NATIONAL LANDFILL DIVISION

Waste Management Association of Australia

Waste and Resource Efficiency Enquiry
Productivity Commission

The National Landfill Division would like to congratulate the Productivity Commission and Philip Weickhardt for producing a comprehensive Draft Report for its Waste Inquiry. The Draft Report clarifies many issues in a succinct and logical manner and has shone a light into the often murky waters of waste policy in Australia. It is a remarkable achievement in such a short space of time. I would also like to commend the public consultation processes and the conduct of the public hearings.

Landfills, being at the bottom of the Waste Hierarchy, are least preferred in terms of Waste Policy, but still provide a safe, economic and environmentally responsible place for over half the solid waste in Australia. It is gratifying to see that at least the Productivity Commission appreciates this point.

The National Landfill Division supports the following Draft Report recommendations with the following comments:

- Draft Finding 2.1 – The data comparisons between Australia and other OECD countries for waste to landfill are biased. The Landfill Division plans to investigate these data thoroughly so Policy makers have better information to use. I attach a paper that was presented by me at the recent Enviro 06 Conference in Melbourne that shows the relatively high performance of Australia in limiting waste to landfill compared with European Countries that rely, as we do, on landfill for waste disposal.
- Draft Finding 2.2 – Australia has a well defined waste classification system called The Australian Waste Database that has been adopted by State and Federal governments, but sadly is not used as much as it could be.
- Draft Finding 4.1 – In the attached paper are data on estimates of the external costs of landfill in Europe including disamenity costs that could be translated to the Australian context at about $20/tonne (including gas capture).
- Draft Finding 4.3 – We agree that the benefits of AWT have been overstated and that the substantially higher costs are usually not justified.
- Draft Finding 5.1 – We agree that using a policy of minimising waste to landfill as method of influencing upstream environmental externalities is inappropriate. It would be better in our view to focus on minimising residual waste for economic and sustainability reasons and not demonising landfill as something to be avoided at all costs. The Landfill Industry supports residual waste minimisation and plays a significant role to achieve this at its own sites. For landfills that have a high opportunity cost of airspace because capacity is limited, the benefits of waste minimisation are quite high.
- Draft Finding 7.1 – The setting of targets for waste to landfill arose in the early 1990's and was an area that States competed to see who would go for the biggest target. The original 50% target was ambitious, but has in fact largely been achieved through a combination of the success of kerbside recycling and construction waste recycling. When the targets were set, the data on waste were very rudimentary. As the data collection improved the total amount of waste generated became clearer as recycling quantified wastes that were previously unaccounted for. The result was that the amount sent to landfill hardly changed, but the amount recycled grew enormously. We agree that the Zero Waste target is not creditable and is more aspirational.

- Draft Recommendation 7.1 – We agree that the Waste Hierarchy is used too indiscriminately by government for setting waste policy. When logical arguments are put forward by the Landfill Industry about the direction of waste policy and regulation, they are often dismissed because of the rigid application of the Waste Hierarchy. It has been used as a convenient escape clause to avoid more rigorous policy analysis.

- Draft Recommendation 7.2 – We agree that setting waste management targets in terms of reducing waste to landfill is an inappropriate policy, but would add that targets for reducing certain recyclable materials in the waste stream are good policy. Many materials have well proven re-use and recycling industries and the performance of these industries should be improved and supported. Once governments focus on getting higher performance in the recycling and re-use industries, the cost-benefits ratio will increase.

- Draft Finding 8.2 – We agree that there has been a convergence in landfill regulation in the last 5 years and that it has been in general a sensible progression. However, we don't agree that landfill gas management is optional. The Landfill Industry generally accepts that management of landfill gas and the minimisation of gas emissions is a basic principle for sound landfill operations on a similar level of importance as leachate management. The uncontrolled emission of landfill gas is an explosion hazard, affects the growth of revegetation on landfill caps and is a significant source of odour. Methane is also a powerful greenhouse gas and a useful fuel and should be captured and used where feasible. Regulation for installation of gas recovery systems is supported to ensure that landfill standards meet best practice principles. This is particularly the case for putrescible landfills as opposed to non-putrescible landfills.

