



Waste Wood Reuse and Recycling in Essex & Cambridgeshire

WasteWISE Overview Report 3 JUNE 2003

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We are keen to share research and discuss joint projects on this opportunity.

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Executive Summary

- Waste wood is considered a major opportunity for focused new social enterprises.
- It is estimated that over 1.7 million tonnes of domestic wood waste are produced annually in the UK, of which only about 40,000 tonnes (2.3%) are currently recycled.
- 2.5 million tonnes of construction and demolition wood waste are also produced annually, of which 1.2 million tonnes is estimated to be reclaimable but only *ca.* 39% of this is reused, recycled or burnt.
- Major opportunities for social enterprises include timber sales and furniture reuse, with commercial sources and partnerships with councils, re bulky collections, offering the best early opportunities.
- A number of other significant opportunities exist, including pallet reuse and reprocessing for particle board manufacture, fuel, and as biomass, including reprocessing of wood already diverted by CA and other sites.
- Over 24,000 tonnes of waste timber and 11,000 tonnes of waste furniture are estimated to be available annually in Essex and Cambridgeshire for such projects.
- It is estimated by WasteWISE that new social enterprises could create 90 jobs in Essex and Cambridgeshire for a 10% increase in the recycling rate of timber and a 20% increase for furniture reuse.
- Wood is a versatile, high availability waste stream. This enables projects to combine a wide variety of options which are explored and summarised here as a preliminary guide.

1. Background

There have been some valuable recent developments regarding waste wood - for example the Waste Resources Action Programme (WRAP) has recently introduced an interactive site (www.wrap.org.uk/RecycleWood) which together with letsrecycle (www.letsrecycle.com) provides good marketing opportunities.



It is estimated (WRAP 2002) that the UK annually produces around 1.76 million tonnes of domestic wood waste. 242,000 tonnes of this arises from normal household collections, 40,000 tonnes from bulky household collections and the clear majority from civic amenity (CA) sites. This constitutes *ca.* 7% of the total domestic waste stream. Virtually no collected household wood waste and only 2.7% of civic amenity waste nationally is recycled. In addition, it is estimated that *ca.* 0.67 million tonnes of wood packaging waste was produced in 2001, of which 44% was recycled and *ca.* 2.5 million tonnes of commercial and demolition (C&D) waste are produced every year, of which 32% is reused as wood or wood products, 6% is burnt to produce energy and 1% is recycled. APU is currently researching ways to reduce the levels of C&D waste within the TREE (Timber Recycling For Essex Environment) project.

For the purposes of this report, wood is used as a general term to encompass timber, timber products such as furniture and woody waste such as branches.

A survey of 203 local authorities conducted in 2001 by Flora and Fauna International revealed that the major constraint to timber recycling was the lack of a local outlet for material (62% of respondents), followed by lack of resources (38%), lack of space (37%), contamination/quality of material (24%) and lack of awareness/information availability (6%).

The current cost of segregating and processing waste wood from CA sites is estimated to be between £19 and £47 per tonne. This cost could probably be reduced if skips for various categories of wood waste shown in Tables 2 and 3 were provided.

Current uses for wood waste include:

1. Re-use/recycling of timber, furniture and pallets
2. Chipboard and MDF manufacture
3. As a bulking material and carbon source for compost
4. Conversion to mulch for horticultural use
5. As a fuel source or feedstock for charcoal manufacture
6. As animal bedding
7. As a pulp for the manufacture of corrugating medium and brown paper
8. As a fibre source for wood-plastic and fibre-cement composite materials

Future opportunities include use as biomass for conversion to transport fuels such as ethanol or methanol, which can be used as fuel extenders for petrol



and diesel or for bio-diesel manufacture. These are discussed in more detail in the Appendices. Appendix 1 discusses wood products opportunities, skills needs and business angles. Appendix 2 assesses opportunities in by looking at successful recycling social enterprises elsewhere in Britain.

Appendix 6 lists local wood recyclers. These are rather few and far between as they are more traditionally found in the North. Letsrecycle (www.letsrecycle.com) have a national listing.

2. Estimated Quantities Available for Recycling

The quantity and type of wood waste available varies shows seasonal fluctuations and variances such as varying levels of trade waste, local policies and overall lack of measurement contribute to the level of uncertainty. However, the following tables probably represent the best available estimates. Table 1 shows estimated annual quantities of wood available for recycling in Essex, Cambridgeshire and the Eastern Region.

The household values include normal domestic collections and CA waste and are calculated from '00 – '01 data (Eastern Region) and '01 – '02 data (Essex). Appendices 3 and 4 provide more details. National average values of 1.2 % for the percentage of wood in collected household waste and 22.5% for the percentage of wood in civic amenity waste are used (WRAP averages from a survey of 450 local authorities '01-'02). The figure of 1.2% for household waste is within 10% of the average figure of 1.1% reported from an analysis of Cambridgeshire waste conducted in '02.

A recycling rate of 0% is assumed for household collections and an average Essex '01 – '02 CA recycling rate of 4.7% is assumed for all CA sites. This rate is *ca.* 2% above the national average and assumes that all the recorded CA waste is recycled, which may not be the case. However, this means that the values provided are likely to be an under rather than an over estimate. In addition to these figures, bulky household collections of wood, an unknown percentage of which are currently recycled, probably total 1,000 tonnes for Essex, 400 tonnes for Cambridge and 3,400 tonnes for the Eastern Region.

