various methods, reused, and recovered were investigated.

In recent years, various studies have been carried out which have gathered data on wood wastes arising in the UK in different waste streams. Some information has also been gathered on how wood wastes are managed. This study is in response to the need to bring this information together in order to provide as complete a picture as possible of wood waste generation and management in the UK.

The aims of this data review were to

- Identify all relevant publications, surveys, data and estimates on wood waste arisings and management for all waste streams. The scope of this exercise included all relevant reports published in the previous ten years.
- Identify the data provided in these studies and to critically assess the data quality of each dataset.
- Generate best estimates of quantities of different types of wood waste arising in the UK in different waste streams. Where more than one data source exists for the same waste stream, the data source which was of a higher quality was to be selected.
- Gather data on quantities of wood waste following different waste management routes.
- Identify where there are gaps without data and where there is data, but it is of poor quality.
- Provide brief recommendations as to how gaps in data could be filled, and how better quality data could be gathered in areas where the data quality is poor.
- Analyse trends in wood wastes arising and its management in recent years
- Forecast wood wastes arising in future years

Scope of study

The study covered all wood wastes arising from the post consumer use of wood. Woody garden wastes such as branches and prunings were not included. Wastes from sawmills were also not covered, but wastes from industries which used wood to make products including joinery and builders' carpentry and furniture etc were included. The study was limited to data gathered over the last ten years.

Sources of wood waste

Wood waste arises in many different waste streams including the municipal waste stream, commercial and industrial waste streams and from both construction and demolition activities. Different types of wood waste predominate in different waste streams.

Municipal waste stream

In this sector, wood waste arises from the disposal by householders of wooden items eg furniture, fencing or decking, from the disposal of wood offcuts from DIY, and from the disposal of wooden packaging. Most useful data on wood arising in the municipal waste stream has been gathered at the point at which the wood is disposed of through the following routes:

- Civic amenity sites (CA sites or sometimes known as Household Waste Recycling Centres)
- Kerbside collected household waste
- Special collections by councils of larger items (bulky waste collections)

Industrial and commercial waste stream

A diverse range of wood wastes is produced by the industrial and commercial sector. Some of the main sources of wood waste are:

- Furniture manufacture
- Manufacture of products for use in construction e.g roofing timbers, joists, floorboards, doors, windows
- Wood wastes arising during the manufacture of wooden packaging
- Wood wastes from waste wooden packaging

This category also includes items such as utility poles and railway sleepers.

Construction and demolition waste stream

Construction and demolition waste is often considered together as one category. In fact construction and demolition produce quite different waste streams. The main wood wastes arising from each are listed below.

- Construction – off-cuts from structural timbers, timber packaging, scaffolding, wooden hoardings
- Demolition – used structural timbers, e.g floorboards, joists, beams staircases and doors

Refurbishment activities are likely to give rise to a combination of construction and demolition waste types.

Methodology

An information gathering exercise was carried out to identify all data and reports appertaining to UK wood waste during the previous ten years. This included library and internet searches, and contacting relevant people and organisations.

Where data was available split into different types of wood waste, for example treated and untreated wood waste, this information has also been collated. There have also been some studies which have looked specifically at the composition of the wood waste fraction arising in various waste streams. Such data has also been included in this review.

All relevant reports and data were critically analysed using a standard proforma. The proforma gathered general information on the reports including the authors, year of publication, who the report was prepared for and the aims of the work that the report or data arose from, and a summary of the results of the work. The data in each report was summarised and reviewed using the following headings:

- **Data tables** - all relevant tables of data from the reports.
- **Data assessment and methodology** - details of exactly what data was gathered and how. The geographical region, and year the data refer to, the method used to gather the data, details of any sampling techniques used to select a sample for the survey and details of any grossing up techniques were also covered. The survey and data generation methods were critically assessed in this section.
- **Data summary** – a table listing all data tables extracted from the report. There were separate columns for “summary of issues with the data” in which summary bullet points were used to list shortcomings of the data table. There was also a column for a rating for each data table. Scores were given between 1 (excellent quality data) and 4 (very poor quality data).

