Energetics / Submission

WASTE GENERATION AND RESOURCE EFFICIENCY IN AUSTRALIA: SUBMISSION OF COMMENTS

PRODUCTIVITY COMMISSION

January, 2006

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Submission	MSW	PHA, WOV, EDJ	TCO	12/01/2006

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Cover Sheet

Productivity Commission

SUBMISSION COVER SHEET

(not for publication)

Waste Generation & Resource Efficiency Inquiry

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Project Brief

This report has been prepared by Energetics as a formal input to the Waste Generations and Resource Efficiency Inquiry of the Australian Productivity Commissions. In this response we refer to a number of papers, these are available on request only for those papers which are in the public domain.

CONFIDENTIALITY AND DISCLAIMER STATEMENT

Confidentiality

The information in this report is confidential and may be legally privileged. It is intended solely for the company addressee(s).

Disclaimer

The report draws on information provided by the client and other sources. Energetics has relied on this information in making its assessment.

ACKNOWLEDGEMENTS

Energetics thanks the Productivity Commission for calling for public comment on this important issue.

If you would like to discuss any of the topics or have any questions please feel free to contact Energetics on +612 9929 3911.

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Enquiry Objective

The objective of this inquiry is to identify policies that will enable Australia to address market failures and externalities associated with the generation and disposal of waste, including opportunities for resource use efficiency and recovery throughout the product life-cycle (from raw material extraction and processing, to product design, manufacture, use and end of life management).

The Commission is to examine and report on current and potential resource efficiency in Australia, having particular regard to:

1. The economic, environmental and social benefits and costs of optimal approaches for resource recovery and efficiency and waste management, taking into account different waste streams and waste related activities;
2. Institutional, regulatory and other factors which impede optimal resource efficiency and recovery, and optimal approaches to waste management, including barriers to the development of markets for recovered resources;
3. The adequacy of current data on material flows, and relevant economic activity, and how data might be more efficiently collected and used to progress optimal approaches for waste management and resource efficiency and recovery;
4. The impact of international trade and trade agreements on the level and disposal of waste in Australia; and
5. Strategies that could be adopted by government and industry to encourage optimal resource efficiency and recovery.

The Commission is also requested to report on: the effectiveness of performance indicators to measure efficiency of resource recovery practices; the effect of government and commercial procurement practices on optimal resource recovery; and the impacts of government support to production and recovery industries.

Comments on the Inquiry focus Areas

In this section we supply over-arching comment on the three focus areas of the enquiry. These comments are built on the more detailed comments included in the section which follows.

ECONOMIC, SOCIAL AND ENVIRONMENTAL EFFECTS OF WASTE MANAGEMENT

What are the economic, environmental and social costs and benefits of waste and waste-related activities?

It is not possible to quantify these without context as many of these impacts are experienced on a local level. What does need to be stressed is that it is not always practical or necessary to dilute consideration of environmental and social impacts by articulating them as economic values. The Commission should seriously consider retaining environmental and social impact quantities separately to economic quantities, in different units of measure, and develop policy which allows their constituencies – local and state government, the broader Australian public, and industry – to engage with these apparently disparate and competing sets of considerations. The tools to engage with these are available and have been applied in a number of different countries (the majority in the European Union).

MARKET FAILURES ASSOCIATED WITH SOLID WASTE MANAGEMENT

What are the market failures (including externalities) associated with the generation and disposal of waste?

The market failures associated with the generation of wastes is often associated with the cost of raw materials. If raw materials cost more to purchase less of them would report to the waste stream. It is outside the scope of this Inquiry to engage with these market aspects.

While it might be argued that both the amount of waste generated, and the amount disposed would decrease should the cost of managing waste be increased, this alone is a short-sighted approach to waste reduction. Companies would see improving their waste management practises as something that they are forced to do, as opposed to a significant commercial opportunity. There is greater value to be gained from developing policy that supports and encourages innovation and proactive waste management.