The estimated figure for business waste is for wood packaging and is calculated on a population basis using a figure of 670,000 tonnes for the UK total (DETR 2000). The estimated figure for C&D waste is derived similarly



using an estimated UK total of 0.71 million tonnes of unrecycled but reclaimable C&D wood waste (WRAP '02) and includes the substantial waste imports into Essex where noted.

Table 1

Estimated Wood Available for Recycling In Cambridge and the East of England (Tonnes)

	Household Collections	Household CA Sites	Business	C&D	Total
Essex	6,300	37,300	9,200	18,000 + 36,000*	70,800 106,800**
Cambridge	2,400	13,500	3,700	7,400	27,000
E & C	8,700	50,800	12,900	25,400 + 36,000*	97,800 133,800**
Eastern Region	22,400	89,000	31,400	61,600 + 36,000*	204,400 240,000**

*Estimated additional contribution from imports (T. Bomber, TREE bid , APU 2002)

**Total including estimated imported waste

Table 2 shows estimates of quantities of various categories of CA wood waste available for recycling in Essex, Cambridgeshire and the Eastern Region using national average percentages of 10.5% for timber, 5% for furniture and 6.5% for branches (WRAP survey).

Table 2

Categorised Estimates of CA Wood Waste Available for Recycling In Essex, Cambridgeshire and the Eastern Region (Tonnes)

	Timber	Furniture	Branches
Essex	17,400	8,300	10,800
Cambridge	6,300	3,000	3,900
E & C	23,700	11,300	14,700
Eastern Region	41,500	19,800	25,700



Table 3 shows an estimated breakdown of the timber element of CA waste for Essex, Cambridgeshire and the Eastern Region derived proportionately using data from an analysis of CA sites in Brighton and Hove conducted by the Wood Energy and Research Group in '01 (WRAP '02). This analysis found that timber constituted 20.2% of CA waste, almost twice that of the national average of 10.5%. This may reflect the inclusion of some furniture within this category in the Brighton study, although this would not be expected to account for such a large difference. The data does at least give some broad guidance as to the amounts of wood that may be available within these categories.

Table 3

Breakdown of Timber Element of CA Wood Available for Recycling In Essex, Cambridgeshire and the Eastern Region (Tonnes)

	Chip Board	Fibre Board	Untreated Solid	Treated Solid	Painted Solid	Solid Furniture	Block Board	Virgin Timber
E	5,400	2,700	1,900	2,100	2,000	1,700	1,100	340
C	2,000	1,000	700	800	700	600	400	130
EC	7,500	3,700	2,600	2,900	2,700	2,400	1,500	530
ER	13,000	6,400	4,500	4,900	4,700	4,100	2,700	800

3. Financial Overview

Government has created new start-up funding for effective community recycling projects. Although it is recognised that grants may be essential at the beginning, the aim is to create sustainable businesses that no longer need them. WasteWISE will assist organisations to win funding for projects in the two counties, including in Thurrock, Southend and Peterborough. There is plenty to bid for, including: New Opportunities Funding: The CRED scheme, SEED funding, Fair Share projects, the new Government £100 million/year sustainable waste funding package managed by WRAP and others and the DTI Clear Skies funding package.



4. Social Employment Opportunities

It is difficult to calculate the precise economics of social enterprises reusing or recycling wood waste ahead of undertaking detailed business planning, which WasteWISE would be keen to assist groups with as a next stage. One initial approach is to consider specific schemes which already operate in some parts of the UK and apply the information available to the quantities of waste estimated to be available in Essex and the Regions. The following three examples of (A) timber, (B) furniture and (C) pallets are used to provide estimates of social employment opportunities for further discussion. It is assumed that WasteWISE furniture schemes would collect from homes and businesses before the waste was deposited at CA sites, so the reference to CA waste is largely academic and is used only as a means of deriving estimated quantities. Timber schemes may also benefit from some degree of prior collection, in addition to some assistance from local authorities with improved pre-sorting at CA sites. There may also be room for a fair amount of overlap between all three scenarios. Future research, including visits to the various projects outlined will provide more financial and operational information on this.

Skills and training involved would include driving, valuation, furniture restoration, sales, carpentry, machine skills, creative design, chipping and grinding. A listing of possible skills and markets associated with various categories of wood waste is assessed in the summary analysis of the cascade of opportunities for creating value from wood and wood products presented in Appendix 1.

Successful projects are likely to combine a range of reuse and reprocessing options. Reuse plus back-up is one strategy. Projects need to define a main income product range but also have an outlet/opportunity for the residue, perhaps using one or other of the options described here.

A. Timber

Up to 10 enterprises similar to the 4-man Wood Recycling Project in Brighton and Hove could be set up locally to achieve a 10% increase in the C&D wood re-use/recycling rate in Essex. A more detailed analysis is presented in Appendix 2. The C&D wood waste in Cambridge could support 6 people at the 10% rate, creating employment for *ca.* 46 people for the combined counties.



Timber from CA sites in Essex should be able to provide work for another 3 enterprises for a 10% increase in the re-use/recycling rate. Timber from CA sites in Cambridge should be sufficient for at least one enterprise, providing *ca.* 16 jobs in total for timber derived from CA sites and *ca.* 62 jobs using C&D and CA timber in the two counties combined.