- Draft Finding 8.3 – We agree that compliance with landfill regulations has been relatively poor. This has been in part due to the fact that landfills are seen as an essential service and closure is not an option. Therefore badly run sites in both the private and public sector have been able to get away with non-compliance. The WMAA through its landfill working groups are trying to raise standards among its members by voluntary consent and by working with the State EPA's rather than against them. The industry has recognised that if it wants to change its image and to obtain permits for new sites, it must raise the standards at existing sites. However in some States (e.g. NSW) there are still a large number of sub-standard sites and the EPA is addressing them only very slowly.

- Draft Recommendation 8.2 – Greenhouse gas externalities is an issue that the Landfill Industry recognises world wide. It is not a local problem, it is a global one and as stated above best practice landfill management recognises that landfill gas must be managed.

- Draft Recommendation 9.1 – The Landfill Industry has generally accepted Landfill Levies in the past because it is revenue neutral. The Productivity Commission's arguments have encouraged a review of this position. The levies are in effect a tax and are diverting funds into one area at the expense of others. However, levy rebates provide an income to offset the cost of waste minimisation.

  Application of financial assurances to landfills for closure cost and remediation of environmental pollution are an effective way of forcing landfill operators to meet environmental and operational standards. The risk based analysis involved to quantify the size of the financial assurance provides an incentive for improvement of operational standards.

- Draft Recommendation 12.2 – Local Government operated landfill sites in large urban areas are usually managed in a regional context. Local Governments have been operating regional sites for years and pool resources and expertise to meet the same standards as the major privately owned sites. There are differing standards in this regard in different States

- Draft Recommendation 13.1 – As stated above a nationally consistent database system already exists in The Australian Waste Database. This should be used for collection of data.

We would like to also comment that Local Government runs successful landfills in most Australian capital cities and are the only viable sponsor for landfills in small rural communities. We believe that the Productivity Commission's draft Report treats Local Government too harshly.

We would like to make final comment on the reaction to the Draft Report from stakeholders. The State Governments in particular appear to be dismissing the arguments put forward in the report. State Government representatives when asked if they are reconsidering their targets and policies taking the Productivity Commission's recommendations into account have stated that the targets are not arbitrary, but are the results of careful analysis. That analysis is at best to look at the potentially recyclable and reusable materials still going to landfill and basing the target on that figure. There has been very limited analysis of the marginal costs of the potential recycling or reuse and cost benefit analysis of results. There has also been limited analysis on the implications of location on the targets. The cost benefit of recycling one tonne of material depends on proximity to markets. The State Governments are expecting the targets to be exceeded in metropolitan areas to compensate for below target performance in non-metropolitan areas.

There is a strong level of momentum in the waste management policy area and the Productivity Commission's Waste Inquiry is the only recent significant expression of a countervailing view. It will take effort to change policy directions. The National Landfill Division supports waste minimisation where it is economic and produces environmental and social benefits. Over the last 10 years there has been much progress to meet these goals and the gains should be preserved. The achievements of those involved must be recognised. However the new policies being implemented, exemplified by the mantra of Zero Waste, are losing sight of economic, social and environmental goals and as a result scarce financial resources are being wasted.

I would like to make a presentation and answer any questions at the Public hearings in Melbourne.

Yours sincerely

National Landfill Division (WMAA)

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Paper number e6012

How does Europe Treat Residual Waste Compared to Australia?

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EXECUTIVE SUMMARY
The paper looks at how Europe has dealt with residual waste disposal with special reference to the Landfill Directive and they way it was developed and how it has affected different countries. Standards in European landfills are reviewed and compared to Australian landfills. The external cost environmental costs of landfill in Europe are compared to recent reports in Australia. The conclusion is that full social cost of landfilling is less than any other alternative waste treatment option and landfill not longer deserves to be at the base of the waste hierarchy.

