RESIDUES TO REVENUES 2005

Wood Management, Handling and Combustion Technologies to Improve On-site Energy Efficiencies

Melbourne, Australia, 17-18 October 2005

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Quantifying and Effectively Extracting Wastes from Industrial Landfills and the Urban Wastes Stream

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Abstract

Accurate data on the volume of waste wood currently going to landfill Australia-wide are difficult to ascertain. Whilst the Australian Waste Database (AWD) was created to provide data on waste generation, it does not categorise the composition of the waste streams. Specific data on wood waste are, therefore, difficult to elicit.

The volumes of wood waste being generated have been estimated at state level. State-based data have been generated via specific government-funded projects, compiled from landfill levies and from private consultancies. The most accurate data are from New South Wales and Victoria, which estimate 446,000 and 623,000 tonnes of waste wood respectively are sent to landfill each year. Based on some crude assumptions, the total volume of wood waste going to landfill in Australia each year is estimated to be more than 1.7 million tonnes.

The individual state agencies have made some progress in the development of wood waste networks; these facilitate the recycling of wood waste by providing easily accessible information about wood waste recycling companies. However, key issues such as transport cost, variability of supply and sorting technologies remain as hurdles to establishing competitive wood waste recycling businesses that can extract maximum value from this resource.

Introduction

To tackle Australia’s national research priorities, CSIRO has established a series of large research programs called Flagships. One of the Flagship programs has focused on extracting maximum value from Australia’s waste streams. As part of the “Water for a Healthy Country” Flagship, a survey of the volumes of wood waste ending up as landfill was undertaken. This paper is a summary of the findings from that report combined with more recent data which have become available since its completion.¹ This paper summarises results from various studies that have attempted to estimate the generated volume of waste wood on a state-by-state basis. Current and future incentives for diversion of wood waste from landfill as well as some of the issues preventing a more successful wood waste minimisation process are highlighted.

Australian Waste Database

The Australian Waste Database (AWD) was developed by the CRC for Waste Management and Pollution Control Ltd. for the Environmental Protection Group of Environment Australia, in order to provide “an overview of the waste management scenario of various regions of Australia.”  The AWD has provided Australia with a National Solid Waste and Hazardous Waste Classification System, a Guidance Manual for Solid Waste Composition Studies and data on waste generation and disposal in Australia.

Data on waste generation and disposal are created in the form of “Standard Reports” which are generated from the information supplied by state-based EPA offices and waste authorities. The breakdown of waste streams presented in these reports are in three categories: municipal waste, commercial and industrial waste (C&I) and building and demolition waste (B&D).

Unfortunately, there is no further breakdown of waste categories, so accurate estimates of the amount of waste wood disposed to landfill are difficult to ascertain. However, various state EPAs and waste authorities have focused some of their efforts on determining the composition of these waste streams, and valuable information about wood waste volumes can thus be gleaned from various reports.

New South Wales

There have been numerous reports in the past four years which have estimated the volume of wood waste generated in the Greater Sydney Region.3,4,5,6,7 The most recent estimate suggests that about 446,000 tonnes of wood waste is generated annually.8

The 2001 Russell report contains the most detailed breakdown of wood waste data yet commissioned by the NSW state government. Russell estimated that wood waste made up approximately 10% of the C&I waste stream (210,500 tonnes/year). She estimated that packaging and pallets made up about half of that waste stream (104,892 tonnes/year). She further estimated that if the C&I waste stream constituted 61% of total wood waste, then the total wood waste generated by the Greater Sydney region annually (in 2001) would be 345,081 tonnes.

Furthermore, Russell estimated that only 9% of the wood in the C&I waste stream was reused or recycled. This rate of recycling is extremely low when compared to other waste categories, such as glass and metals (Figure 1).

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Russell also investigated the source of wood waste generated by the C&I waste stream. She found that the major contributors were from three main Australian New Zealand Standard Industry Classification (ANZSIC) codes:

1. ANZSIC 231 – Log saw milling.
2. ANZSIC 232 – Wood product manufacturing (including kitchen joineries and cabinet makers).
3. ANZSIC 2921 and 2929 – Wooden furniture manufacturers.

Most of the wood waste was generated by industries in ANZSIC 232 and 292 codes (Figure 2).

The volumes of contaminated (with paint or preservative) waste wood are much more difficult to calculate. One estimate places the volume of contaminated wood waste at 4,756 tonnes per year for the C&I waste stream in the Greater Sydney Region.  