GOVERNMENT AND INDUSTRY STRATEGIES

What strategies should be adopted by government and industry to improve economic, environmental and social outcomes in regard to waste and its management?

Industry in Australia is well-placed to make decisions that ensure their long-term economic survival. The government should make it possible for companies to enhance this long-term survival by assisting companies to improve their social and environmental performance – improved systemic waste management and recovery activities are just a small part of this. An example of such an outcome is that of the regional synergies work of the Kwinana Industries Council[1]. The challenge for Federal government is to develop policy which supports this type of proactive resource

[1] http://www.kic.org.au/

recovery model. Education and capacity building also have a significant role to play here.

Government on a Federal level needs to develop policy which supports innovation in waste minimisation, recovery, reuse and recycling. This policy should be developed to guide the development of strategies at state and local authority level. There should be sufficient guidance offered around the reporting requirements as discussed below to ensure that any information which is gathered is useful to both industry and government. At the same time policy should not be prescriptive around the decision tools that companies, society, local and state authorities use to make waste management decisions. These decisions are context and information specific, and values driven. The Federal government needs to ensure that decision makers are able to engage with the complexity of decision making for sustainable development, without being prescriptive about the content of the decision process.

With specific reference to information available and the need for data to be collected, data should only be collected once the use to which it will be put is known. Data should only be collected if it will support better informed decision making by all constituencies, viz., local, state and federal government, industry and society as a whole. It is necessary to understand what the objectives are for data collection, before any further data sets are collated.

Laying the ground work for Key Performance Indicators (KPIs) is equally import. If KPIs are to be developed these need to support proactive decision making. Attention should be paid to the development of progress indicators, as opposed to transgression indicators. It is necessary to ensure that KPIs are well-understood and correctly used. Targets in indicators should only be set once performance in these indicators is understood.

Comments on Specific Questions

TYPES OF WASTE COVERED BY THE INQUIRY

The paper seems to exclude wastes disposed of on site by industry (page 11). This is a particular shortcoming for primary industries which often dispose of their general wastes, together with their production wastes, on site. These wastes need to be included as they often present as the most significant waste streams. This was illustrated by Clift and Wright[2]

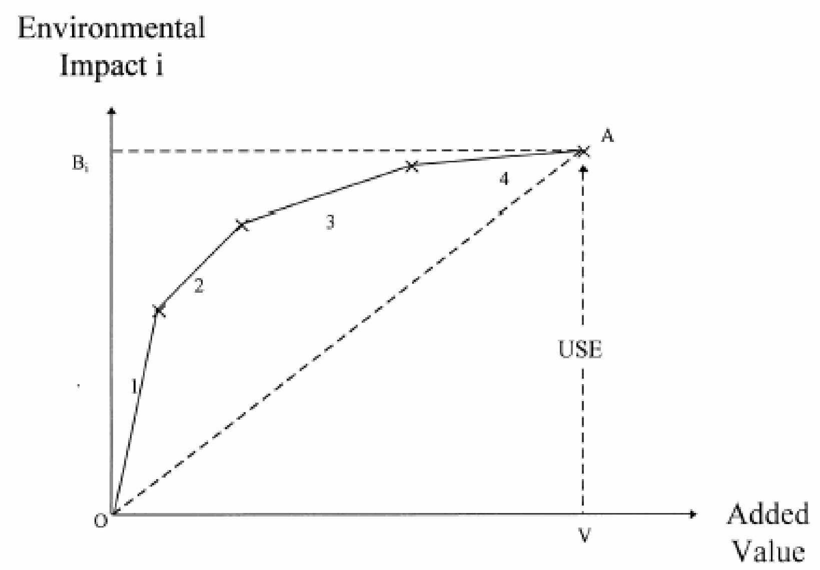

Fig. 2. Accumulated added value and environmental burden along the supply chain from primary resource: 1 = Resource extraction; 2 = Processing and refining; 3 = Forming; 4 = Assembly.