B. Furniture

For an increase in the recycling rate of 20%, the estimated waste furniture available at CA sites in Essex could produce employment for *ca.* 20 people along the lines of Bulky Bob's in Liverpool. An analysis is provided in Appendices 2 and 6. This would probably be best divided up into 4 schemes distributed over the county. For Cambridge, the figures indicate that employment for *ca.* 8 people should be possible for the 10% recycling rate, making a total of 28 jobs for the two counties combined. The estimated 1,400 tonnes of bulky household waste in Essex and Cambridge would provide additional resources.

C. Pallets

Estimates of the number of pallets available in Essex and Cambridge (see Appendix 1C) show that these could be worth up to £42,000 and could be sufficient to provide employment for *ca.* 3 people in Essex and 1 person in Cambridge.

Other Opportunities

Tables 1-3 show there is plenty of wood waste available in other categories and a number of other possibilities for social employment using these are outlined in Appendix 2. It is difficult to estimate the financial aspects of these due to the current lack of information but this is being continuously updated and possible WasteWISE projects will be assessed on an individual basis if requested.

5. Environmental Issues

Land-filled wood produces methane – a greenhouse effect gas - when it rots, so this should be avoided if possible. Treated wood can also contain tributyl tin oxide and copper and tributyl tin naphthenate which can contaminate



surface water. It has been commonly thought that items such as furniture decayed in around 25 years in landfill and items containing preservative around 50 years, however preliminary findings from recent research (www.forest.nsw.gov.au/bush/feb02/stories/21.asp) have shown that many products may take a hundred years or more to decay.

Decisions concerning wood reuse and recycling will assist councils to achieve landfill directive targets to divert biodegradable municipal waste (BMW). These are required to fall to 75% of 1995 levels by 2010 and 50% of 1995 levels by 2013. Councils have failed to analyse wood as an issue as they have only analysed dustbin composition regularly, not civic amenity waste.

Use as a fuel for either domestic heating or conversion to electrical energy in commercial units is effectively carbon neutral but toxic emissions are produced when wood treated with preservatives is burnt. Items for external use such as railway sleepers and telegraph poles are particularly bad in this respect. Railway sleepers contain creosote which incorporates benzopyrenes and may be carcinogenic. Telegraph poles contain pentachlorophenol and pressure treated wood contains chromated copper arsenate. Use as biomass for road fuels such as ethanol or methanol, which can be used to extend petrol and diesel without engine modifications, would reduce CO₂ and other emissions.

Chipboard manufacture raises environmental issues because of the possibly carcinogenic formaldehyde based glues used and the large amounts of energy and water consumed. No proper life-cycle analysis has been conducted for this in the UK, although a Dutch study has recently reported that recycling to produce chipboard leads to a greater reduction in CO₂ emissions than burning the wood to produce electrical energy. The new Fibresolve process being developed by TRADA appears to dispense with formaldehyde based glues and allow particleboard itself to be recycled.

6. Potential Partner Organisations

- WasteWISE and WISE - WISE provides detailed development and management training for recycling/other social enterprise managers in Essex, Cambridgeshire and neighbouring areas.
- Recycling social enterprises and community/environment groups



- Essex and Cambs county councils, district and unitary councils, and joint waste strategy and recycling initiatives. Councils may donate timber and furniture to reuse and recycling schemes as in Liverpool with Bulky Bob's.
- Essex ReMaDe, and other initiatives/umbrella organisations.
- TREE, also at APU, provides research on C&D waste within Essex
- External partners, e.g. TRADA and wood recovery companies listed at www.letsrecycle.com.
- Local construction sites and DIY stores such as B&Q etc.
- Local recycling, waste, and other businesses.
- New entrepreneurs/venture capital funders

7. Next Steps

Our standard two stage approach at WasteWISE is, with partners, to

- a Consult on discussion drafts like this, then improve and publish a final 'overview report'
- b To then undertake a detailed feasibility study and financial analysis with partners on a real potential scheme covering a defined catchment area that is projected to deliver economic and successful recycling. This will normally cover at least three council districts in Essex and/or Cambs, and the study will be overseen by the creation of a 'task and finish' project group including key partners.

8. Detailed Financial Analysis

In the case of wood, the issues to be costed in detail include:

A **FIXED COSTS** (** costs reduced by partnerships/links)

Capital investment

- recycling skips appropriate to various categories of wood
 - collection vehicles
 - ** premises for sorting/refurbishing/chipping/external storage
 - ** Retail outlets
- ** Operating costs
- business rates, phones etc
 - promotion/media



B VARIABLE COSTS

Staff costs

- Wood collection
- Sorting/refurbishing/selling/craft design
- Delivery/transport to market

Operating costs

- Fuel/premises/refurbishing materials

C INCOME

Price per item of timber/furniture or kg fuel/woodchips sold

Recycling credit per tonne (or landfill saving from commercial wood sources)

Packaging recovery notes

Potential financial support from local authority for trial

Staffing contribution re: placing people with learning disability/training support

Potential one off assistance from industry/packaging compliance schemes

Local partners interested in reprocessing outputs

Potential grant aid and start up funding (WasteWISE has further analysis on these)

9. Further Contacts and Sources

Tony Bomber, TREE Project, Anglia Environmental, APU, Bishop Hall Lane, Chelmsford. CM1 1SQ. t.bomber@apu.ac.uk, 01223 363271.