INTRODUCTION
Residual Waste is a concept that landfill operators understand, because there is only one home for it: in one of their landfills. When a waste material, or in fact any material, becomes residual waste it no longer has any economic or other use and it must be placed in a location where it no longer poses any harm to human health or the environment and it is securely and permanently contained. That means a landfill.

Alternative Waste treatment (AWT) can change the nature of the waste so that it has different properties and this may reduce the potential harm caused by landfill. A reduction in amount of biodegradable waste to landfill can reduce the potential for polluting leachates, landfill gas emissions and to some extent the affect on local amenity. A European Landfill Directive (Ref 1) promulgated by the European Commissions (EC) in 1999 is causing significant changes in the treatment of residual waste in Europe. The Directive is mainly concerned with ensuring that landfill standards and waste acceptance standards are uniform across the EU to avoid dumping of hazardous waste into low standard sites. However, the Directive also has targets for reduction in the weight of biodegradable municipal waste (what Australians would call putrescible waste) in stages to 35% of the weight recorded in 1995 and it is this requirement that has spawned the growth in AWT in Europe.

The strategy behind the Landfill Directive, as far as reducing biodegradable waste in landfills, is to reduce methane emissions and the greenhouse impact from landfills and to encourage AWT to be established to treat the biodegradable waste. There is no strategy to reduce waste to landfill for it own sake as an over-riding goal. Each country has its own approach to waste treatment depending on the availability of landfills, the past approaches to waste management and local planning and geo-environmental circumstances. There are widely differing waste management approaches to meeting the requirements of the Landfill Directive in different countries.

Reducing waste to landfill has become holy writ in Australia and AWT has marketed itself as a way of recovering resources from the waste stream and reducing the need for landfill. It is not a final resting place for waste, it can only treat waste, produce by-products that can have an economic use and leave a smaller amount of residual waste to be landfilled. AWT doesn't eliminate landfill; just reduce the volume of airspace needed per year. The question is at what cost and does the benefit (ie reduction in landfill) outweigh the cost.

HOW HAVE DIFFERENT COUNTRIES APPROACHED RESIDUAL WASTE MANAGEMENT FOR MSW?

To understand the genesis of the Landfill Directive, a review of the policies of the EU countries is needed. The UK has the largest amount of waste going to landfill in the EU. It has therefore been one of the EU member countries most affected by the Landfill Directive. The British Chartered Institution of Wastes Management commissioned a report (Ref 2) into how the rest of Europe was dealing with its wastes and it makes very interesting reading.

10 EU countries were surveyed, Austria, Denmark, France, Germany, Ireland, Italy, Netherlands, Spain, Sweden and the UK. The report also looked into the historical context in which each country developed its waste management strategy. Austria, Denmark, Germany and The Netherlands had significant environmental problems with badly managed landfills in the 1960's and1970's and this had lead to a public outcry against landfill that forced politicians to act. Germany and The Netherlands were instrumental in bringing the Landfill Directive into being. Germany was particularly affected after unification when many badly managed landfills in the former East Germany became a liability. Ironically the former West Germany was happy to export its waste to the former East Germany in the 1990's.

Austria, Denmark, France, Germany and Sweden had long used energy from waste for district heating with a high level of public acceptance and this was accelerated by the 1970's oil crises. These countries introduced large scale waste management planning and included policies to gradually drive combustible materials out of landfills well before the Landfill Directive. Landfill bans for biodegradable waste were gradually introduced later. In Sweden and Denmark the incineration of waste became part of the national energy policy. The Netherlands, Denmark and Sweden, as a result of the development of incineration and lack of space for landfills, have reduced MSW to landfill to less than 10%, though industrial waste continues to be landfilled. France relies on landfill for disposal of over 50% of its MSW mostly in non-metropolitan areas. Germany still landfills 35% of its MSW and has more landfill sites than any other country.

