



John Shepherd

# Closing the loop?

## A review of recycling in Australia

How are we faring as a nation when it comes to domestic and industrial recycling? What are its real environmental and economic impacts and are these measured? More importantly, should we really be doing more of it, and do recent technological advances mean that ambitious and much-vaunted Zero Waste targets can actually be achieved? **Steve Davidson** reports.

For forward-looking proponents, recycling works – more than we’ve realised – and it’s time we acknowledged the huge inefficiency of our current, traditional waste practices. Among industry innovators there is a growing awakening that fortunes can be made by regarding waste as a valuable, if unglamorous, resource rather than something to be burnt or buried.

There are, however, increasing calls for more action by state and local governments to give alternative waste technologies a level playing field as they commercially compete with traditional landfill operations. At least one Australian company is quite a way ahead in thinking that there is profit in perceiving all waste materials not as a disposal problem, but as

a rich and varied ‘ore lode’... and its ‘waste mining’ business is off to a flying start.

Dr John White, Managing Director of Australian company, Global Renewables, a subsidiary of GRD Limited, is an enthusiastic proponent of recycling and, in particular, hi-tech resource recovery and the contribution this makes to sustainability through energy conservation and reduced greenhouse gas emissions. Through its state-of-the-art UR-3R operation at Eastern Creek in Sydney, Global Renewables is heavily invested and committed in this belief (see page 29).

‘When we analyse the embodied energy in the various materials that make up waste – which can be conserved through appropriate technology, versus traditional disposal practices, such as landfilling or

incineration – the need for a new approach is all too obvious,’ says White.

‘I consider this to be at the heart of the sustainability issue,’ he says. ‘In our consumer economy, more than 90% of GDP goes to form waste and about 80% of all saleable products end up as waste, on average, within just six months. These are staggering figures ... and governments, local councils and profit-motivated enterprises would be unwise to ignore them.’

### Recycling rated

Fortunately, Australians are generally enthusiastic about recycling. We have a long and proud tradition of it says Mr Jon Dee, Managing Director of the Planet Ark organisation. An Australian paper mill was using recycled material way back in 1815; waste paper collections from households and factories began in Melbourne in the 1920s; and, in 1975, Canterbury Council was the first Australian municipality to start separating some of its household waste.

Steel giant BHP was recycling steel back in 1915, well before it became an environmental issue – it simply made economic sense. Recycling scrap steel requires much less energy than use of raw materials.

However, as a nation we have come a long way since those early tentative steps,



# Progress

Landfilling of putrescible waste (organic matter that rots) is being progressively banned across Europe between now and 2010. In the United Kingdom, authorities that landfill more biodegradable waste than they have allowances for will face fines of £200 per tonne.

Here in Australia, state governments are also getting serious, if somewhat belatedly. New South Wales, Victoria and the ACT have set zero-waste targets and the states are looking for alternative ways to deal with waste and beginning to implement 'resource recovery' strategies rather than following the traditional 'bury or burn' mentality. By 2004, about nine alternative waste facilities (such as mechanical-biological treatment systems) were operating around Australia, mostly in NSW and WA, with a few others proposed or under construction. Still, there is a long way to go with most waste still ending up in landfills, despite increasing disposal charges.

Mr Peter Eggleston, Director, Corporate Affairs at GRD Limited, believes governments are not being aggressive enough. 'Opportunities are going begging ... to develop more hi-tech infrastructure, create new industries, boost employment and contribute to GDP,' he says.

'We have zero-waste targets from governments, but these have not been backed up with strategies or mandates to make it happen – such as bans on landfilling or other disincentives that would

encourage recycling,' says Eggleston.

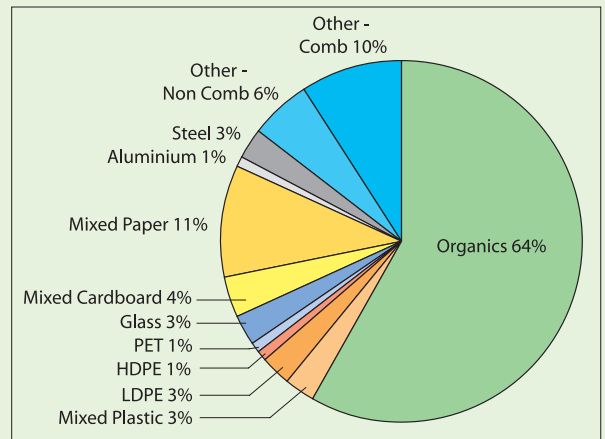
### Landfills – at an unfair advantage?

One problem is that landfill, immediately appears a lot cheaper than alternative resource-recovery technologies. This infuriates resource recovery companies competing against landfills.