Tony Rowan, Head of Finance, FRC Group/Bulky Bobs, Atlantic way, Brunswick Business Park, Liverpool L3 4BE.
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Richard Mehmed, Project Director, National Community Wood Recycling Project, Municipal Market, Circus Street, Brighton. BN2 9QF.
Info@communitywoodrecycling.org.uk, 01273 696900.

Neil Thomson, Project Manager, Remade Essex, tel: 01245 259351,
neil.thomson@eepartnership.co.uk.



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The Composition of Household Waste in Cambridgeshire, Report to the Cambridge and Peterborough Joint Waste Management Strategy, AEAT/ENV/R/1262, October 2002.

An Introduction to Waste Wood in the UK., Dr Georgina Magin, Flora and Fauna International, Cambridge, UK, 2001. ISBN: 1-903703-02-6.

TREE Funding Application, T. Bomber, APU 2002.

Strategic Waste Management Assessment: East of England 2001

www.woodrecycling.org.uk/

www.recycle.mcmill.com/pallets.htm

www.lwrp.org.uk

www.frcgroup.co.uk

www.recycle.mcmill.com/wood.htm

www.equiworld.net/uk/ezine/1102/easybed.htm

www.recycle.mcmill.com/wood.htm

www.recycle.mcmill.com/pallets.htm

www.palletservicesuk.com/sevices.htm

www.trada.co.uk/aT/web/standard/kc/research.html?filepath=.%2FEnviroFibre.htm

www.dti.gov.uk/sustainability/downloads/wood.pdf

www.equiworld.net/uk/ezine/1102/easibed.htm

www.tangram.co.uk/TI-WPC_Review.pdf

www.crservices.co.uk

www.remade.org.uk/new_site/Wood/wood_programme.htm#Activity1

www.defra.gov.uk/environment/waste/strategy/part1/3.htm

www.wrap.org.uk/RecycleWood

www.forest.nsw.gov.au/bush/feb02/stories/21.asp

www.associationhq.org.uk/ae/ourclients/showclient2.asp?UniRef=8

www.communitywoodrecycling.org.uk

APPENDIX 1

OPTIONS FOR REUSE & RECYCLING SOCIAL ENTERPRISES TO EXTRACT VALUE FROM WOOD - INITIAL 'CASCADE'

Waste Opportunity	Skills Required/Training Opportunity	Business Angle/Income Sources in Order?
Office furniture	Entrepreneur – selecting what will earn/ declining slow moving items	Furniture resale – shop, newsletter to local firms/residents/other charities/schools
Commercial wood e.g. furniture/hardwood offcuts	Sales/Shop operation/Marketing	Trading/clearance/links with a dealer/techniques to clear surplus/swap with other project's surpluses
Shop/exhibition fittings	Carpentry	Grade one timber length resale, particularly hardwoods (charity shop for men)
Pallets/packaging	Machine skills – depends on investment in processing equipment e.g. chipper	Resale of upgraded/processed items
Other commercial timber byproducts eg chips/sawdust	Processing work e.g. bagging	Sale of kindling/winter fuel
Household furniture	Furniture restoration	Sale of grade for chipboard/composite making
Kitchen units/drawers	Creativity – make timber products with value	Chipping for garden mulch, or for 'biomass' fuel
DIY wood	Driving	Charcoal making/other processing e.g. chemical
Broken furniture	Lifting/shifting	Export of particular items?

Related opportunities

- Reassembly of flatpack furniture e.g. resold imported product or a service for MFI/IKEA customers (eg business partnership)
- Selling related new products e.g. becoming shop outlet for furniture/product line not sold locally/seasonally e.g. coal
- Business as a foot in door to other opportunities e.g. clearing warehouse stores of reject/unused product, home clearances?
- Bigger DIY Resale yard– lower version of a B&Q or a Solopark (south of Cambridge)
- Partnership with local Household Waste Recycling Centres
- Links to district councils e.g. operating their bulky collections where public is disposing furniture

Examples of Potential Problems

- People taking advantage of projects as a free disposal service/overstating the quality

- Minimising collections, in favour of getting people to deliver (if base premises are suitable)



Appendix 2

Detailed Analysis of Opportunities, Focusing on Wood and Furniture Projects Elsewhere in the UK.

Subheadings:

1. Reuse of Timber, Pallets and Furniture
2. Chipboard and Particle Board
3. Mulch
4. Compost
5. Fuel and Charcoal
6. Animal Bedding
7. Pulping for Cardboard
8. Wood-Plastic Composites
9. Wood Waste as Biomass

1. Reuse of Timber, Pallets and Furniture

A. Timber Reuse and Recycling

The Brighton and Hove Wood Recycling Project (www.woodrecycling.org.uk/) is a good example of C&D timber waste reuse and recycling. It is a self-financing initiative which collects wood waste from within a 15 mile radius of Brighton, mostly from construction and demolition sites although packaging waste including pallets and domestic waste is accepted. It employs a staff of 4, processes around ten tonnes of wood a week and had a turnover in 2000 – 2001 of around £110,000. The project has acted as a model for numerous schemes around the country, including the Leaside Wood Recycling Project at Bromley-by-Bow (www.lwrp.org.uk/). The founder member, Richard Mehmed is now the project director for the National Community Wood Recycling Project (www.communitywoodrecycling.org.uk) and is available to give advice.