Ireland relies almost totally on landfill, but has very high prices due to scarcity of sites. Italy has started to change to incineration and more planning-friendly MBT in the north due to the closure of some major landfills, but in the south remains reliant on landfills. Spain is like Australia with large cities and sparsely populated countryside outside the cities. It disposed of waste in many poorly regulated landfills, which have been closed putting pressure on landfill space and leading to adoption of AWT. In Spain the use of MSW compost for the prevention of desertification has proved popular. The

Netherlands has had poorly operated landfills and incinerators in the past which have made public acceptance of new facilities difficult to achieve. However, through a National Waste Plan started in 1993 and very large landfill levies, a program of incineration and composting has reduced residual waste to landfill to 25%. The UK is of course different to the rest of Europe and still uses landfill for over 2/3 of its MSW. Planning processes are difficult and new facilities are slow to come on stream.

The Landfill Directive doesn't require landfill levies, but they are common as drivers of change. The approach to landfill levies is varied across the 10 countries. In Austria, Denmark and The Netherlands the landfill tax is over A$130/tonne. In the UK it is set to rise from A$40 to 80/tonne over the next 5 years. In Italy and Sweden the levy is about A$65/tonne. In Ireland and Spain it is A$25/tonne. In Sweden and Denmark there is also a levy on incineration to promote recycling. The UK has introduced an unusual approach called the Landfill Allowance Trading Scheme (LATS) which allows Municipalities to buy landfill credits to meet the Landfill Directive targets if they cant meet it themselves or suffer a A$350/tonne fine. In France and Germany there is no levy.

In many EU countries the planning concentrates on dealing with MSW only (Municipal Waste as defined by the Australian Waste Database). For example, C&I and C&D waste are out side the Landfill Directive in regards to reduction of biodegradable waste. The non-MSW waste is handled by private companies or by Government owned facilities at a higher price than MSW. Australia's "whole of waste" approach is more useful, I believe.

WHAT HAS BEEN THE EFFECTOF THE LANDFILL DIRECTIVE?

The EU were naturally interested in what effect the Landfill Directive has had on waste management and commissioned a study in 2005 by Golder Associates (Ref 3) that looked into this issue. Some of the text from the report has been included and edited below.

The data presented in the study report shows that the quantity of municipal solid waste generation continues to increase across Europe. However the amount of municipal solid waste being disposed of to landfill by the EU States is in most cases decreasing or, at worst, levelling off. A graph from the report is shown below. There are some trends that can be observed. The countries that have higher reliance on landfill: Ireland, UK, Greece, Spain, Portugal and Finland, have seen a steady rise in waste to landfill up until the Landfill Directive and then have plateaued or fallen, except for Greece which has continued to rise. The countries that have a lower reliance on landfill: Germany, Sweden, Belgium, Denmark and The Netherlands have been reducing their waste to landfill over the last 10 years and the Landfill Directive doesn't seem to have made any difference because they were compliant anyway. Austria and France have had the same amount of waste to landfill over a long time because they introduced WtE a long time ago. Italy is a composite picture because the Landfill Directive affected the north but not the south. Luxembourg has increased waste to landfill since the Landfill Directive, but they have such a small amount of waste that is probably a data anomaly.