Clift and Wright (2000) go on to highlight the reduction in environmental impact associated with recovery and recycling vs virgin production as included overleaf. While this is not a new concept, this information is included to highlight the fact that there has been significant research into this area. Models of preferred economic structures to support recovery and recycling activities abound. In the main these have been developed under labels such as reverse engineering, reverse supply chain and recovery systems. These engage with resource recovery from waste in significant depth, to the level of understanding uncertainty inherent in developing industries which depend on waste materials as inputs. The nature of waste is extremely variable which introduces significant uncertainty into any business model.

[2] Relationships Between Environmental Impacts and Added Value Along the Supply Chains in *Technological Forecasting and Social Change* 65, 281–295 (2000)

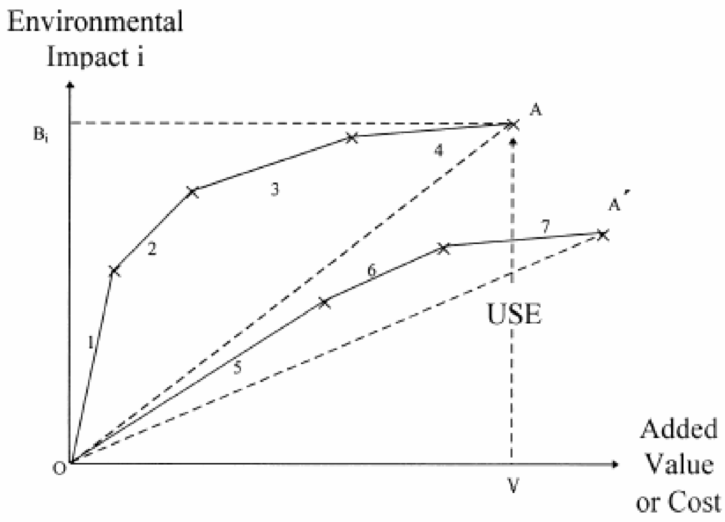

Fig. 4. Primary manufacture and re-use: 1 = Resource extraction; 2 = Processing and refining; 3 = Forming; 4 = Assembly; 5 = Collection; 6 = Dismantling; 7 = Re-assembly.

The exclusion of some hazardous wastes

The Commission states that certain types of waste are excluded from the inquiry including sewage, sewage sludge and sewage treatment residues. Sewage represents a significant resource, from which resource recovery is practical. The heavy metal content of sewage sludge is comparable to compost derived from mixed municipal solid waste (MSW)[3], and pathogen risks are not relevant for many recovery operations such as the use of sewage pellets in cement kilns or biogas generation. Sewage is an important competitor in the waste product markets, and sewage treatment processes have been used overseas in synergy with MSW treatment – such as the use of sewage digesters to biologically treat MSW. The exclusion of sewage from the investigation into Australia's waste generation and resource efficiency is a scope limitation which impairs the identification of resource efficiencies, competition and synergies.

OVERVIEW OF SOLID WASTE

Where is Solid Waste Coming From?

The importance of waste segregation and collection methods is underplayed by the Productivity Commission's Issues Paper. Waste segregation and collection methods are a major determining factor in the ability for waste technologies to enable resource reuse, recycling and recovery. For example, the resource value of the organic waste fraction of municipal solid waste (MSW) is reduced by collection as mixed solid waste due to higher levels of contaminants such as heavy metals. Furthermore, the scope for industrial ecology through the use of MSW fractions as fossil fuel substitutes in industry is heavily influenced by MSW contamination by heavy metals and chlorinated plastics.[4] Any investigation into waste generation and resource efficiency should pay adequate attention to waste segregation and collection methods.

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[3] European Commission, *Draft Discussion Document for the Ad-hoc meeting on Biowastes and Sludges*, 15-16 Jan 2004. It should be noted that the composition of sewage sludge depends on the catchment area and the treatment process.

[4] The European Standards organisation (CEN) recently outlined mercury content and chlorine content as key indicators for the attractiveness of solid recovered fuel.