The waste wood at the Brighton and Hove Wood recycling Project is sorted into 3 categories. Grade 1 is timber good enough to sell back to the DIY/builders market, defined as around 2 metres in length, sound, free from bad splits and relatively free from nails and other contaminants. Plywood, chipboard, hardboard and MDF more than a metre square are included, as well as doors. Grade 2 is clean and sound - too short to be easily sold for DIY



but useful for making wood products. Current BSI standards do not discriminate against the use of recycled/reclaimed wood for such products (WRAP Wood Market Study – Standards review '02). Grade 3 represents around 80% of the waste, consisting largely of old fence posts and small off-cuts. It is mostly sold as firewood and kindling to local farmers or re-manufactured into chipboard.

The project processes *ca.* 500 tonnes of C&D waste per year and employs 4 people with a turnover of £110,000. Table 1 above shows that 54,000 tonnes of C&D waste is estimated to be available in Essex, so an increase in the recycling rate of *ca.* 10% or 5,000 tonnes would be sufficient to provide work for 10 similar 4-man teams with a total turnover of over £1.1 million.

Table 2 shows that a further 17,400 tonnes of timber should be available annually from CA sites in Essex which would provide work for at least 3 4-man enterprises assuming a 10% re-use/recycling rate. Table 3 shows that each enterprise could be dealing with up to 110 tonnes of virgin timber, which can be compared to an estimated 100 tonnes (20%) of grades 1 and 2 timber from mostly C&D waste processed annually by the Brighton and Hove Project. The corresponding figure for Cambridge is sufficient for at least one 4-man enterprise, making *ca.* 16 people in total for timber derived from CA sites and *ca.* 62 people for C&D and CA timber combined, with a total turnover of *ca.* £1.7 million. These figures would increase if the 8,700 tonnes of unrecycled wood estimated to be present in collected household waste in Essex and Cambridge could be utilised.

As a final point, B&Q operate a good in-house recycling scheme, back-hauling waste timber, products and damaged pallets which are used to make wood chips. In 1999, over 2,600 tonnes of chips were produced and recycling saved the company £750,000. However, many stores have an arrangement with local community groups or scrap stores who take waste wood and might be able to contribute to these schemes.

B. Furniture Reuse

For household furniture there are over 360 re-use schemes in the UK, co-ordinated through the Furniture Recycling Network Liverpool (e-mail: furniture.rn@virgin.net). The most successful social enterprise is Bulky Bob's based in Liverpool. This is operated by the Furniture Resource Centre (www.frcgroup.co.uk), which employs around 100 people and has an income



of £7.6 million ('01- '02), only 10% of which originated from grants. A complete social audit for the last year can be downloaded from the site, which provides useful information for prospective enterprises. Waste furniture and other bulky items, including carpets and white goods are collected from council offices and local homes.

In the year '01-'02, 42,000 house visits were made and 2.700 tonnes of waste collected. Of this, 607 tonnes were recycled (22%), comprising over 6,000 items of furniture and 9,000 white goods. Performance has improved recently, as in the financial year '02 –'03 a recycling rate of 32% was obtained from a total collection of over 6000 items of furniture and almost 16,000 white goods. An income of £120,000 was generated from the sale of furniture alone – the white goods were donated to local charities. Recently, a separate division, Revive, has been set up specifically for retailing furniture supplied by Bulky Bob's, which has become a collection only service. Around 3% of collections are supplied to another social enterprise, Dove Designs, for craft working. For economic reasons, furniture is no longer refurbished.

Table 1 lists average weights for various types of wooden furniture and soft furnishings:



Table 1 Average Weights of Various Items of Furniture (kg)

Bathroom suite	100
Bedroom unit	50
Bedside cabinet	15
Bookcase	18
Cabinet	15
Chair	7
Chest of drawers	25
Coffee table	15
Cupboard	40
Desk	27
Dining table	20
Dressing table	34
Kitchen cabinet	15
Sideboard	38
Stool	5
Table	20
Wardrobe	25
3P suite	38
Armchair	80
Bed-double	35
Bed-single	92
Sofa	50

(Source: Biffa/CRN "Measure Your Treasure" using FRN and other data)

Assuming a proportional conversion from number of items to weight, which probably over estimates the weight of furniture, furniture would appear to constitute *ca.* 28% of Bulky Bob's collected waste or a total of *ca.* 800 tonnes. This suggests that each tonne of waste furniture generated *ca.* 320 kg of reusable or recyclable material worth £150, equivalent to £468 per tonne.

Appendix 6 provides an estimate of the costs involved in setting up a WasteWISE furniture reuse/recycling scheme. From this it appears that up to 10 people could be funded by collecting 800 tonnes of furniture, preferably before being deposited at CA sites. Two vans would be needed, with a driver and assistant, leaving 6 people to administer the scheme, sort, refurbish and



sell. The economics suggest that the scheme could probably operate on half this scale.

For an increase in the recycling rate of 20%, the estimated 8.300 tonnes of waste furniture available at CA sites in Essex (see Table 2) would be expected to produce an income of ca. £250,000 and employment for *ca.* 20 people. This would probably be best divided up into 4 schemes distributed over the county, each with a van and five people. For Cambridge, the amount of waste could provide work for *ca.* 8 people or two groups, each with a van and 3 people. The estimated 1,400 tonnes of bulky household waste in Essex and Cambridge would provide additional resources.

