



STATE OF WASTE SERIES: QUEENSLAND



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October 2007

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Funding provided by The Pratt Foundation Ltd Website: www.prattfoundation.com.au

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Front cover photos (from top to bottom):

household drop off waste in Central Queensland

mixed commercial and construction waste in Central Queensland

working face of Brisbane landfill.

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EXECUTIVE SUMMARY

One component of a sustainable society is the ability to maximise recycling of materials back into the productive economy. Although Australia has not reached this level of performance, many jurisdictions have signalled their intent to radically improve resource recovery and even commit to the 'goal of zero' – a waste free society. Achieving this goal will require many innovative interventions. Total Environment Centre, is working with support from the Pratt Foundation to develop market based approaches to sustainable resource recovery. This study into the state of waste in Queensland is one contribution to the debate and follows a report on Western Australia.

There are many challenges to overcome in order to deliver improved resource recovery and waste management outcomes in Queensland. On the basis of a national comparison, Queenslanders are the third highest generators of waste in Australia with 2.1 tonnes per capita (8.3 million tonnes in total) and the second worst recyclers, recycling only 27 per cent of waste generated and landfilling the remaining 1.5 tonnes per capita (6 million tonnes in total). This poor performance needs to be significantly improved if Queensland is to work towards sustainability.

One avenue is to embrace a 'no waste' future through the creation of an 'industrial ecology' of infrastructure that is able to transform waste into valuable resource inputs. In a no-waste society all by-products from production and consumption need to have a beneficial use. Queensland has a number of unique characteristics because of its richness in natural resources, relatively large regional population base, a great number of tourists, geographic isolation and its huge surface and distances. Market based instruments (MBIs) offer the flexibility to overcome these challenges and support increased resource recovery.

The range of MBIs includes charges, fees and taxes, market creation (such as the establishment of tradeable permits/certificates), subsidies, deposit/refunds and improving the operation of the market through non financial means such as information provision. The use of container deposits is another market intervention that will embed costs of recovery into product price and support the transition to more sustainable patterns of production and consumption. Queensland is considering a landfill levy as a means to internalise some landfill costs.

Other market based options for consideration include a UK style of Landfill Allowance Trading Scheme, establishing embodied energy savings as carbon abatement under a National Emissions Trading Scheme, and using a Resource Recovery Certificate in a similar fashion to Renewable Energy Certificates. Each option has strengths and weaknesses. The challenge is to articulate the case for intervention and create the political imperative for change.

Queensland is at a waste management and resource recovery crossroads. It is the second largest landfiller of waste on a per capita basis and the only mainland state in Australia without a defensible waste strategy that incorporates targets and associated action on improving resource recovery. It is hoped that this 'State of Waste in Queensland' report, and the associated workshop for key stakeholders, will contribute some of the impetus for intervention that delivers sustainable systems of resource recovery.

01

The ability to recycle a maximum amount of material back into the productive economy is an important component of a sustainable society. Unfortunately this is also a feature largely missing from the Australian economy. Each year Australians generate 38 million tonnes of waste. More than half of this waste is disposed of to landfill (22 million tonnes) - in the order of 1000 kg of waste to landfill per person¹. Such linear resource flows are unsustainable in the long term and generate undesirable environmental, social and economic impacts.

A multi-pronged approach is needed to address the problem of waste. Across Australia many jurisdictions have signalled they want to improve their waste situation and engage with sustainable resource recovery. Some states have even developed inspirational visions and strategies for commitment to the 'goal of zero'. Many innovative interventions in the economy will be required if the desired change is to materialise. Market Based Instruments (MBIs) can be used to support the recycling of materials back into the economy by providing incentives for sustainable resource recovery, reprocessing and remanufacture.