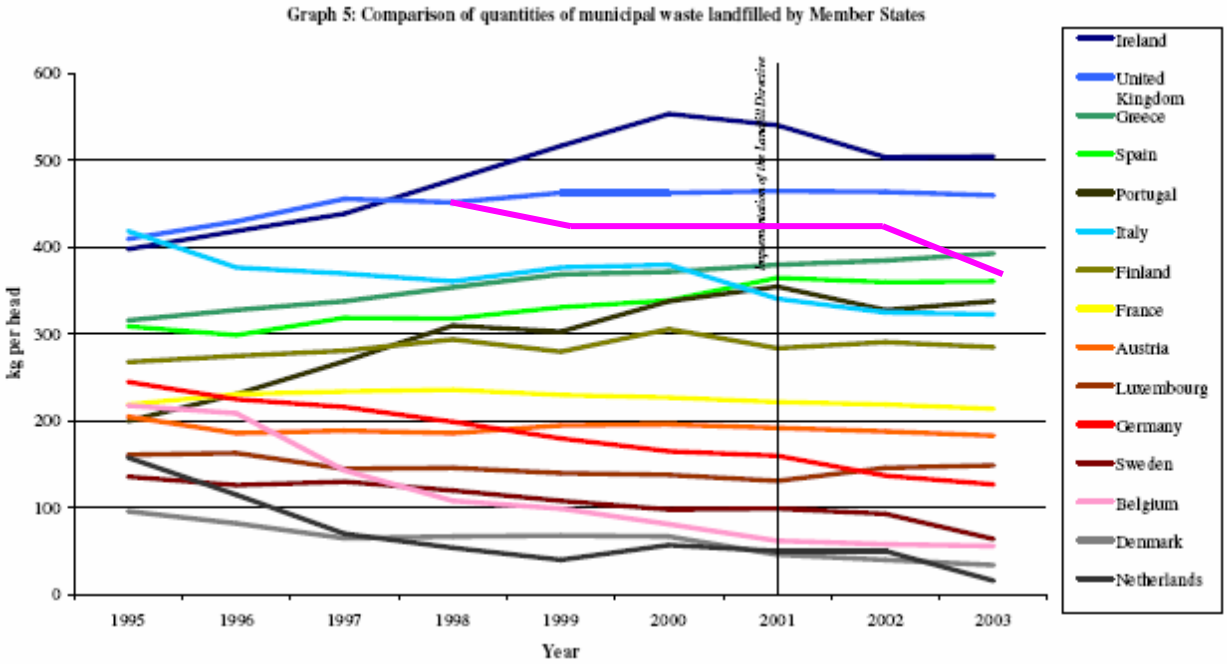

Figure 1

---- Victoria

For comparison the MSW to landfill for the State of Victoria is shown on the graph in purple, interpolated from the Landfill Levy data published on the EcoRecycle web-site. MSW to landfill has gradually fallen from 1998 to 2003 when it dropped to 380 kg/head/year. This is a very creditable performance given that there are no WtE or AWT plants operating in Victoria and all the waste reductions had to come from recycling and composting.

In most countries the number of permitted or legal landfills appears to have declined since the implementation of the Landfill Directive. This is due to the closure of non-compliant landfills and the increased difficulties and costs associated with the siting, design, construction and operation of a modern landfill. This should be qualified by recognising that most countries have implemented their own national strategies, which call for increased waste minimisation, reduction, recycling and treatment of residues.

There is good evidence that there have been important developments in the standard of engineering of landfills across Europe over the past few years. The Landfill Directive has brought some consistency to the principles of engineering design and has encouraged many operators to develop high-standard compliant landfills, perhaps becoming one of the first to do so whilst knowing that the Landfill Directive will ensure that ultimately competitors will need to follow.

HOW DO EUROPEAN LANDFILLS DEFINE BEST PRACTICE AND HOW DO AUSTRALIAN LANDFILLS COMPARE?

The Golder Study (Ref 3) assessed one landfill in each country for compliance with the standards in the Landfill Directive. Overall, it can be concluded that Golder found every country has a good example of how a modern landfill should be designed and operated within the specifications of the Landfill Directive. The sites generally ranged from 2-6Mm^3 total airspace; though one

in Germany had 40 Mm^3 and one in Luxembourg had 0.3Mm^3. A summary of its findings follows.