Ms Sam Hawthorne, General Counsel for Global Renewables, in a pitch for the big, leading-edge Urban Resource – Reduction, Recovery and Recycling (UR-3R) Facilities, such as the one now operating in NSW, says current government policies and regulations discriminate against alternative waste technologies and are arguably anti-competitive in the way they favour landfill operations.

'Landfill waste disposal rates are only 'cheap' if the environmental, health and resource security issues – including inter-generational equity – are disregarded,' says Hawthorne. 'And current regulations for the control of landfilling are comparatively lenient on landfill operators.'

Prices charged at landfills do not take into account the full cost of operating a landfill, including site remediation and after care, and this is acting as a barrier to



Typical composition of residual waste going to the Global Renewables facility at Eastern Creek, NSW. Global Renewables

the development of economically viable alternatives. Global Renewables argues that one reason for the artificially low cost of landfilling is the lower environmental standards that apply to these operations compared with the stringent regulations for new alternative waste management technologies. This disparity creates a significant barrier to the uptake of sustainable technologies.

Illustrating this, an analysis of waste options by Nolan-ITU, for Global Renewables, concluded that, in Victoria, where a second UR-3R Facility is proposed, the net social, environmental and economic benefit of waste processing in the facility, as compared to landfilling the waste, is about \$93 per household per year. However, if the full cost of landfill is not taken into account, it gives the misleading impression that the alternative technology costs \$30 more per household. Another Nolan-ITU study estimates that the environmental cost of best-practice landfilling of putrescible waste in our major cities is as high as \$640 million a year, easily exceeding the cost of salinity to Australia at \$243 million<sup>1</sup>.

'Properly accounted, landfilling is not the cheapest option,' says Hawthorne. 'Continued adherence to landfilling means that the community is not receiving value for money and, adding insult to injury, it has to endure the longer term environmental degradation associated with the practice. It is clearly the role of government to intervene in cases of market failure such as this.'

### Recycling rewards

The benefits of recycling are not insignificant. They include the resource and energy savings that accrue from re-using resources like glass or metals rather than processing



Australians have the world's second-highest rate of domestic food disposal, behind the USA. Waste mining processes such as the UR-3R facility convert organic matter to valuable compost which is returning carbon, exported to urban areas in produce, to farmland. Nathan Watkins

raw materials; the reductions in greenhouse gases that such energy savings mean; and the re-use of the nutrients, carbon and water in organic wastes. Experts in the field talk about ‘closing material loops’ – whether carbon, metal, glass, plastics, concrete or organics – through re-use. This complements ‘dematerialisation’ which is a reduction in the amount of energy and materials required for production of goods and provision of services – another challenge for society.

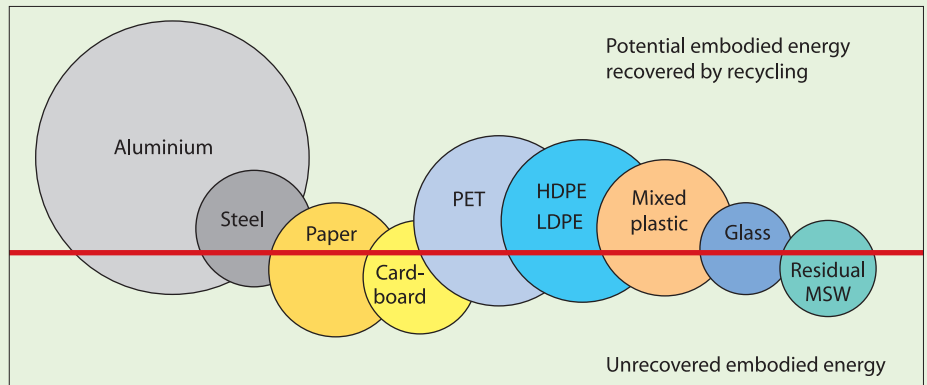
The need for recycling and dematerialisation is highlighted by estimates of our per capita material and energy requirements, generated by ecological footprint analysis. One such analysis by Yencken and Wilkinson in 2000<sup>2</sup>, indicated that, in 1997, the ecological footprint of the global population was at least 30% larger than the Earth’s biological production capacity and the authors predicted this could rise to 130% by 2030.

Of the materials we currently use, metals have the greatest potential for recycling according to Mr Terry Norgate and Dr John Rankin of CSIRO Minerals. ‘They are non-biodegradable and their elemental nature means they have an essentially unlimited lifespan,’ they say. ‘In effect, once we have dug ‘em up, they can be considered renewable materials – we can recycle them over and over again.’