After all the reports had been reviewed and proformas prepared, the data was collated using an Excel workbook to group data on the same/ similar waste streams or waste management methods on different worksheets. The following data was held in the compiled workbook on each dataset:

- Table title (as it appears in the proforma)
- Report title
- Author
- Year to which the data apply - guessed if not known
- Type of waste eg MSW - CA, demolition etc
- Whether the data is estimated based on a survey/ estimated based on guesswork/ actual data
- Type of data eg “telephone survey of those generating and using wood carried out by survey authors”, “compilation of compositional analysis data gathered by others”
- Rating of quality of data from 1 (very good) to 4 (very poor) - same grading as in the proforma

Data on each waste stream or waste management methods was assessed and compared and the best available estimates for each one were selected.

Making best estimates of quantities of waste arising and waste management routes

Municipal waste

The approach taken for estimating the wood content of municipal waste was to look separately at different municipal waste streams. The municipal waste streams included were collection round household waste, civic amenity site waste, bulky waste collections, and non household collection round waste. The vast majority of municipal wood waste is expected to occur in these waste streams.

The best possible data on the percentage wood waste composition of each municipal waste stream was selected. This percentage was then applied to national data for the overall quantities of each waste stream. Good quality data is available for all parts of the UK on overall municipal waste tonnages.

Many compositional studies have been carried out of doorstep collection waste from households, and so there is much data on the composition of this waste stream. The composition of the civic amenity waste stream has also been the subject of many studies. There is less information, but still useful data, on the composition of household bulky waste or of non household collection round waste (waste from businesses) collected by local authorities.

Main wood containing municipal waste streams and data used to estimate wood wastes arising

Municipal waste stream	Data source	Data year	Comments on sample	General comments
Collection round household waste	WRAP review ¹	1999-2002	Compilation of 27 compositional analyses carried out for local authorities, each of which was an average over more than one season of the year.	All other studies were smaller scale relying on smaller samples.
	Welsh Assembly study ²	2003	Large study with data gathered throughout Wales with nearly 3000 samples analysed.	
CA site waste	WRAP review ¹ NACAS review ³	1999-2002	Both studies are compilations of a large number of individual compositional studies.	These two studies had very similar results for the percentages of wood and of furniture in CA waste (9.3% and 4% respectively for NACAS and 8.8% and 4/6% respectively for the WRAP study).
Bulky waste	Welsh Assembly study ²	2003	Based on 3,000 records of individual waste collections and assumed average weights for items.	This study was the most comprehensive bulky waste compositional study.
Non household collection round waste	Welsh Assembly study ²	2003	Reasonably sized sample	There were not many other data sets, and this was the only reasonably sized sample. A potential problem with the Wales data is that only 240 and 360 litre bins were sampled for logistical reasons. It is not clear whether this would affect the composition of the non household collection round waste.

¹ Analysis of household waste composition and factors driving waste increases, WRAP, 2002

² The composition of municipal solid waste in Wales, MEL WRc, AEA for Welsh Assembly, 2003

