

A case study of waste management practices of a large Australian University

Waste minimisation strategies at Western Australian Universities have previously been discussed in WM&E (vol. 5(4)). That article concentrated primarily on paper recycling in 1991. This article describes changes that have occurred since then and in particular reports on the results of a 3 year waste audit and recycling study conducted at Edith Cowan University in Perth (ECU).

Since 1991, there have been significant positive changes in attitude towards waste minimisation, recycling and general environmental concerns, with most of the WA universities responding by creating Environmental committees and/or appointing environmental officers. The major impetus for this change has been pressure from concerned staff and students. Indeed in 1993, the Edith Cowan University (ECU) Student Guild commissioned a small scale waste audit of the University. This audit has been continued each year by utilizing student labour from the Environmental Management degree course.

ECU has four suburban campuses and a small country campus (Bunbury). The main focus of the research has been the Joondalup campus, for which a detailed Environmental Management Plan is currently being prepared.

The university produces a wide variety of wastes: paper products (eg. high and low quality paper, cardboard, waxboard and liquid paperboard), aluminium (cans and foil), glass (drink bottles), plastics (food wraps, bags, drink bottles, food containers, overhead transparencies), organic wastes (food scraps, cooking fats, garden wastes), steel (tins), hazardous wastes (sharps etc), building wastes (rubble, packaging etc) and others. Building and hazardous waste were not considered in the audit.

There are over 14,000 full-time equivalent staff and students at the University. At Joondalup, each student disposes of about 1.5 l and 0.2 kg of waste on campus per week. There has been a general decline in the amount of waste disposed of per person between 1993 and 1995. Approximately 37% of the waste (by volume) is easily recyclable (includes high quality paper, cardboard, aluminium, glass and organic matter - refer to **Figures 1 and 2**). A further 62% can be described as

potentially recyclable as it can only be recycled if suitable markets and sufficient quantity/quality is present (this group comprises mainly of low quality paper products (32%) and plastic products (28%)). Only 2% was found to be largely non-recyclable. Therefore considerable scope exists for both waste minimisation and recycling programs to be enhanced at the University.

At present, the campuses have about 5100 m³ of waste collected per year, at an estimated cost of about \$27,000 for 1996. Given the fact that ECU is multi-campus, this compares very favourably with the other WA Universities, where data are available. Since 1991/92 ECU has adopted a simple two stream waste system which separates out high quality paper for recycling from the general waste. In 1992-93 about 43 tonnes of high quality paper was collected by a local recycler in a closed loop system where the recycler supplied the University with recycled toilet paper in return for the paper. In 1994, the loop was broken with toilet paper coming from another source. ECU is currently trialling the APM 'Paper Chase' system at Joondalup, where virtually any type of paper is accepted for conversion into packaging. The return per tonne is low at only about \$20, however convenience and the reductions in total waste are likely to result in this system being adopted across the whole university. The closed loop model was abandoned because of problems with the local recycler. This should serve as a lesson to any small recycling company, that large institutions while often favouring local companies must be given a reliable service. The recycling system is managed by the Facilities and Services Division, with cleaners consolidating paper from offices into bins on each floor and then further consolidating the paper into larger bins for collection by the recycler. Much the same scheme is used at both Murdoch and Curtin Universities. Curtin has in trial areas the most sophisticated system consisting of colour coded and well labelled bins.

The paper recycling rate at Joondalup has improved from 27% to 41% (based on weight) between 1993 and 1995 (see **Table 1**). The increase can be largely attributed to streamlining of the office paper collection system over the years and a greater commitment to recycling from staff and students. Interestingly, our studies have shown that staff involved in printing and copying activities are the best paper recyclers followed by academic staff, with students being the worst recyclers and offenders in terms of contamination of the paper waste. A better targeted education and publicity campaign may be required to improve recycling by students.

ECU used approximately 130 tonnes of photocopy and computing paper, and 30 tonnes of other paper (forms, fax paper etc) in 1995, which equates to approximately 2500 A4 sheets per student. This amount is high by any standard but compares very favourably with Curtin University (similar in size to ECU) which in 1991 used 3000 A4 sheets per student. The difference may be because duplex copying is normal at ECU whilst uncommon at Curtin. Reports from the late 80's and early 90's indicated large annual increases in paper usage per staff and student at many universities (increased work loads and demand for hard copy(s) of computer generated information were often blamed for this trend). At ECU paper usage appears to have remained relatively constant or even declined in the period 1993 to 1995, although changes in paper ordering procedures make this hard to verify. At ECU at least, the increasing use of Email and the posting of administrative manuals and research documentation on a World-wide web site (<http://www.cowan.edu.au/>) may have helped keep paper usage down.