Given this, we can look at metals like aluminium in a new light. Often disparaged for being incredibly demanding in terms of the energy used in its production, aluminium looks like a pretty good thing when considering its repeated recycling. Whereas the energy for primary or initial production of aluminium is a significant 211 MJ per kg, the total energy consumption for secondary production, and the global warming potential, drops dramatically with each re-use. After, say, four re-use cycles, the total energy value is down to 51 MJ per kg. (Read more on metals recycling on page 31.)

What about recycling rates – are there limits? Recycling rates of exactly 100% are clearly unlikely for most materials, however new thinking and aligned technological innovation in industry around the world are making the idea of ‘zero-waste’ scenarios for certain product streams a closer reality.

The CSIRO analysis of metal life cycles shows that there are limits or ‘maximum



The proportions of embodied energy that can be recovered, that is conserved, by recycling various waste materials in Australia. The area of each sphere represents the embodied energy per unit mass; the area above the line represents the potential energy savings by recycling the material; the MSW sphere indicates the embodied energy savings by recycling residual municipal solid waste. (After T. Grant and others (2001). Global Renewables)

recycling rates’ beyond which recycling is not sustainable – that is, the additional energy required to recover and recycle the remaining scrap metal exceeds that for primary metal production. However, Norgate told *ECOS* that current metal recycling rates in Australia are almost certainly below the maximum rates ... and the same probably applies to other materials.

Maximum recycling rates are very specific to the material, the product and the location. So the sustainability of metal recycling (or any other recycling scenario) has to be evaluated on a case-by-case basis, preferably by full life-cycle assessment.

### Ways to ramp up recycling

Norgate raises three key issues central to improving our national recycling performance: design for recycling; better recycling policies and regulations; and extended product responsibility (EPR) or stewardship.

‘Design for recycling’ is an approach that manufacturers can apply during a product’s conception, design, assembly and disposal – to minimise wastes and maximise re-use of materials. For example, manufacturers should endeavour to reduce the number of different materials in a component or assembly, maximise use of



Metals recycling is improving. Molten slag and alloy being poured at CSIRO Minerals’ bath smelting facility. Mark Fergus

1 [www.nolanitu.com.au/whats\\_new](http://www.nolanitu.com.au/whats_new)

2 Yencken, D. and Wilkinson, D. (2000) *Resetting the Compass: Australia’s Journey Towards Sustainability*. CSIRO Publishing, Melbourne.

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recyclable and recycled materials, mark parts with standard identification codes, use compatible materials within an assembly and make products easy to disassemble by avoiding adhesives.

‘One trick is to have policies and regulations that make recycled materials as attractive as virgin ones,’ says Norgate. ‘Measures like minimum recycled content specifications, taxes on virgin materials, and subsidies on products containing recycled materials will all help. Another way is to increase the supply of available material for recycling by modifying consumer behaviour through compulsory take-backs, fixed target recycling, deposits on goods, landfill bans and so on. This is already happening in several OECD and European Union countries.’

Stewardship or EPR programmes aim to fundamentally shift the balance of responsibility for waste management away from consumers and municipalities towards manufacturers and distributors of commercial goods. A producer’s responsibility for a product is extended to the post-

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consumer stage of its life cycle.

‘This shift of costs and/or physical responsibility for waste management is a radical and far-reaching notion,’ says Norgate. ‘It will usually mean that the environmental costs of treatment and disposal of discarded consumer goods are incorporated into the cost of the product ... which also sends a clear signal to consumers.’

Such EPR schemes are now being put into operation in Australia. The nation’s peak electrical and electronic industry associations, together with federal and state governments, are developing voluntary

product stewardship initiatives for, firstly, televisions and computers. And, in December 2004, the Environment Protection and Heritage Council, comprising all Australian Environment Ministers, released a discussion paper on product stewardship that sets out a proposed regulatory framework which could be applicable to a range of sectors (see: [www.ephc.gov.au/ephc/product\\_stewardship.html](http://www.ephc.gov.au/ephc/product_stewardship.html)).

The paper emphasises that the stewardship approach is one that ‘recognises that manufacturers, importers, governments and consumers have a shared responsibility for the environmental impacts of a product throughout its full life cycle.’ We’re all in this together.

**More information:**

Global Renewables and the UR-3R facility: [www.grd.com.au](http://www.grd.com.au)

Planet Ark’s ‘Recycling Olympics’ report: [www.planetark.com/nrw/04recyclingreport.pdf](http://www.planetark.com/nrw/04recyclingreport.pdf)

Yenken, D. and Wilkinson, D. (2000) *Resetting the Compass: Australia’s Journey Towards Sustainability*. CSIRO Publishing, Melbourne.

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Keoghs Creek, Tasmania. Photo: Phillip Sloane

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