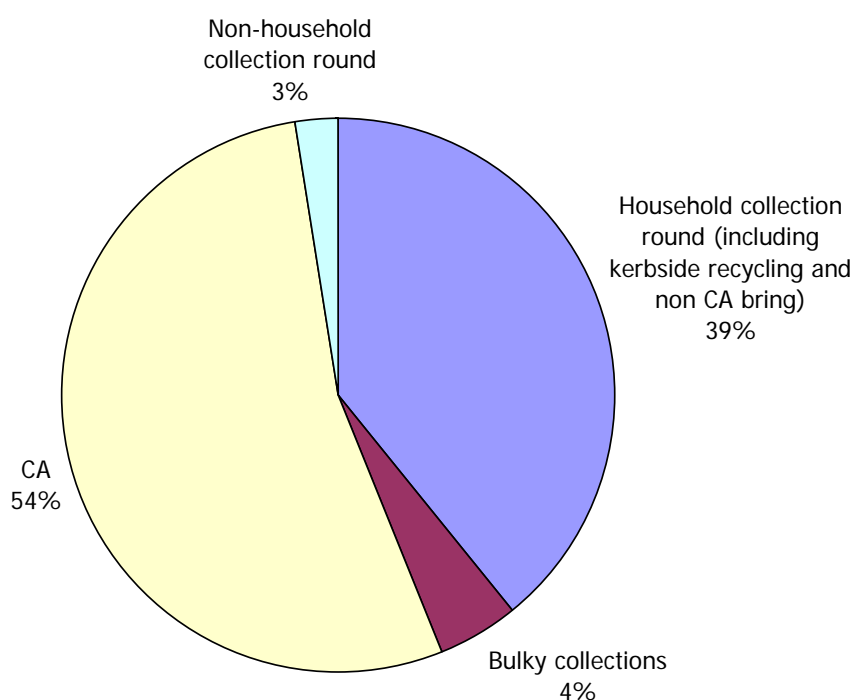
³ National assessment of civic amenity site: maximising recycling rates at civic amenity sites (NACAS report), WPSD and Network Recycling, 2004

In the case of municipal waste, the following best estimates were produced for wood waste, not including waste furniture which was calculated separately.

Wood quantities (not including furniture) in municipal waste in the UK '000 tonnes – 2003/4 estimates

Waste Stream	NI	England	Wales	Scotland	UK
Household collection round (including kerbside recycling and non CA bring)	12	356	12	38	418
Bulky collections	1	37	2	7	47
Civic amenity	23	498	13	37	572
Non household collection round waste	0	22	2	3	27
Total Wood in MSW	37	913	29	85	1,065

Sources of wood waste in municipal waste in the UK (not including waste furniture)



This pie chart shows that the dominant source of municipal wood waste (not including furniture) is the civic amenity waste stream which accounts for over half of municipal non furniture wood waste arisings. The other major source of non furniture wood waste is the household collection round waste stream which accounts for nearly 40% of the total.

Waste furniture from the municipal waste stream is the other source of municipal wood waste and the best estimates for total waste furniture (not just the proportion which was wood) are shown in the following table.

The table below shows that bulky waste and civic amenity site furniture waste each account for nearly 50% of the municipal waste furniture waste stream, with a very small quantity contributed by collection round waste.

No data was available on the proportion of furniture that was wood, and so it was not possible to combine the data for furniture and wood waste.

Furniture quantities in municipal waste in the UK '000 tonnes – 2003/4 estimates

Waste stream	England	Wales	Scotland	NI	UK
Household collection round (including kerbside recycling and non CA bring)	34	0.7	3.6	1.1	39
Bulky Collections	230	11.5	43	6.9	291
CA	236	6.1	17.7	11.1	271
Non household collection round waste	0	0	0	0	0
Total furniture in MSW	500	18	64	19	602

Furniture collected for refurbishment and reuse was not included in the table above. The best estimate for wood in furniture that was reused was 35,000 tonnes of wood for the UK as a whole.

Packaging waste

Some of the wood waste in the municipal, and also in the commercial, industrial and construction waste streams is wooden packaging. The quantities in these waste streams are included along with non packaging wood in the wood waste estimates produced in this report for the individual waste streams.

Wood packaging will only account for a relatively small proportion of municipal wood waste as much of this waste stream is furniture and wood offcuts from DIY. The Environment Agency's survey of commercial and industrial waste⁴ estimated that a total of just under 900,000 tonnes of wood packaging waste was generated by commerce and industry in 1998. Important quantities of packaging waste are also expected to arise on construction sites.

There is some specific data on wood packaging waste across the different waste streams which is worth mentioning separately. Data is available from Timcon (Timber Packaging and Pallet Confederation) on estimated total tonnages of wood packaging wastes in the UK. Overall it is estimated that about 1.4 million tonnes of packaging wood waste was generated in the UK in 2004. Timcon though view this data as of poor quality due to a lack of good quality data on which to base estimates.

Industrial and commercial waste

The industrial and commercial sector covers a wide range of activities. The wastes generated reflect this. Data from a variety of different industry sources and from surveys was assessed to choose best estimates for wood wastes arising from the different waste streams emanating from commerce and industry.