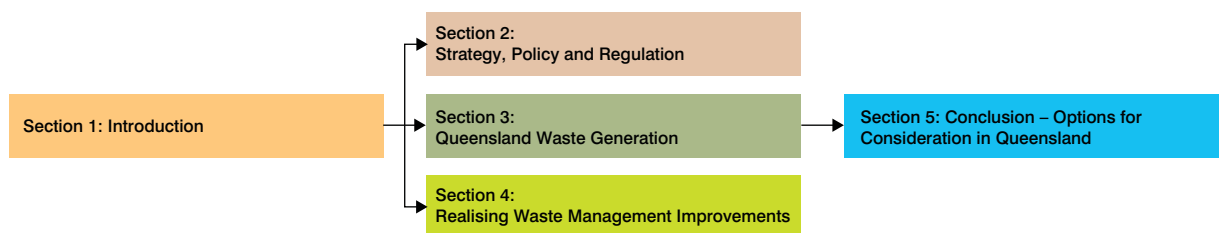
As a first step to stimulate debate Total Environment Centre (TEC) published 'Market Based Instruments and Sustainable Resource Recovery' in 2004,²

which considered the potential for MBIs to promote sustainable resource recovery in Australia. TEC, with funding from Pratt Foundation, is undertaking a national series of workshops to identify opportunities for market based interventions to help fast track the transition towards a 'waste free' society. As part of this consultation process, Warnken ISE has been retained to prepare a series of 'State of Waste' reports. This report is the second such study.

1.1 Overview of Report

Section 2 presents an overview of the strategy, policy and regulatory settings as they relate to resource recovery and waste management in Queensland. Section 3 discusses the available data on waste disposed of to landfill, the amount and types of recycled materials, overall rates of waste generation and compares Queensland performance to the rest of Australia. Following this overview Section 4 examines the required interventions to achieve waste management improvement generally and approach zero waste including infrastructure needs, challenges from a Queensland perspective and the use of market based instruments. Finally Section 5 provides a summary, options for consideration and conclusion. The structure of the document is presented in Figure 1 below.

Figure 1 – Structure of report



¹ Base data from Hyder Consulting 2006, "Waste and Recycling in Australia, Department of Environment of Environment and Heritage, found at <http://www.pc.gov.au/inquiry/waste/subs/sub103attachmenta.pdf> , February 2007, Population data for 2007 from ABS on population clock.

² See http://www.tec.org.au/dev/index.php?option=com_docman&task=doc_download&gid=109 for more information.

02

The strategic setting for waste management in Queensland is found in the 1996 'Waste Management Strategy for Queensland'.³ The policy setting is provided in the Environmental Protection (Waste Management) Policy 2000 and the regulatory framework for the state can be found in the Environmental Protection (Waste Management) Regulation 2000. In December 2008 a new strategy framework is planned to be released, which might contain market based instruments such as landfill levies to stimulate a higher percentage of resource recovery. An overview of the strategic, policy and regulatory settings is provided below.

2.1 Queensland Waste Strategy

The 'Waste Management Strategy for Queensland' was released in January 1996 and is based on the following principles (Queensland Department of Environment 1996):

- integration of waste management from the point of generation to final disposal
- 'polluter pays' and 'user pays'
- waste generators and product designers have a responsibility
- waste management should be based on the hierarchy of prevention, recycling, treatment and finally disposal.

A future waste management strategy (planned to be finished in December 2008) might canvass market based instruments as landfill levies, but is unlikely to contain any reference or vision towards 'zero waste'.⁴

2.2 Policy Settings for Waste Issues

The waste policy settings in 'Environmental Protection Policy 2000', are partly based on the waste management strategy mentioned above. Additional components include the 'product stewardship principle' and changes made to the waste management hierarchy. The 'product stewardship principle' recognises the producer or importer of a product as the one that should take reasonable steps to minimise environmental harm from the production, use and disposal of the product. The waste management hierarchy, based upon the most preferred to the least preferred method, uses different terminology to cascade from waste avoidance to waste re-use, to waste recycling, to energy recovery from waste and then finally to waste disposal.⁵

The intention of the waste management hierarchy, polluter pays, user pays and the product stewardship principles is to provide a basis for waste management programs for voluntary industry waste reduction programs and for state and local government waste management strategic plans.

2.3 Regulatory Settings for Waste

The 'Environmental Protection (Waste Management) Regulation 2000', addressed waste issues which were not dealt with, or not clearly defined, under previous legislation and are intended to provide clarification to waste producers and state and local government. The Regulation provides for:⁶

- offences for littering and waste dumping
- a waste tracking system

³ DoE Queensland Government: "Waste Management Strategy for Queensland", January 1996

⁴ Personal Communication, Queensland EPA, August 2007.

