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ENHANCED MANAGEMENT OF GREENHOUSE-SIGNIFICANT SOLID WASTE – COMMERCIAL AND INDUSTRIAL AND BUILDING AND DEMOLITION SECTORS

The waste management sector generates 4% of Australia's greenhouse gas (GHG) emissions, including 13% of total methane emissions, mostly from disposal of waste to landfill (Australian Greenhouse Office 1999). Human contributions to the greenhouse effect have the potential to damage ecosystems and economies. Although the extent to which climate change will occur due to human activities is uncertain, effects are likely to be intensified by continued increases in emissions. Australia is committed to reducing GHG emissions from the waste sector through a range of measures, including waste minimisation, reuse and the recovery of gases for energy production.

EPA Victoria (EPA) commissioned a study to examine options for reducing GHG emissions from the management of solid waste generated by the commercial and industrial (C&I) and building and demolition (B&D) sectors. The report, *Enhanced Management of Greenhouse-Significant Solid Waste* [Meinhardt (Vic) 2000], is now available on EPA's website [www.epa.vic.gov.au]. This information bulletin presents the key findings of the report.

The options for enhanced management of greenhouse-significant solid waste have been developed through a study conducted with the participation of the Barwon Regional Waste Management Group (BRWMG). The Barwon Region has a mix of land uses and businesses that is representative of both the metropolitan and non-metropolitan areas of Victoria.

This study has considered options for the management of greenhouse significant solid wastes in terms of their:

- reduction of net GHG emissions;
- cost-effectiveness; and
- wider context of ecological sustainable development and waste minimisation.

Priority was given to the options that provided the maximum outcome across all criteria. As with other waste minimisation initiatives, reducing GHG emissions can also lead to efficiency and productivity gains. The diversion of organic waste from landfill is the most effective way of preventing GHG emissions from solid waste.

The report and the user model (named the 'Greenhouse Wizard') are intended for use by regional, municipal and private waste managers to identify how they might work together to take advantage of opportunities to reduce the quantities of landfilled organic waste. The strategies developed for enhanced management of greenhouse-significant wastes are applicable to other waste management regions.

Components of the study

The study involved the following stages:

- Quantification of C&I and B&D wastes through modelling using Australian Bureau of Statistics, secondary waste composition data and data obtained from a written survey of industries.
- Estimation of the relative significance of waste types, sectors and municipalities within the Barwon Region on total GHG emissions from landfill.
- Development of an MS Excel user model that will allow municipality-by-municipality and region-by-region assessment of GHG from C&I and B&D wastes.
- Estimation of the relative significance of waste types, sources and waste management regions on a statewide basis.

- Identification and assessment of options for reducing the GHG emissions from C&I and B&D organic waste landfilled in the Barwon Region.

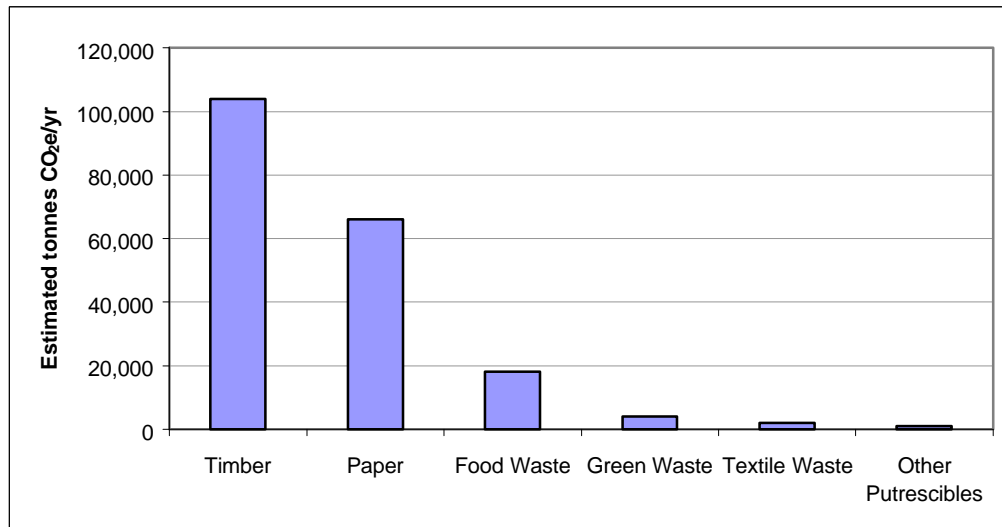
Summary of findings

The study found that, within the Barwon Region and on a statewide basis, the most significant contributors to GHG emissions from landfilled C&I and B&D wastes are:

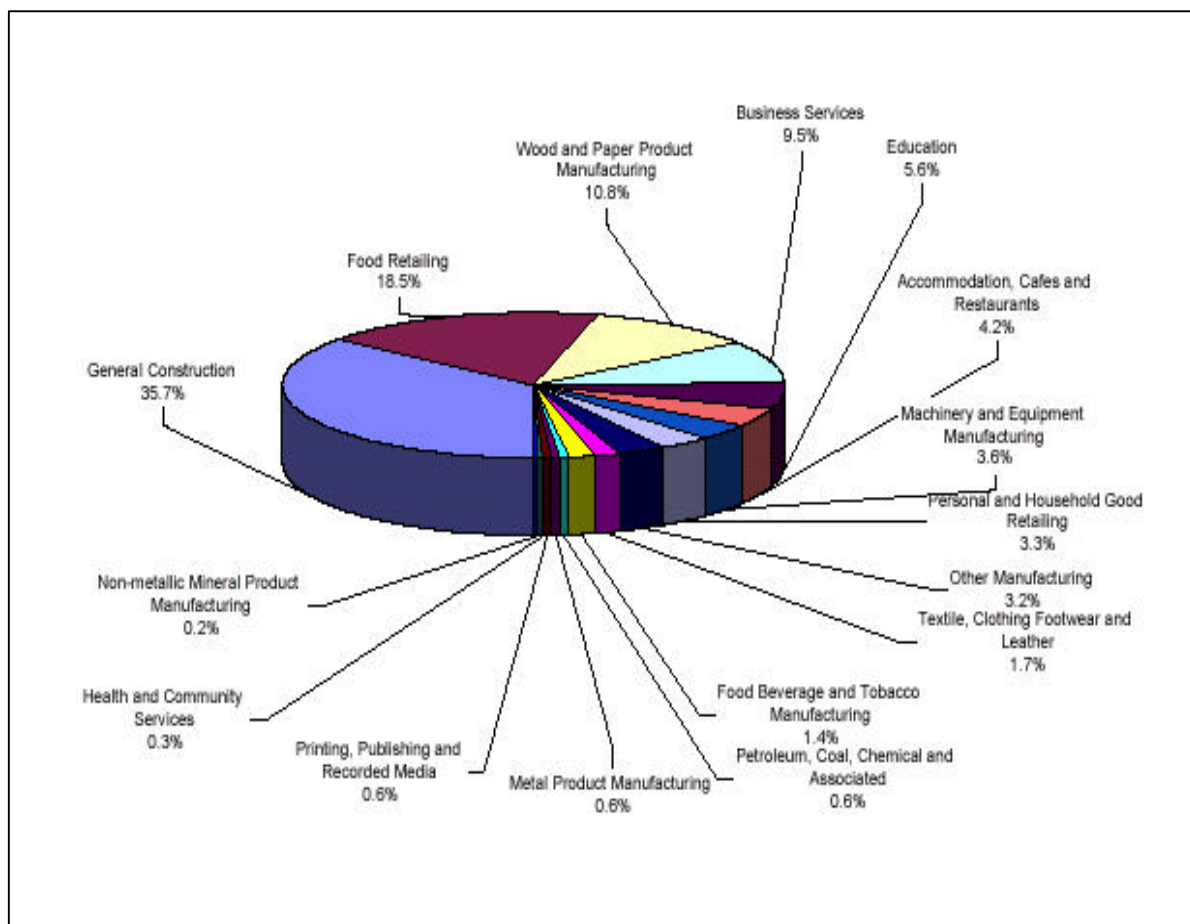
- Timber from the B&D sector.
- Cardboard and food waste from the food retailing sector.
- Timber from the wood product manufacturing sector.
- Paper and cardboard from the business and administrative services (offices) sector.

The relative contributions of material types and sectors in the Barwon Region are shown in figures 1 and 2. These figures assume that virtually all of the available organic carbon decomposes within the landfill. Further research is required to determine the proportions of organic carbon in materials that decompose in mixed landfills.

Figure 1: Estimated total greenhouse emissions by waste type per annum from organic wastes sent to landfill in the Barwon Region (tonnes CO₂e/yr)*



**Figure 2
Region (by CO₂e)***



* Assuming that all available organic carbon is converted to landfill gas.

The relative costs of reducing GHG emissions from C&I and B&D waste will largely be determined by the:

- potential cost savings and productivity gains that can be achieved through waste reduction;
- relative costs of processing wastes to produce marketable products; and
- availability of markets for products and energy produced from waste.

Currently the costs of some waste minimisation practices (particularly reuse, recycling and composting) are relatively higher than landfill costs in the Barwon Region.

On a statewide basis, the Barwon Region is estimated to contribute 4% of Victoria's GHG from landfilled C&I and B&D wastes. As might be expected, the greatest concentrations of organic wastes were found to be, in descending order, in the:

- South Eastern Metropolitan Region (25%)
- Western Metropolitan Region (22%)
- Northern and Eastern Metropolitan Regions (14% each).