At ECU, virtually all paper used is white virgin paper. The only recycled paper used, is sold in the bookshop as exercise books and lecture pads, and some is used in Departmental photocopies. The main objections to using recycled paper are that it produces too much dust for the University's high speed copiers, it is not suitable for archiving and is more expensive than virgin paper. The problems of dust and suitability for archiving are largely based on the first recycled papers available and current recycled copy paper should not cause any problems (depends slightly on the make of copier used). Certainly in low speed copiers, there can be little justification for not using recycled paper. Indeed at Murdoch, about 35% of the paper used is recycled. The argument that recycled paper is more expensive than virgin paper is also largely outdated as many wholesalers are offering the papers at or close to the same cost when purchased in bulk. One of the recommendations arising from our study is that all printed stationary is printed on recycled paper, all low speed copiers offer the option of both recycled and virgin paper and the feasibility of using recycled paper in the high speed copiers be re-examined. Another recommendation is that all future photocopiers either brought or leased by ECU are fully compatible with recycled paper.

Despite removal of paper in the two stream system, paper products still account for the majority (41% by volume) of the mixed waste (**Figure 2**). Most (over 80%) of this paper is low quality (hand towels, liquid paperboard, newspaper and glossy magazines), the remainder is high quality paper that should really be in the paper recycling bins. Based on these figures, the current recycling rate for high quality

paper is relatively high at 80% (based on volume). Although a market exists for liquid paperboard, recyclers want it clean. This is hard to achieve in a cafeteria situation. This fact and the low volume produced mean that it is unlikely to be recycled in the near future. Adoption of the 'Paper Chase' system is likely to reduce the overall volume of mixed waste produced by removing a proportion of the low quality paper. Unfortunately in this system the potential to directly utilise high quality paper (to produce copy paper for instance) is reduced as it is largely mixed with paper of lower quality. The fitting of electric hand driers to all bathrooms is recommended to reduce the unnecessary provision and waste of hand towels.

At Joondalup, grounds staff sometimes collect cans and bottles out of external bins for recycling. The cafeteria staff also occasionally collect bottles and cans left on tables for recycling. This system is largely ad hoc in nature and yields a recycling rate (based on volume) of 19 to 30% for aluminium cans and 23 to 50% for glass, with better figures achieved in 1995 compared to 1993 (**Table 1**). The rate for aluminium is well below the Australian average of 63%. All the WA. universities are in the process of organising schemes for the collection of cans and bottles.

Much of the kitchen waste at Joondalup is disposed of to landfill, although fat is sold to a recycler. The remainder and the vast majority of garden waste is composted on a compost heap located on campus. The use of more kitchen waste in composting either in closed heaps (necessary for health reasons) or in a worm farm would reduce waste to landfill by 30-40%.

Plastics contributed 28 to 31% to the total volume of waste produced per week (**Figure 2**), with only 21% of it being easily recyclable PET or HPDE. They mainly come from the cafeteria, including food packaging, drink containers, utensils, cups and the large number of bags used to bag the rubbish. There has been a slight decrease in the percentage of the volume of waste contributed to by plastics between 1993 and 1995, which can probably be related to the reduced use of wraps and containers within the cafeteria in 1995. The volumes of each type of plastic produced is starting to make it economically viable to collect plastic for recycling. Interestingly, while the use of reusable crockery and utensils was recommended, too many undamaged crockery items were collected from the waste. Procedures need to be instigated to reduce this as it affects the viability of reusable items.

One important area frequently overlooked in recycling schemes is that of contamination. Contamination reduces the value of the recyclable to the recycler.

This is a particularly important issue at present because the economic returns on recyclable products often makes for a relatively slim profit margin for recyclers. The provision of recyclables with low levels of contamination will help ensure collection and reduce rejection to landfill of contaminated waste. A recycling and waste minimisation strategy for the University would be comparatively easy to set up, but to ensure its success it would need to be administered by the university administration rather than student bodies as students come and go. However another key to a successful scheme is education and the universities would do well to utilise the enthusiasm and dedication of student bodies, in this education process. In many Universities in Australia students have largely led the push for recycling and waste minimisation it is now up to the University administrations to turn these schemes into reality.