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Strategies to divert waste wood from landfill in the Sydney region were devised in 2003 by Resource NSW and released as “The NSW Waste Avoidance and Resource Recovery Strategy”. This document defined four broad targets in the following areas:

1. Preventing and avoiding waste. Hold levels of total waste to a constant level regardless of population and economic growth.
2. Increasing recovery and use of secondary resources. Increase levels of recovery and reuse of waste by 2014. Includes target recovery rates of commercial waste stream (63%) and construction waste stream (76%) by 2014.

Victoria

The acquisition of raw data on volumes of wood waste to landfill is the responsibility of EcoRecycle Victoria. EcoRecycle interprets data collected by the Victorian landfill levy, and have recently implemented a waste categorisation system at landfills in order to capture data on municipal, C&D and C&I waste.

Data from the 2000 report “Understanding the Waste Stream” estimated that a total of 516,124 tonnes of waste wood is disposed of each year in Victoria. This amounts to 12.3% of total landfilled waste by volume and is enough timber to fill the MCG 1.5 times. More recent data from the “Towards Zero Waste – Supporting Analysis to the Strategy and Plan” suggests that wood waste in the 2000/2001 period was even higher, at 623,000 tonnes.

Most of the waste wood comes from the C&I waste stream, which accounts for 325,000 tonnes, followed by the C&D waste stream (100,000 tonnes) and the municipal waste stream (90,000 tonnes).

Recent data from EcoRecycle Victoria indicate that about 153,000 tonnes of timber are diverted from landfill each year and recycled, mainly as landscaping mulch. The volumes of recycled waste wood have risen dramatically in recent years with the establishment of the Wood Waste Network, which provides a website listing of available wood recycling centres.

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throughout Victoria. This cooperation may account for the higher level of recycling in Victoria than is suggested in Figure 1 for the Greater Sydney Region.

Further recycling targets have been published by EcoRecycle Victoria as part of the “Towards Zero Waste” draft strategy. These targets include:

- Solid waste reduced by 1.5 million tonnes by 2013.
- All C&D waste processed for resource recovery prior to landfill by July 2006.
- All C&I waste in Melbourne processed for recovery prior to landfill by July 2009.
- All C&I waste in Provincial City Regions processed for recovery prior to landfill by July 2011.
- All household waste processed for resource recovery prior to landfill by July 2012.

**Queensland**

Wood waste data for Queensland are very limited, with most information on wood waste available from a Queensland EPA document, “Construction and Demolition Waste. Waste Management and Resource Use Opportunities”. Further detailed information is available in the “State of the Environment 2003” report which cites the results of a statewide survey of waste management where solid waste to landfill has fallen 13% from 4,428,800 tonnes (1996-1997) to 3,866,278 tonnes (2001-2002). The total amount of solid waste generated for 2001-2002, including the recycled component, was 4,859,100 tonnes. If wood waste constitutes approximately 5.5% of the total waste generated on a weight basis (which is the average from statistics obtained from Victoria and NSW combined), then a calculated estimate is 267,000 tonnes.

Data on waste wood recycling in Queensland are even more elusive. The only information available on waste wood diversion from landfill is contained in data for recycling of total C&D and C&I waste streams, of which 330,000 tonnes of C&D waste and 20,700 tonnes of C&I waste were recycled in 2001-2002.

**South Australia**

Data from a South Australia EPA report of landfills suggests that in 2001-2002 1,115,000 tonnes of solid waste were sent to landfill in metropolitan Adelaide, with a further 217,000 tonnes sent to landfill from non-metropolitan regions. More recent data from 2004 suggest that the volume of waste generated in South Australia is closer to 3,153,000 tonnes. Further differentiation of the landfill data is difficult. However, a 1998 audit found that 53% of
landfill waste was generated from the C&D waste stream. Applying the average composition rate of 5.5% to the total volume of waste generated in South Australia gives an estimated 173,000 tonnes of wood waste per annum.

The volumes of contaminated waste wood entering the waste stream in South Australia are also unknown. However, volumes of CCA and creosote treated timber produced in SA in 1999 amounted to 250,000 m$^3$, of which 70% was sold in SA. Given that wineries are a major user of treated timbers in SA, it is reasonable to expect that a large volume of that treated timber each year would end up in landfill at the end of its service life.

Tasmania

The gathering of raw data on landfill volumes is the responsibility of the Southern Waste Strategy Authority (SWSA) in Tasmania. Estimates indicate that in 1999/2000 over 150,000 tonnes of waste was disposed of in Southern Tasmania. This estimate is based on data from Victorian reports.

Recent communications suggest total waste generated in Tasmania is close to 360,000 tonnes. Applying the average composition rate of 5.5% results in a calculated estimate of about 20,000 tonnes of wood waste.

Furniture and timber waste was estimated to make up 6% of the municipal waste stream.