C. Pallets

The current rates for Packaging Recovery Notes (PRNs) for wood recovery are between £10-12 per tonne. These can be applied to wood packaging such as pallets and crates. There is a well-established network of dealers prepared to pay cash for used pallets of standard sizes in sound condition -the sites www.palletservicesuk.com/sevices.htm and www.recycle.mcmill.com/pallets.htm provide useful information. Damaged, non-standard and sizes smaller than 900mm (36") shortest dimension are of little interest. The ringshank nails used in their construction can make them somewhat difficult to salvage.

The weight of pallets varies with the type, but average *ca.* 30 to a tonne This means that the use of relatively few new pallets - 30 or so a week - may result in a company being obligated by the Packaging Waste Regulations. Pallet re-use is therefore widespread - on average they are used nine times. Dealers pay up to £2 for pallets in good condition. Damaged or end-of-life pallets represent a significant amount of timber for disposal within the packaging wood waste stream in the UK. It is estimated that 170,000 tonnes of this are chipped for panel manufacture, 15,000 tonnes shredded for mulch or compost and 5,000 tonnes burnt in energy producing plants.

West Midland Pallet supplies in Birmingham is an example of a small company recycling pallets, employing 22 people. Pallets are either collected or delivered to the company's site. Five people are involved in repairing damaged pallets for reuse, processing around 500 – 600 pallets a day. Those beyond repair are broken down and the timber used to reconstruct new pallets. Timber



beyond reuse is transferred to a neighbouring company that chips it for chipboard and particle board manufacture.

Taking the average weight of a pallet as 33 kgs, the throughput of pallets reported by West Midland Pallet supplies translates to around 6,000 tonnes a year. Around 24 million pallets are produced in the UK each year. Proportionately, this would translate to *ca.* 19,500 tonnes in Essex and *ca.* 8,000 tonnes in Cambridge. It is difficult to estimate the current recycling rate of pallets but figures of between 44% and 51% are usually quoted. A 10% increase in this rate would mean that *ca.* 2,000 tonnes were available for recycling or reuse in Essex and *ca.* 800 tonnes in Cambridge. These could be worth up to £168,000 and could be sufficient to provide employment for *ca.* 12 people in Essex and 4 people in Cambridge.

2. Chipboard and particle board.

Good quality recycled wood chips and sawdust can be used in the manufacture of chipboard and particle board. These need to be of the highest quality – not mixtures of hardwood and softwood - and low on contamination with nails, paint or chemicals. In 1997, 2.7 million tonnes of wood chips were used for this, of which 375,000 tonnes (14%) were recycled. There is believed to be considerable capacity to increase the quantity of recycled wood chips used to around 2.2 million tonnes, sufficient to utilise the entire UK domestic waste stream. The new Fibresolve process being developed by the Timber Research and Development Association (TRADA) with Dti funding (www.trada.co.uk/aT/web/standard/kc/research.html?filepath=.%2FEnviroFibre.htm) appears to be able to utilise waste particle board, for which there has not been any previous use, for MDF manufacture. However, the equipment needed for producing wood chips is fairly expensive is only viable where there is a large, uncontaminated, reliable supply of suitable timber and a market for the chips. It may be more appropriate for WasteWISE schemes to deliver clean, sorted waste to commercial wood chippers.

3. Mulch for horticultural use

Light brushwood waste can be chipped to produce weed suppressing mulch, footpath surfacing or fuel for hopper-fed wood burning boilers. Considerable demand exists for this from public authorities and others engaged in landscaping work.



4. Compost bulking

Branches can be ground to produce a bulking agent to balance high nitrogen loads in composting operations. ReMaDe Essex are currently organising a countywide trial of potting compost made from civic amenity green waste. This is produced by the Suffolk-based company Petering Out and is a mix of raw compost with bark and wood fibre. CRS (Cambridge Recycling Services) recycling in Cambridge (www.crservices.co.uk) have expertise in composting equipment and are willing to provide advice to WasteWISE projects. It may be possible to use other wood waste but it is not recommended to grind or compost wood covered with lead-based paint as this generates a toxic dust cloud.

5. Fuel and Charcoal

Unpainted wood waste free of preservatives can be used as fuel. The Brighton and Hove wood recycling project sells this to local farmers as firewood and kindling. Wood waste could also be burnt in small electrical generation plants. The DTI clear skies programme (www.clear-skies.org) has funding available for community wood heating schemes using automated wood pellet stoves and wood burning boilers.

Around 50,000 tonnes of charcoal are consumed annually for barbecues in the UK and a growing proportion is home produced from hardwood forest waste by 200 small scale operators. A third of a tonne of charcoal with a wholesale value of £200 can be produced from 2 tonnes of waste. It is projected (WRAP) that the industry could expand to manage as much as 3000 tonnes per year of hardwood waste.

6. Animal Bedding

Clean, untreated whitewood can be used to manufacture animal bedding. Easibed (www.equiworld.net/uk/ezine/1102/easibed.htm) based in Manchester won the "Best Reprocessing Initiative award" for this in 2002.



7. Pulping for Cardboard

Remade Scotland are currently investigating ways in which waste wood can be used as pulp for brown paper and corrugating material manufacture (www.remade.org.uk/new_site/Wood/wood_programme.htm#Activity1). The USA is more advanced in this respect. Clean material appears to be needed.