The metropolitan Melbourne area therefore contributes about 75% of emissions from landfilled C&I and B&D wastes.

The Barwon and Gippsland Regions each contribute approximately 4%, while the Calder, Goulburn Valley, Highlands, North East, South Western, and Mornington Peninsula each contribute about 2% of State emissions from landfilled C&I/B&D wastes. Landfilled C&I/B&D wastes from the remaining four Regions (Central Murray, Grampians, Mildura, and Desert Fringe) collectively contribute less than 3% of total State emissions from these sources.

Priorities and opportunities for enhanced management of greenhouse-significant solid waste in the C&I and B&D sectors

Priorities for enhanced management of greenhouse-significant solid wastes include:

- Emphasis on promoting opportunities and advantages of waste reduction over other waste minimisation measures such as recycling and energy recovery.
- Emphasis on minimising the amount of organic waste going to landfill. Even landfills with gas capture and energy recovery systems are likely to be net contributors to GHG emissions.
- Establishment of timber waste drop-off and processing facilities to increase timber waste diversion from landfill for reuse, particleboard manufacture, mulching, composting, use in bioremediation and the production of refuse-derived fuels.
- Continued promotion of cardboard and paper recycling.
- Working with the textile industry to establish drop-off facilities for textile recycling.
- Promotion of on-site management of compostable wastes where there is sufficient space to manage them through composting/vermiculture.

On the basis of modelling conducted during the study, the greatest net reductions in GHG from solid organic wastes can be achieved by diverting this waste from landfill, unless very high levels of landfill gas (LFG) capture are achieved. Historically, such high levels of gas recovery are not achieved. The greatest net reductions in GHG emissions are likely to be achieved through waste reduction/avoidance and energy recovery. These management approaches are also likely to be the most cost-effective management options. Strategies, including energy from waste technologies should be consistent with community expectations and the wider social, economic and environmental objectives of sustainable development.

The most immediate opportunities for enhanced management of greenhouse significant solid wastes from the C&I and B&D sectors are:

- waste reduction of cardboard, paper, timber and manufactured food wastes;

- recovery and processing of timber waste from mulching for use as landscaping mulches and compost/bioremediation feedstock;
- recycling of cardboard and paper and textiles; and
- composting and soil products manufacture.

Future actions by Regional Waste Management Groups

EPA encourages all RWMGs and their member councils to develop management strategies for greenhouse-significant C&I and B&D (and domestic) wastes that are consistent with the objectives of their regional waste management and business plans, and which involve C&I and B&D sector representatives.

Regional Waste Management Groups have a role in:

- promoting management of waste through application of the waste hierarchy, focusing on priority areas listed in this document;
- promoting the cost benefits of waste reduction to C&I and B&D sectors;
- promoting source separation of materials to reduce costs to reprocessors;
- assisting with the development of processing facilities that can cost effectively reprocess waste; and
- assisting with the development of markets for products derived from waste.

Further information

EPA has produced a number of resources which relate to this topic. They provide information on best practice management of greenhouse gas emissions from landfills and wastewater treatment facilities for waste minimisation, recycling, reuse and energy recovery. These resources are relevant to the waste management sector including organisations that recycle, mulch, compost, recover methane from, recover energy from, incinerate, treat, or dispose of organic waste. The resources are also relevant to other types of waste operators and people who generate

organic waste. EPA encourages these organisations to utilise these resources to help reduce their environmental impact. The resources include:

- *Environmental Guidelines for Reducing Greenhouse Gas Emissions from Landfills and Wastewater Treatment Facilities* (EPA Publication 722) provides information on the options available to operators including waste minimisation, reuse, recycling and energy recovery. The guideline will assist waste management managers and facility operators to:
 - identify, monitor and manage greenhouse emissions;
 - use and maintain appropriate technologies and systems to reduce greenhouse emissions; and
 - derive economic benefit from better management and use of methane, and comply with regulatory requirements.

The guidelines will help waste managers to integrate greenhouse gas reduction and management into their day-to-day management activities and assess performance, set targets, implement greenhouse gas reduction measures and monitor progress.

- *Methane Generation from Victorian Landfills* estimates the methane generation of Victorian landfills accepting municipal wastes. The report presents the results of a study that developed a database of the physical characteristics for 521 Victorian landfills, and utilising a greenhouse gas emissions model, estimates each landfill's generation for the year 2000. The report can help target emission reduction programs as it provides preliminary information as to the size of landfills which offer the greatest potential for cost effective renewable energy generation from the capture and use of methane.

The above reports and information bulletins as well as the report, *Enhanced Management of Greenhouse-Significant Solid Waste*, and the

Greenhouse Wizard are available from EPA's website [www.epa.vic.gov.au]. Copies of the information bulletins are available from EPA's Information Centre, phone 03 9695 2722.



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