Across Europe the principles of containment have been adopted. Caps and liners are controlling surface water and groundwater. Leachate collection systems have been installed and a variety of leachate treatment systems have been installed. Ten of the fifteen representative landfills utilised the local municipal waste-water treatment works for final disposal of leachate, either directly by sewer or by tankering. At least three of these ten incorporated some on-site pre-treatment (aerobic or biological). The examples in France and Spain used reverse osmosis technology, which is usually the most expensive form of treatment, such as when there are no local sewers available in rural areas and effluent must be of stream or river quality.

It is interesting to note the sophistication of some of the landfill liner systems. There are leachate collection systems in every site. Only one of the examples, in Denmark, relied entirely upon a mineral-only liner system, but this was where the natural geology provided at least 5 to 8 metres of natural clay. Interestingly, the same site was the only one that retained a permeable cap by design because of the philosophy of allowing ingress of rainwater to speed up bio-degradation. Most sites (10) incorporated a natural clay/mineral with an additional HDPE layer as their composite liner. Two of these (Italy and Portugal) added a further layer of a geo-synthetic clay liner to provide an additional level of safety. Two of the sites (Netherlands and Spain) incorporated the use of bentonite-enriched sand (BES), usually an expensive process necessary when there is little or no natural clay or low-permeability mineral available. The example in Finland quoted the use of “waterproof asphalt”, presumably dense asphaltic concrete (DAC) which is a more robust form of construction beginning to become popular in a number of specific types of locations such as hard-rock quarries.

With regard to capping systems, designs incorporate not only low permeability barriers to minimise surface water ingress (and therefore leachate production) but also several have recognised the need to include drainage systems above these low permeability layers in order to maximise the volumes of run-off. Nine of the fifteen examples incorporated this drainage layer, which illustrates a growing tendency towards high-specification design. Similarly, six of the fifteen incorporated membranes in addition to natural layers and seven included a gas drainage layer beneath the cap. Twelve of the fifteen used natural materials, mostly clay, beneath their artificial membranes and eleven described topsoils although this could be due to the fact that the questionnaire discussed ‘caps’ which some practitioners define as only the low-permeability layers. In general, cap design and construction appears to be of a high standard and is likely to be mostly due to the Landfill Directive.

There were a high number of sites that incorporated positive landfill gas control. Only 2 of the fifteen had no control but stated that measured quantities of gas indicated there was no need. Eight of the sites already convert landfill gas to energy (5 of which are combined heat and power systems) and three more have plans to do this in the future.

Comparing to Australian landfills, the design features are similar for the larger sites here.

- Composite base lining is commonly used;
- Leachate is collected and treated on site or off-site;
- Capping incorporates a clay barrier as a minimum and also HDPE in some cases;
- Landfill gas is collected and flared or used for electricity generation.

The standards adopted by Australian State EPA's generally are in line with the Landfill Directive and major landfills and many smaller sites are adopting these standards. The base lining systems are appropriate for Australia as the need to protect groundwater from leachate contamination is important in Australia and Europe. The Landfill Directive does not require geomembranes in the cap and the landfills from the south of Europe did not use them.

HOW DOES EUROPE VIEW THE EXTERNAL COSTS OF LANDFILL?

The Nolan ITU report (Ref 4) made some startling conclusions about the external costs of landfill compared to a specific AWT (GRL's UR-3R). This topic has been well researched in Europe and two economic papers were reviewed The first (Ref 5) is a report published by the European Commission in 2000 on the economic environmental externalities of landfills (and incineration) and the second (Ref 6) is a paper by two economists in The Netherlands in 2004 on the externals and private costs of landfilling versus incineration.

The references are basically comparing landfilling with incineration, because these are the two options generally available and with sufficient data. AWT is not well understood in Europe at this time. The studies do examine the external environmental and disamenity costs based on a number of other reference studies. Table 1 shows the detailed costs converted to A$ (Euro = A$1.60).