8. Wood-plastic composites

Wood-plastic composites (WPCs) are at an early stage of development in the UK (see www.tangram.co.uk/TI-WPC_Review.pdf) but are increasingly being used in the USA. They are produced from finely ground wood flour and a variety of polymers, including recycled polypropylene, polyethylene, and PVC. Virtually any wood waste stream can be used, including hardwood, softwood, plywood and newsprint. They are claimed to be suitable for window frames, furniture, doorframes and decorations.

Plastic Reclamation in St Helens, Merseyside, recently won the 2002 national recycling award for best recycled product for their new Knotwood wood-plastic composite which is able to utilise both high and low-density polyethylene, providing an end use for plastic bottles and bags as well as wood.

9. Wood waste as Biomass.

Conversion of wood waste for transport fuel such as ethanol is becoming common in the US but there are no operations occurring at present in the UK. The proposed 20p per litre cut in excise duty recently announced to take effect in January 2005 is probably too small and too distant to have much effect at stimulating UK production.

The conversion to ethanol, is a four stage process – the wood is pre-treated to expose the cellulose and hemicellulose components, these are then converted into sugars which are fermented to produce ethanol which is then recovered. Around 200 litres of ethanol can be produced from each tonne of wood waste. This is used as a fuel extender, added at between 5 to 10% concentration to petrol and diesel. No engine modifications are necessary and emissions are reduced by this oxygenated fuel. Virtually any type of waste can be used, including branches. If all the wood waste annually land-filled in the UK were converted to ethanol, this would produce *ca.* 0.5 million tonnes



of ethanol, sufficient to produce a 5% ethanol blend for half the UK's annual total petrol consumption of 24 million tonnes. Alternatively or in addition, conversion to methanol for use in bio-diesel manufacture from waste cooking oil (see WasteWISE report 2) would complete a virtuous process, since methanol is currently manufactured from petroleum. It may also be possible to blend ethanol with bio-diesel – Minnesota University has just begun to research the properties of this so-called EB diesel. The DTI clear skies scheme (www.clear-skies.org) may be able to provide funding for feasibility studies for the use of wood waste as biomass.



Appendix 3

Essex County Council Civic Amenity and Recycling Centres: Wood '01-'02

Site Name	Wood (Tonnes)	Total Waste (Tonnes)	Wood % Total
Mill Lane , EPPING	117.2	4016	2.918
Mountnessing, BRENTWOOD	197.21	7093	2.780
Waltham Abbey, EPPING	115.61	4608	2.509
S. Woodham Ferrers, CHELMSFORD	145.97	6114	2.387
Newlands, CASTLE POINT	190.86	8084	2.361
Pitsea, BASILDON	339.18	14442	2.349
Coxtie Green, BRENTWOOD	197.44	10088	1.957
Temple Bank, HARLOW	232.58	12706	1.830
Rayleigh, ROCHFORD	174.3	12269	1.421
Burnham, MALDON	68.82	5000	1.376
Luxborough Lane, EPPING	55.04	9082	0.606
Maldon, MALDON	0	7333	0
Rush Green, TENDRING	0	10962	0
Shrub End, COLCHESTER	0	16257	0
Drovers Way, CHELMSFORD	0	11758	0
Witham, BRAINTREE	0	6118	0
Saffron Walden, UTTLESFORD	0	5294	0
Shalford, BRAINTREE	0	5658	0
Martins Farm, TENDRING	0	5401	0
Kirby-le-Soken, TENDRING	0	4950	0
West Mersea, COLCHESTER	0	1529	0
Dovercourt, TENDRING	0	5186	0
Total	1834.21	173948	1.05



Appendix 4

Essex District Council Collections and Civic Amenity Sites '01-'02

DISTRICT COUNCIL	potential* total (tonnes)	total recycled (tonnes)	% recycled	not recycled (tonnes)	% not recycled	total waste (tonnes)
BRAINTREE	618	0	0	618	100	51463
TENDRING	567	0	0	567	100	47213
COLCHESTER	685	0	0	685	100	57092
EPPING	592	0	0	592	100	49335
UTTLESFORD	391	0	0	391	100	32578
BASILDON	894	0	0	894	100	74479
BRENTWOOD	278	0	0	278	100	23183
CASTLE POINT	418	0	0	418	100	34813
CHELMSFORD	864	0	0	864	100	71991
HARLOW	338	0	0	338	100	28196
MALDON	251	0	0	251	100	20938
ROCHFORD	390	0	0	390	100	32513
DISTRICT TOTAL (tonnes)	6286	0	0	6286	100	523794
CA TOTAL (tonnes)	39138	1838.00**	100**	37300**	95.30**	173948
District + CA TOTAL (tonnes)	45424	1838.00**	4.05**	43586**	95.95**	697744

*Estimated using WRAP data:

% Wood in Domestic waste = 1.20

% Wood in CA waste = 22.5

Av. % Recyc. Rate CA = 4.70

Av. % Recyc. Rate CA + District = 4.05

Assumes no collected waste recycled

** Assumes 100% of recorded CA waste is recycled

Similar analysis could be produced for Cambridgeshire and other counties



Appendix 5

Local Wood Recyclers

(Full UK listing available at www.letsrecycle.com)

Ashwell Recycling Co Ltd

Wick Place, Brentwood Road, Bulphan, Upminster
Essex RM14 3TL Tel: 01375 892576 Fax: 01375 891736