The Need for More Data

The questions in this section focus on data availability and quality, and ask what the cost of data collection might be. The focus here is on government and how government might best use the information. At the same time it needs to be recognised that greater value would be added if this question was asked from the point of view of what information would be best gathered to support both government and industry in their own individual as well as combined decision making process. With respect to information detail, companies find that internal reporting on their total waste stream has value in supporting change for some time. It is only once they start to recognise that waste represents a cost which can be reduced, that they begin to disaggregate the information into waste stream types and components.

Further, it should be recognised that many companies report information on waste streams internally or to corporate level. Attention should be paid to this information, and how it is used by companies, before an additional reporting burden is added.

A solution might be to request companies submit what information detail they have readily available. Here the suggested web-based exchanges have a significant role to play. Once a complete understanding of this information set has been established there might be value in requesting information in more detail.

The main driver for gathering information should be an understanding of how the information is going to be used. If the government driver is merely to be able to defend the statistics on amount of waste generated and recycled in Australia then aggregated waste stream information should suffice. If the driver is to support increased resource efficiency and reuse then information which support these should be made available. This type of information is context specific, for example there is value in understanding how much paper waste there is available in a suburban/urban area as there is likely to be sufficient waste paper to support industries which use this as a feedstock. In more remote mining areas there may be more value in understanding the amount of scrap metal being generated as this has the potential to support a local industry. Developing a single set of waste information will not necessarily support all of the objectives of the Inquiry.

QUANTIFICATION OF COSTS AND BENEFITS

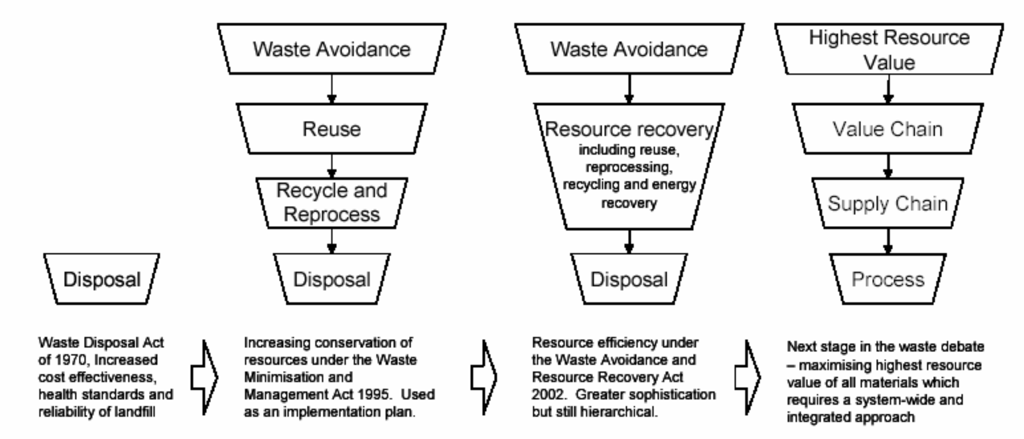
The commission is slipping into the often repeated mistake of assuming that environmental and social costs and benefits can be articulated in economic terms. While it is possible to do this, it introduces significant uncertainty and facilitates aggregation of non-commensurate “costs”. For example, companies view operating cost and capital costs differently and integrate them only when they fully understand what this integration means – for example in the calculation of an IRR for a project. There is greater value to be gained from environmental and social information if it is retained as separate quantities. It is only when these drivers are considered in isolation that it is possible to understand the trade-offs accepted when certain decisions are taken.

The competing drivers of sustainable development mean that it will always be necessary to accept trade-offs between competing objectives; what is necessary is that these trade-offs be fully understood and acknowledged. Significant work has focused on using multi-criteria decision support tools in decision making for waste management. This work has mostly used the concept of “pareto optimality” to define best performance. “Pareto optimality” is used to define that point which offers best outcomes on all of the objectives being considered, moving away from this point would require the decision maker to accept worse performance in one of their objectives.