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Table 1: Estimated recycling rates for selected waste categories at ECU Joondalup campus, 1993 - 1995. (NF = No figures available)

	Recycling rate (by weight)			Recycling rate (by volume)		
	1993	1994	1995	1993	1994	1995
High quality paper	44%	63%	67%	47%	68%	80%
Low quality paper	7%	15%	18%	4%	12%	19%
Cardboard	~25%	NF	NF	~25%	NF	NF
Total paper products	27%	33%	41%	20%	30%	45%
Glass	27%	NF	NF	23%	NF	~50%
Aluminium cans	17%	NF	NF	19%	NF	~30%
Kitchen organic waste	0%	NF	NF	0%	NF	36%
Garden waste	~90%	~90%	~90%	90%	90%	90%
Plastics	0%	0%	0%	0%	0%	0%
Steel and Tin	0%	0%	0%	0%	0%	0%
TOTAL WASTE	~12%	NF	NF	~12%	NF	~21%

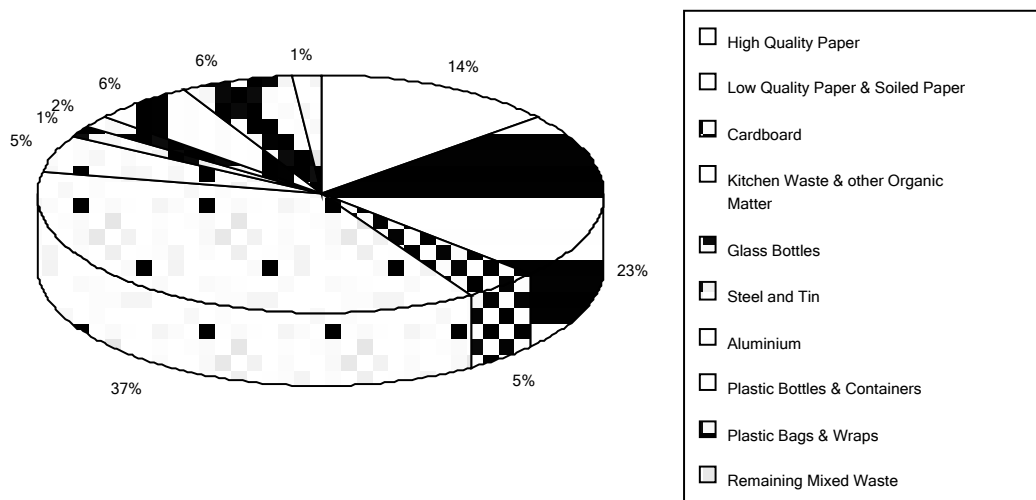


Figure 1: Percentage composition of disposed waste by weight, ECU, Joondalup Campus 1993

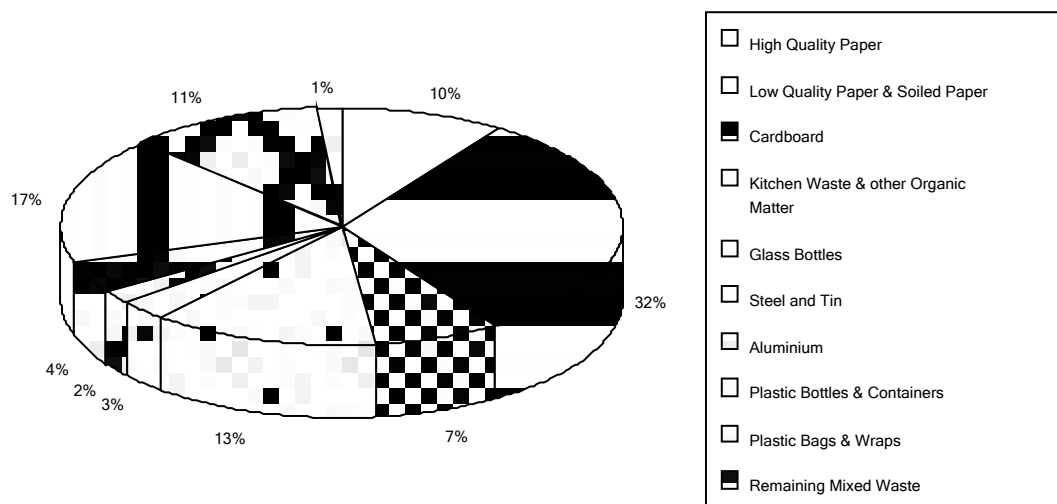


Figure 2: Percentage composition of disposed waste by volume, ECU, Joondalup Campus in 1993.