Brighton & Hove Wood Recycling Project

7/8 Regent Street, Brighton, Sussex BN1 1UL
Tel: 01273 570500 Fax: 01273 570600

A & J Bull Group of Companies

Benedict Wharf, Mitcham, Surrey
CR4 3BQ Tel: 0208 6463019 Fax: 0208 6406511

Cleanaway Ltd

David Nicholson, Senior Project Manager, Cleanaway Limited
Rainham Landfill, Coldharbour Lane off Ferry Lane
Rainham, Essex RM13 9DA
Tel: 01708 632200 Fax: 01708 524612

Dial-Skip Waste Management

Waste Treatment Plant, Blackpitts, Welsh Lane
Helmdon, Northants NN13 5QY
Tel: 01295-768000 Fax: 01295-768008

Firbank Recycling Limited

Blackburn Road, Houghton Regis, Bedfordshire, LU5 5BQ
Tel: 01582 475 500 Fax: 01582 664 117

Murtagh

16 Titan Court, Laporte, Luton, Bedfordshire, LU4 8EF
Tel: 01582 480830 Fax: 01582 482688

Shorts Services Limited

Station Works, Lyndhurst Road, Ascot, Berks SL5 9ED



Tel: 01344 620316
Fax: 01344 624572

TPM Services

Commercial, Industrial and Domestic Waste Solutions
Registered Waste Carrier TSE/387 012
39 Downland Drive, Southgate West, Crawley, Sussex RH11 8QZ
Tel/Fax: 01293 413 084 Direct dial: 07836 795 835
e-mail: palletmanuk@aol.com

Tree Fella PLC

Stewards Yard, Wakering Rd, Shoeburyness
Essex SS3 9TR Tel: 01702 216766 Fax: 01702 216765

UK Bulk Terminals Ltd

Focal House, Port of Tilbury, Tilbury, Essex RM18 7HL
Tel: 01375 843825 Fax: 01375 843186

Wood 'n' Things

Leeds Farm, Newborough Road, Peterborough, Cambridgeshire
PE4 7AA Tel: 01733 326 291 Fax: 01733 325 305

Wood Waste Services Ltd

Texmore Building, Colney Street Village, St. Albans, Herts AL2 2EN
Tel: 01923 855517 Fax: 01923 855534

Also at

North London Centre, The Railway Terminal, Brent Terrace
London NW2 1LF
Essex/East London Centre, Unit 2, Kerry Avenue, Purfleet Industrial Estate,
Purfleet, Essex RM15 4YE



Appendix 6

Estimate of Initial Furniture Recycling/Reuse Scheme Costs/Income.

(WasteWISE will assist local groups to develop more detailed business plans/analysis)

Activity	Debit (£/tonne)	Credit (£/tonne)
Collection vehicles and fuel	75	
Collection wages	156	
Scheme promotion	4	
Disposal of waste	2	
Other staff	234	
Gross cost	471	
Landfill saving/recycling credit		30
Sales revenue		468
Gross income		498
Net income	27	

Notes:

Analysis assumes 6000 items of furniture are collected (ca. 800 tonnes) with reuse/recycling rate of 32% (similar to Bulky Bob's, '02-'03). The figures are based on a per tonne basis on the remaining 256 tonnes using two vans but should be applicable to operations with half this turnover using a single van.

Collection Costs

Assumes two Ford Transit vans are leased at £300 each per month (www.castleleasing.co.uk), insured at £400 each per year and used for 30,000 miles each (10 miles per item, 12 items per day per van, 20 mpg diesel at 82p per litre). Figure reduces to £58 per tonne using bio-diesel



produced from waste cooking oil (see WasteWISE report 2). This would not only benefit the environment but release ca. £5,000 for other uses. Two drivers and two assistants, each earning £10,000 per year are used to calculate wage costs

Scheme Promotion

£1000 is allowed for cost of leaflets etc.

Waste Disposal

The cost of diesel for ca. 1500 trips to dispose of waste (68% or 544 tonnes) furniture is used.

Other Staff

Salaries for 6 other people employed for sorting/sales/refurbishment at £10,000 per year are included.

Landfill Saving/Recycling Credit

It may be possible to claim a recycling credit of ca. £30 per tonne. Further research and action is necessary to confirm this as local authorities are under no legal obligation to pay this. Credits are not normally paid for reuse, but Government is expected to review this and the counting of refuse in national waste targets.

Collector Gross income

This is calculated using Bulky Bob's figures for '02 -'03 which suggest that £120,000 income is generated from 256 tonnes of reused/recycled furniture (800 tonnes collected).

Net profit

The figure of £27 per tonne leaves a final surplus of ca. £7,000 which could be used towards the rent of premises etc.



This report has been compiled to the highest accuracy using the best available information, but prospective users should check details prior to setting up a new social enterprise and produce a detailed business plan. The WasteWISE team requests anyone using this analysis or other assistance to set up a new enterprise to acknowledge the role/contribution of WasteWISE and other partners e.g. councils, to such projects.

RESEARCHED AND WRITTEN BY: Andrew Stevens, JUNE 2003

Previous WasteWISE reports:

1. Expanding Plastic Bottle recycling in Essex and Cambridgeshire (Feb '03)
2. Waste Vegetable Oil Recycling for Bio-diesel Production in Essex and Cambridgeshire (March '03)

Planned reports for the next few months:

3. Rubber Products from Waste Tyres
4. Reuse Centre Concept Analysis

and subjects under consideration:

- Batteries
- Aluminium
- Computers and other WEEE