⁴ Environment Agency 1998 Waste Production Survey

Data used to calculate best estimates of commercial and industrial (C&I) wastes arising

C&I waste stream	Data source	Data year	Comments on sample	General comments
Furniture manufacture	Surveys by furniture industry bodies ⁵	2000 - 2003	The surveys carried out of furniture manufacturing companies concentrated on the larger companies predominately and assumed that the waste quantities generated per financial turnover by these companies would be typical of furniture manufacturing as a whole which is unlikely to be the case, and therefore affects the quality of the estimates.	Data from surveys/ studies of wood wastage rates - all from studies carried out by furniture industry bodies.
Manufacture of panelboards	Esys survey ⁶	2003	Data gathered on all relevant companies. No grossing up of survey data therefore required.	Data expected to be of good quality.
Other industrial/ commercial wood wastes	EA survey ⁷	1998	Sample selected by different types of industry/ commerce and stratified according to numbers of employee bands of organisations.	Sources of error arise from Assumed weights for different sizes of skips used – potential source of error. Self reporting by some respondents of bin emptying frequencies, waste types and proportions – another potential source of error. Data now old – 1998.
Manufacture of wooden products for the construction industry	EA survey ⁷	1998		
Wastes from wooden packaging manufacture	Trada ⁸	About 2001	Not based on a survey, but on an assumed wastage rate of 20% of input wood.	
Railway sleepers	Network Rail	2005-6	Data on planned replacement of railway sleepers.	
Utility poles	Energy Networks Association and British Telecom	2004 for ENA and 2002/3 for BT	Actual data on replacements of poles.	

⁵ Evaluation of waste production, utilisation, and brokerage potential within the UK furniture industry, FIET, 2002; Wood waste recycling in furniture manufacturing – a good practice guide, BFM, 2003; The use of microwave technology for the recovery of wood fibre from MDF, FIRA, 2004

⁶ Determining the market share of recycled materials – Stage 2 case study report, Esys Consulting, 2004