Examples of such work can is that of Cavin et al (2005)[5], Eichner and Pethig (2000)[6], Manoliadis and Sachpazis (2002)[7] and Tiller and Park (1997)[8].

THE WASTE HIERARCHY

While the work of the Victorian Government (2005) is laudable, it must be recognised that waste management has progressed beyond this point. In their paper prepared for the Total Environment Centre, Warnken and Stewart (2003)[9] present a model for how waste management has, and must, move beyond the waste management hierarchy.



Their work highlights the fact that selecting a single tool and forcing companies to use this in the decision taking processes is short-sighted, as is illustrated by the example in the Inquiry's text. Rather, government should develop principles and guidelines which will support industry and society to see waste as an opportunity and to develop innovative solutions and technologies. The waste (minimisation) hierarchy is a good start, but is not directly applicable in all contexts.

RESOURCE EFFICIENCY

As the paper suggests, resource efficiency means different things in different contexts. Again this section of the paper uses an economic rationality argument that all impacts to society and the environment can be quantified in monetary terms and aggregated to a single economically optimal solution. This argument is inadequate in the light of the types of decisions to be taken as is argued above.

Additional Definitions of Resource Efficiency

An element of resource efficiency which might be presented is the fact that different materials have different potential recycle structures.

- Metals as **atomic materials** are infinitely recycleable limited only by considerations of energy required to recover, re-refine and re-form the metal.

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[5] Software tool for waste treatment selection using economic and ecological assessments, http://www.sust-chem.ethz.ch/research/process/waste.html

[6] Recycling, Producer Responsibility and Centralized Waste Management, http://ideas.repec.org/p/sie/siegen/83-99.html

[7] Geotechnical Aspects of a Landfill Site Selection Study in North Evia – Greece, http://www.ejge.com/2001/Ppr0104/Ppr0104.htm

[8] Explaining cooperation in municipal solid waste management, www.apacweb.ag.utk.edu/ppap/pdf/97/mswaste.pdf

[9] The Great Waste Debate: Discussion Paper on Extended Producer Responsibility and Waste Avoidance

- Plastics as **chemical materials** can potentially be recycled into the same use a limited number of times before their chemical structure is reduced to the point that they are no longer reusable in that function and need to be recycled to a “lower” resource value use.
- Wood and concrete as **structural materials** are even more limited in the manner in which they can be recycled as the properties for which they are valued are often degraded significantly in use.

The latter two material types have given rise to so-called cascades of uses (one of which is illustrated in the waste hierarchy in the paper), while metals can essentially be recycled into any material without losing their desired functionality (except in cases where trace contaminants reduce their usefulness).

There may be more value in viewing resource efficiency in the context of highest resource value which supports the use of materials at their highest level of functionality. This should guide the development of policies as described in the section above, and might result in management hierarchies which are better tailored to all materials and contexts.

Basis for Assessing Waste Generation and Disposal

Key Performance Indicators (KPIs) are usually used to assess performance in this area. The development of comparative KPIs in this field is complex and might not add much value. Care needs to be taken in developing a comparative assessment as has already been noted in the paper.

Costs and Benefits of Recycling

The work of Clift and Wright (2000) illustrates the costs and benefits of recycling materials other than the energy carriers referred to in the paper. While their work appears to be only illustrative they, and other authors have demonstrated that it is possible to assess this quantitatively. The Productivity Commission paper pays too much attention to energy carriers to the detriment of the remainder of the waste stream.

The costs and benefits of recycling are a function of the materials available and their location. Answering this question with anything other than illustrative values is irrational.