Western Australia

Landfill data are compiled by the WA Waste Management Board, which has recently implemented a more accurate and effective classification system based on “The Strategic Direction for Waste Management in Western Australia” 2003 report.

Total waste to landfill in 2002 exceeded 2.5 million tonnes, of which C&D waste constituted over 50% of the total. The organic waste stream is a higher priority waste source in WA. In 1996, approximately 1.2 million tonnes of organic waste was produced, of which 18% was wood derived from land clearing and timber processing.

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22 South Australia EPA, “South Australia Landfill Audit – 2000”.
27 Western Australia Department of Environment and Waste Management Board. Strategic Direction for Waste Management in Western Australia. 2003.
Total waste generation for Western Australia is approximately 2,675,055 tonnes. When the average wood composition rate of 5.5% is applied, wood waste generation is estimated at 147,000 tonnes.

An estimated $10 million of materials are salvaged from construction and demolition sites in Perth each year, of which a significant proportion would be timber based materials.29

**Australian Capital Territory**

Total waste generated in the Australian Capital Territory is estimated as 708,669 tonnes.30,31 Using the 5.5% calculator, approximately 39,000 tonnes of wood waste is generated annually.

**Northern Territory**

No data are available on waste generation in the Northern Territory. If a population-based calculation is used based on two thirds the ACT estimate (198,000 NT and 301,000 ACT) then wood waste generated is calculated at approximately 26,000 tonnes.

**Landfill Diversion**

Some of the most critical barriers to establishing a viable wood recycling industry are the costs associated with the raw material coupled with the variability of the waste wood resource. A significant contributor to the cost of the waste wood resource is the cost of transportation, which includes many variables such as:

- type and size of transport
- the form in which the wood is transported (random lengths or chipped)
- transport distance

The issue of transport distance is exacerbated in Australia by the larger potential wood waste resource users (such as composite manufacturers or energy producers) usually being located in regional Australia. These are often a considerable distance from the wood waste resource (centred in the capital cities). The additional costs associated with this transport can eliminate any cost advantages associated with using waste wood instead of virgin resources.

Variability of supply is also an issue with utilising the waste wood resource. This could be addressed by establishing a chain of custody in the wood waste network. This would ensure that the waste wood was sourced from reputable dealers who can guarantee the quality of their supply because it comes from known supply chains. The most difficult supply route to work with is direct diversion from landfill, where variability and contamination of the waste wood

resource is at its highest. However, this hurdle can be overcome by investing in sorting and scanning technology to remove contaminants.

**Summary**

The collection of waste data in Australia is currently the responsibility of state regulatory agencies, such as the state EPAs. The availability of data on wood waste is typically dependent upon specific projects focused on wood waste. The Australian Waste Database provides some general information, but mainly under the broad categories of municipal, C&I and C&D waste streams.

Based on the data collected from the various state-based agencies, it is estimated that around 1.7 million tonnes of wood is going into landfill each year in Australia. This represents a significant potential resource that is not currently being utilised.

The individual state agencies have made some progress in the development of wood waste networks that facilitate the recycling of wood waste by providing easily accessed information about wood waste recycling companies. However, key issues such as transport cost, variability of supply and sorting technologies remain as barriers to establishing competitive wood waste recycling businesses that can extract maximum value from this resource.

<table>
<thead>
<tr>
<th>State</th>
<th>Mass of Wood Waste going to Landfill (tonnes)</th>
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<tbody>
<tr>
<td>NSW</td>
<td>446,000</td>
</tr>
<tr>
<td>Victoria</td>
<td>623,000</td>
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<tr>
<td>Queensland</td>
<td>267,000*</td>
</tr>
<tr>
<td>South Australia</td>
<td>173,000*</td>
</tr>
<tr>
<td>Tasmania</td>
<td>20,000*</td>
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<tr>
<td>Western Australia</td>
<td>147,000*</td>
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<tr>
<td>Australian Capital Territory</td>
<td>39,000*</td>
</tr>
<tr>
<td>Northern Territory</td>
<td>26,000*</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>1,741,000</strong></td>
</tr>
</tbody>
</table>

* estimated on the basis of 5.5% of total waste generated (recycled plus landfilled)

The utilisation of waste wood for the manufacture of value-added timber products is currently an insignificant component of the larger wood products industry in Australia, and will remain so until viable recycling and transport networks are established. As landfill fees increase, the cost of virgin materials increases and further government legislation requires increased levels of waste diversion from landfill, Australia is likely to follow the international trend of converting the wood waste stream into a useful resource.

The authors would like to acknowledge the generous financial contribution by the Forest and Wood Products Research and Development Corporation, which enabled the research and the report upon which this information is based.