⁷ Environment Agency waste production survey 1998

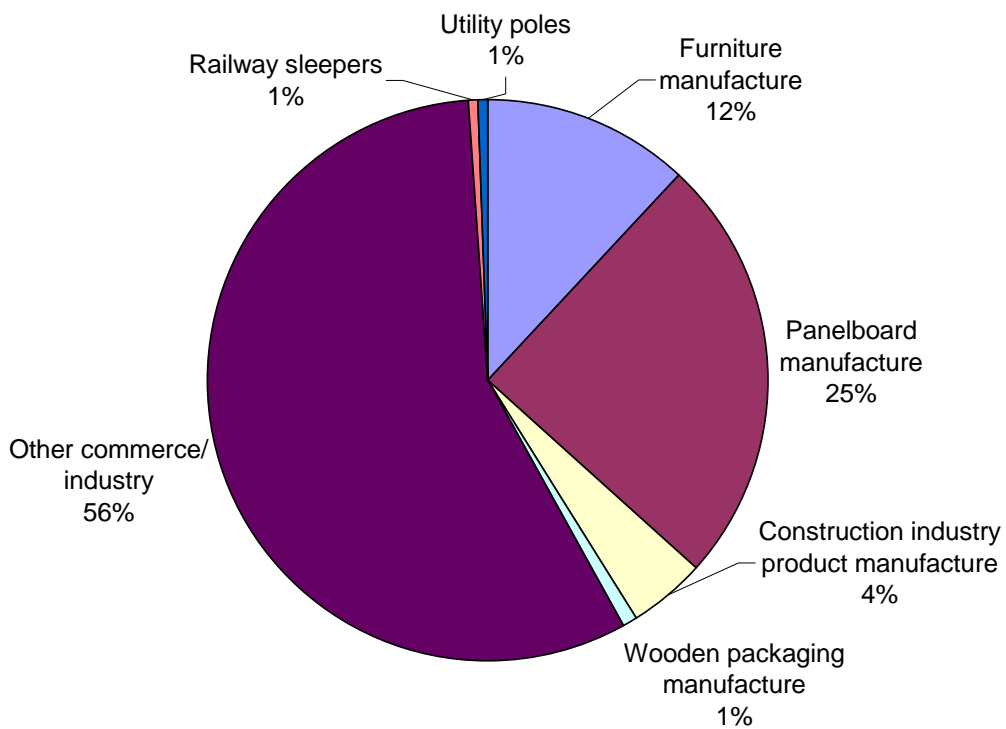
⁸ Turning a blind eye?, Trada, 2002

Best estimates of wood wastes arising in the commercial and industrial waste streams

Waste type	Tonnage	Area covered
Furniture manufacture	530,511	UK
Manufacture of panelboards	1,107,074	UK
Manufacture of wood products for the construction industry (SIC code 20.3)	201,298	England and Wales
Manufacture of wooden packaging	40,000	UK
Total wood wastes from industry and commerce <i>other</i> than furniture manufacture, wastes from sawmills or the wood products industry	2,552,312	England and Wales
Railway sleepers arising	26,000	UK
Utility poles	23,500	UK
Total (rounded to nearest thousand tonnes)	4,481,000	

It can be seen that over a million tonnes of wood waste were generated from panelboard manufacture in 2003. It is thought that the vast majority of this wood waste is burnt on site at the panelboard manufacturers to generate heat and energy.

Sources of wood waste in commercial and industrial waste in the UK



It can be seen that over half of commercial and industrial waste has been estimated to arise from the “other” commerce and industry category (2.5 million). A large proportion of this is likely to be packaging. There are other sizeable contributions from MDF/ chipboard manufacture, with accounts for one quarter of the commercial and industrial wood waste stream, and furniture manufacture which contributes about an eighth to wood waste arising from commercial and industrial sources.

Construction and demolition waste

It proved difficult to estimate the wood content of the construction and demolition (C&D) waste stream due to a lack of good quality data. There was a considerable amount of waste composition information available based on the visual estimation of skip contents. However, in the absence of weighing of the skips and the separated out contents, this method is likely to lead to errors in the relative proportions of different materials, and to the overall weight of the skips due to big differences in density and type of waste.

Very little compositional data based on sorting and weighing waste was found.

The approach taken was to calculate minimum and maximum estimates for wood waste and also a mid range estimate which was an average of the minimum and maximum estimates. Estimates of the minimum and maximum percentage for wood waste in construction and demolition waste were calculated from different studies, and then applied to national survey data on overall construction and demolition waste arisings which were available for each country in the UK.

Data used to calculate estimates of construction and demolition wastes arising

C&D estimate	Data source	Data year	Comments on sample	General comments
Minimum estimate for C&D waste arising	NIEHS C&D waste survey ⁹	2001	Small number of respondent companies (126 altogether).	Postal survey of construction and demolition companies in Northern Ireland. They were asked about the composition of the waste that they generated. Respondents reported 1.5% wood on average. This will be a minimum estimate, as there was a general mixed waste category as well and some wood waste is likely to have been recorded in that category. Main data issues are: The sample may not have been representative of the construction and demolition sectors. The compositional assessment relies on subjective judgement of respondents on the amount of wood waste.
Maximum estimate for C&D waste arising	Nottingham Trent University ¹⁰	1999, 2000, 2001	Relatively small amount of waste analysed (about 150 tonnes altogether).	Based on compositional studies mostly carried out by manually sorting and weighing skip contents. Main data issues are The construction and demolition waste was combined with waste from industries supplying construction products. The samples selected may not have had a representative split of construction and demolition waste and different types and stages of work. Excavation waste not included, which made it problematic to apply the percentages to overall quantities of construction and demolition waste which did include an unknown quantity of excavation waste.
Reclaimed wood	BRE/ BFM ¹¹	1997		Data for reclaimed wood waste taken from the "BigREc" survey carried out by Salvo and BRE which collected data via a postal survey for wood reclamation. There is uncertainty about the grossing up method used to allow for survey non respondents. The data is quite old – 1997.