POLICY OPTIONS

Key performance indicators and target setting

Targets set by government have not necessarily supported communities and industry in driving performance improvement. This may be because the KPIs are not applicable to community and industrial decision making, or because they are not well enough understood. Setting unachievable aspirational goals can be self-defeating, and could undermine momentum when they are not reached. There is however, value in developing KPIs and targets which focus on **progress** and not **transgression**. A transgression indicator is amount of waste to landfill per capita, a progress indicator is a percentage improvement in the amount of recycleable material which is diverted from landfill. It seems that KPIs are inevitable, care should be taken in ensuring that they are carefully constructed to ensure that they are useful for, and easily understood by, the people who are using them. The need is to support innovation and systemic improvement in waste management, not just measure what is going wrong.

Recycling

<u>Life Cycle Approaches</u>

The application of full life cycle assessment (both life cycle costing, and the environmentally focused Life Cycle Assessment or LCA) have significant roles to play in supporting the assessment of waste management and resource reuse as it is only when all aspects of the life cycle are considered that informed decisions can be made.

Attention should be paid to the type of information which is available from LCA. LCA can be used to determine the environmental effects of different approaches to waste management. Using LCA means that it is not necessary to dilute environmental and social information into economic units.

<u>Location issues</u>

There are a significant number of areas in Australia where it is cheaper to dispose of waste rather than recover it. For example, coal mines in the Bowen Basin in Queensland typically operate a landfill on site which they use to manage their general waste stream. This operates at negligible cost to the mine. The cost of diverting waste from this landfill to the recycle stream can be extremely costly given the distance that materials need to be transported to where they can be recycled (either Townsville – 550km, or Brisbane – 1000km).

Energy from Waste

The economic, social and environmental impacts, both positive and negative, associated with energy from waste varies with technology and location. The Energy from Waste (EfW) committee of the Waste Management Association of Australia has developed a policy associated with energy from waste technologies. This policy is the output of a process which involved significant stakeholder input on an Australia-wide basis. Their input is required here.

EfW can play an important role in an integrated waste management strategy for the treatment of residual waste not suitable for reuse or recycling. The government should not seek to bar or encourage the application of any technology, rather it should develop policy which supports innovation, and ensures the project proponents consider environmental, social and economic impacts when developing and implementing projects. This will facilitate EfW being chosen as the disposal method when it is the most environmentally, socially and economically efficient.

Lessons from Europe have shown that the public planning decisions have significantly reduced the development of conventional EfW facilities. This limitation has provided economic drivers for the development of alternative EfW technologies such as anaerobic digestion and advanced thermal technologies. However this limitation has also restricted the EfW capacity for residual waste disposal, a restriction which may result in the landfilling of residual waste where EfW may be more environmentally and socially beneficial.

Lessons from Europe have also shown that the use of waste as a substitute for fossil fuels within industry (such as power generation, cement kilns etc.) is limited, rightly or wrongly, by more stringent emission regulations for waste fuels than for fossil fuels, and exclusion of waste fuels from renewable energy incentives. The Inquiry should consider whether the use of waste fuels as a substitute for fossil fuels is a desirable disposal route. If this disposal route can play a role in delivering economical, environmental and social benefits, then a comprehensive analysis of these barriers is required.

PRODUCT STEWARDSHIP AND EXTENDED PRODUCER RESPONSIBILITY

Regulation of Waste Management Facilities

These should be regulated in the same manner as other facilities in urban areas. They are processing plants in their own right and should not be subjected to any additional reporting or regulatory burden.

Coordination across Jurisdictions

The role of the Australian government should be coordination and developing policies to support local innovation and action. The Federal Government should not however develop strategies as these are region specific and should be left the state and local authorities.

Education Programs

There a definitely a role for government to develop materials to educate/inform the market about the commercial opportunities in resource recovery. An example of good practise in this area is the NSW Department of Environment and Conservation's development and deployment of training materials in support of their Business Partnerships program. Most companies have a limited understanding of the potential value that may be available by assessing up and downstream "waste" issues. There is a need for government to fund information gathering and dissemination on best practise examples.

Another example of best practise which should be highlighted is that of the Kwinana Industries Council[10] (KIC) regional synergies project. In this case industries in the Kwinana region swap waste streams in order to deliver better systemic performance.

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[10] http://www.kic.org.au/