Cost per Tonne / Impact	Landfill to EU Landfill Directive Standard (Ref 5)	Old Landfill without Liner and Gas Collection (Ref 5)	Landfill to Dutch Best Practice (Ref 6)
Emissions to Air	$8.20	$12.80	$9.34
Emissions to Water	$0	$2.40	$0
Chemical Waste	N/A	N/A	$4.21
Disamenity	$16.00	$16.00	$28.61
Gross External Costs	$24.20	$31.20	$42.16
Pollution Avoidance	-$6.40	$0	-$6.74
Net External Costs	$17.80	$31.40	$35.42

Table 1

The disamenity cost in the first two columns is from an American study and is probably more applicable to the Australian context than the Dutch results. The chemical waste cost in the Dutch study was not itemised in the EC study. The external costs of landfills in these two reports are much less than costs proposed in the Nolan-ITU report. As shown above, most major landfills in Australia now conform to the European Landfill Directive and could reasonably claim to have external environmental costs of around A$20/tonne based on Table 1. The Dutch paper stated the private (gate price without levy) cost of a best practice landfill in The Netherlands is about A$55/tonne. Therefore the social cost (environmental cost plus private cost) is A$75/tonne.

The conclusions from the two European reports and others are that automatically putting landfill at the bottom of the Waste Hierarchy is not always justified when the full private and environmental costs are taken into account. Put simply, the extra cost for alternative residual waste treatment may not be justified by the extra benefits. Resources could be better spent on improving source separated materials recovery and improving landfill standards.

CONCLUSIONS

- AWT will not eliminate landfills; just reduce the waste input to landfill at considerable additional cost.
- The Landfill Directive biodegradable waste reduction rules apply to MSW only.
- The Landfill Directive has had a large effect on the standard of landfills in Europe and caused the closure of many sub-standard landfills.
- The Landfill Directive has driven the development of AWT in regions that didn't previously have a history of incineration and relied on landfills.
- Countries that had a well-developed residual waste reduction and incinerator WtE strategies were hardly affected by the Landfill Directive.
- Some countries integrated the incinerator WtE policy with overall energy policy; others shifted to incineration after public outcry over very poor landfill standards in the 1960's and 1970's.

- In countries without pre-existing residual waste reduction strategies the Landfill Directive has at best halted the increase in waste to landfill but not reduced it to the low levels in countries with pre-existing residual waste reduction strategies.
- The current residual waste reduction strategies in Australia (Victoria) have achieved a great deal and the amount of MSW per capita going to landfill is low, given the reliance on landfill and absence of incineration.
- Best Practice landfills in Australia would meet the requirements of the Landfill Directive and are comparable to European landfills.
- Recent work on the external environmental costs of landfill in Europe are about A$20/tonne, not the much larger figures proposed by the AWT lobby.
- Over half of this cost is due to disamenity, which affects AWT as well.
- Respected economic researchers are suggesting that landfill should not be at the base of the Waste Hierarchy if its private plus environmental costs (A$75/tonne) are less than the alternatives.

REFERENCES

Ref 1 *Council Directive 1999/31/EC of 26th April 1999 on the landfill of waste.*

Ref 2 *Delivering Key Waste Management Infrastructure :Lessons Learned from Europe*
Final Report, CIWM, November 2005

Ref 3 *Implementation of the Landfill Directive In The 15 Member States of the European Union, Golder Associates, October 2005*

Ref 4 *National Benefits of the Implementation of the UR-3R Process, a Triple Bottom Line Assessment, Nolan-ITU, July 2004*

Ref 5 *A Study on the Economic Valuation of Environmental Externalities from Landfill Disposal and Incineration of Waste Final Main Report, European Commissions, DG Environment, October 2000.*

Ref 6 *Bury or Burn? A social cost comparison of final waste disposal methods. Elbert Dijkgraaf, Herman R.J. Vollebergh, Dept of Economics, Erasmus University, The Netherlands, Ecological Economics 50 (2004) 233-247.*