⁹ Construction and demolition waste survey, Enviros for Northern Ireland Environment and Heritage Service (NIEHS), 2003

¹⁰ A comparative study of the quantities of construction waste arising in large and small skips in the Greater Nottingham area, Nottingham Trent University and APT, 2001

¹¹ Evaluation of the market development potential of the waste wood and wood products reclamation and reuse sector, BRE/ BFM for WRAP, 2004 (further development of the results of the 1998 Salvo/ BRE "BigREc" survey)

Estimates of wood waste arising in the C&D waste stream in the UK – 2003/4

	Thousand tonnes				
	England	Wales	Scotland	Northern Ireland	UK
INCLUDING reclaimed wood (634,000 tonnes) apportioned to countries in the UK in the same ratios as the other estimated wood wastes quantities					
Minimum estimate	1,565	88	111	16	2,151
Maximum estimate	6,645	375	469	68	7,929
Average of minimum and maximum estimates – best overall estimate	4,105	232	290	42	5,040

The best estimate of wood waste in the C&D waste stream in 2003/4 is just over 5 million tonnes in the UK as a whole.

Overall quantities of wood waste arising in the UK

The table below shows the combined wood waste quantities arising in the UK. Just over 10.5 million tonnes of waste wood are estimated to be generated. Due to the lack of good quality data for some of the sectors generating wood waste, in particular the construction and demolition waste sector, this total wood waste tonnage can only be regarded as an indication of the amount of wood waste and not as a definitive figure.

Waste wood in the form of furniture in the municipal waste stream is not included due to the lack of a percentage for wood in this waste stream.

Estimate of total wood waste arisings in the UK

Waste stream	Thousand tonnes				
	England	Wales	Scotland	Northern Ireland	UK
Municipal waste (not including furniture waste)	37	913	29	85	1,065
Commercial and industrial	-	-	-	-	4,481
C&D average of minimum and maximum estimates	4,105	232	290	42	5,040
Total Wood Waste					10,586

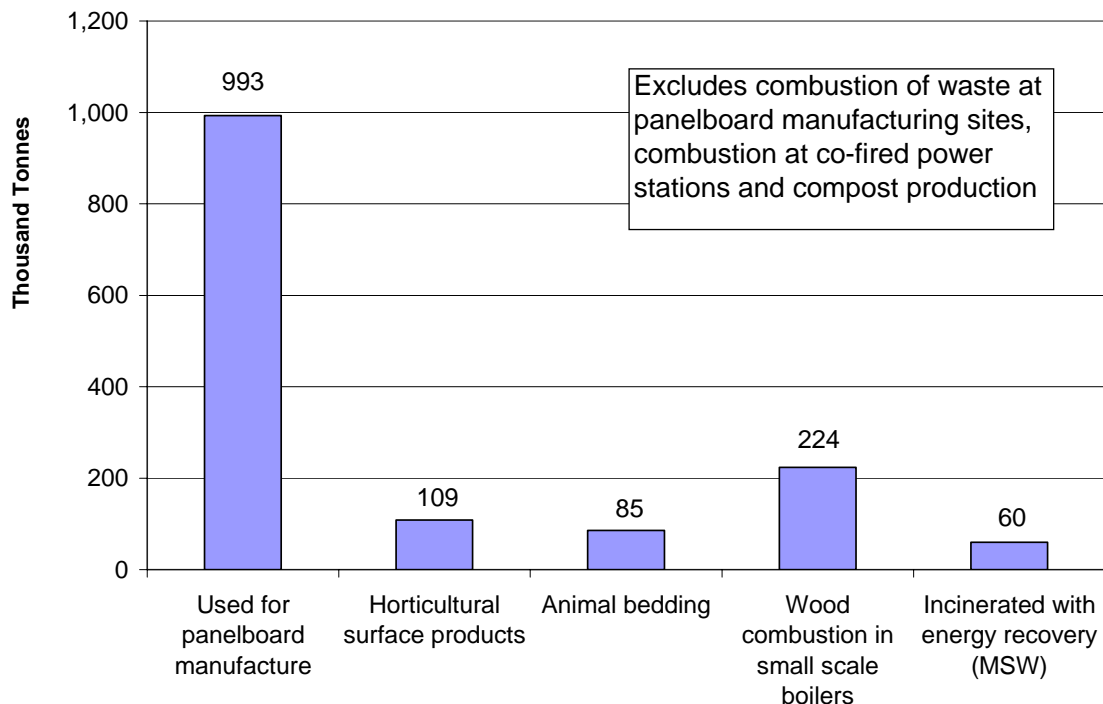
Wood waste management

There are some established recycling routes for waste wood. The predominant route is panelboard manufacture which took nearly one million tonnes of post consumer wood waste in 2003. Nearly 200,000 tonnes went into horticultural surface products (excluding composting) and animal bedding combined in 2004, with over 200,000 tonnes estimated to be combusted with heat recovery in small scale boilers. The quantities of wood waste that are recycled have been increasing in recent years.

Best estimates of quantities of wood waste managed by different routes

Wood waste management route	Tonnes	Data year
Used for panelboard manufacture	993,000	2003
Horticultural surface products	108,794	2004
Animal bedding	85,481	2004
Wood combustion in small scale boilers	223,500	2004
Incinerated with energy recovery in MSW Energy from Waste Incinerators	28,000 tonnes packaging 33,000 tonnes non packaging	2002-2003

Waste management routes other than disposal used for waste wood in the UK



It should be noted that there are other waste management routes used for wood waste not included in the above chart and table due to lack of data. Examples of waste management routes not included are, for example co-fired/wood only power stations, combustion in large scale wood burning stoves by panelboard manufacturers and compost production.

Ability to forecast future wood waste arisings

It is difficult to forecast future quantities of any waste stream and this also applies very much to wood waste. Future waste quantities generated will depend on a complex interaction between factors such as how strong the UK economy is, changes in UK manufacturing output, levels of construction, impacts of legislation and voluntary targets, and adoption of newer methods and technologies.

As regards municipal waste, the average trends in the overall quantities of municipal waste have been upwards in all parts of the UK. Experts consider that an upward trend is likely to continue.

A useful indicator of wood waste generated is how much wood is used in the UK. The consumption of sawn wood went up by an average of 1.2% per year over the period 1999 to 2003. It is hard to forecast whether this trend will continue.

There has however been an increase in the use of timber framed houses in recent years, and this trend is likely to continue. There has also been an increase in the use of timber window frames, wooden decking and wood based flooring in recent years. There is also a planned increase in the construction of houses. The current annual level is about 170,000 homes a year built and this is set to increase to 250,000 homes a year to meet government targets. The government wants more pre fabricated units to be used in social housing. There will be waste from the production of these units during the manufacture.

As regards wastes arising during construction, the increase in housebuilding that will take place over the next few years is likely to lead to increases in some types of wood waste generated on construction sites e.g. wooden packaging wastes, scaffolding, wooden fences, but, the greater use of pre fabricated units will lead to a lower increase or possibly decrease in some of the wood wastes used in housing frames as the units are ready made and do not require cutting on site.

Comments on data quality and recommendations for remedying gaps

There is good quality data on wood waste arisings in the municipal waste stream, and reasonable data on commercial and industrial wood waste, though improved data on several of the waste streams would be useful. The Environment Agency has carried out a follow up commercial and industrial waste survey to update their 1998 survey and the results are expected later in 2005. It is expected that this survey will provide better quality data for some of the commercial and industrial waste streams.

The area where data quality is poor is the construction and demolition waste stream. Various options are suggested for investigating to assess how this lack of robust data could be most effectively remedied.

- Survey based on surveying construction and demolition companies based on their SIC code classifications and company sizes
- Survey of construction/ demolition/ refurbishment sites with the sample selected using Building Control Department records of local councils
- Survey of C&D wastes arriving at landfill sites, exempt sites and crushers
- Programme of compositional analysis of waste at construction sites based on data on the value of construction of different types of construction in the UK
- Programme of compositional analysis of demolition waste