⁵ Office of the Queensland Parliamentary Council: "Environmental Protection (Waste Management) Policy 2000", reprinted May 2006

⁶ Office of the Queensland Parliamentary Council: "Environmental Protection (Waste Management) Regulation 2000", reprinted June 2005

02 STRATEGY, POLICY AND REGULATION

- clinical and relate waste management planning, segregation of infectious wastes, appropriate on-site storage and proper disposal
- managing and ultimately phasing out certain polychlorinated biphenyls
- design rules for waste equipment and toilets.

2.4 Comparison with Other States

The Australian response to the challenges presented by waste generation and resource efficiency has been varied. However they reflect an overall commitment to increasing resource recovery. Some states are publicly aspiring to move towards zero waste, including Victoria, South Australia, Western Australian and Australian Capital Territory.

The Queensland approach to resource recovery and waste management is less well developed as can be seen from Table 1 below which presents an overview of policy approaches to waste management and resource recovery across Australia.

02 STRATEGY, POLICY AND REGULATION

Table 1 – Summary of policy approaches to resource recovery and waste management across Australia

Jurisdiction	Strategy and Use of MBIs	Resource Recovery Targets	Used Waste Hierarchy
Queensland	Waste Management Strategy for Queensland (1996) No levy, however note that a new strategy is under development (December 2008) which might canvass market based instruments as landfill levies, but no vision/strategy towards zero waste.	<ul style="list-style-type: none"> encourage industry associations to set targets review of other potential targets 	Linear progression of waste avoidance, waste re-use, waste recycling, energy recovery from waste to waste disposal as a last resort.
New South Wales	NSW Waste Avoidance and Resource Recovery Strategy 2006 Increasing levy to \$56/m in the Sydney Metropolitan Area and \$52/m in the Extended Regulatory Area by 2010-11 (excluding CPI adjustments)	By 2014 increase recovery and utilisation of materials from <ul style="list-style-type: none"> municipal sector from 26% to 66% commercial & industrial sector from 28% to 63% construction & demolition sector from the current 65% to 76%. 	Modified – reuse, reprocessing, recycling and energy recovery all grouped on the same level as resource recovery, between avoidance of unnecessary consumption and disposal
Victoria	Sustainability in Action: Towards Zero Waste (2005) Levy increased to \$15 per tonne for solid industrial waste in larger Victorian centres by July 2007	<ul style="list-style-type: none"> 1.5 million tonne reduction in the projected quantity of solid waste generated, by 2014 75% by weight of solid waste recovered for reuse, recycling and/or energy generation by 2014 <ul style="list-style-type: none"> 65% for MSW 80% for C&I 80% for C&D 	Linear progression incorporating avoidance, reuse, recycling, recovery of energy, treatment, containment and disposal
Western Australia	Statement of Strategic Direction for Waste Management in Western Australia (2004) Levy increased from \$3 to \$6 for putrescible and from \$1 to \$3 per tonne for inert Considering container deposits	<ul style="list-style-type: none"> changing focus from waste management to waste prevention by 2008 half of effort spent of waste management and the other half on waste prevention by 2012 majority of effort spent on prevention by 2015 little or no waste created that cannot be recovered by 2020 	Linear progression of prevention (avoid the creation of waste), recovery (efficient recovery, re-treatment and re-use all wastes) and disposal (responsibly manage waste into the environment). (However note cross over between prevention and recovery).
South Australia	South Australia's Waste Strategy 2005-2010 (2005) Levy for waste disposed of in metropolitan areas of \$10.50 per tonne, non-metro is \$5.25. Increases occur each year based on CPI movements and current discussion is taking place on increasing the levy. Long established use of container deposits	<ul style="list-style-type: none"> 25% reduction of waste to landfill by 2014 Interim ramping up targets so that by 2010: <ul style="list-style-type: none"> 75% of all materials presenting at kerbside recycle 30% increase in recovery and use of C&I materials 50% increase in recovery and use of C&D materials 	Linear progression of avoid, reduce, reuse, recycle, recover, treat and dispose
Tasmania	Draft Waste Management Strategy for Tasmania (2007) Planning to provide enough financial incentive to waste generators to reuse or recycle their waste. This will result in a reduction of landfill facilities.	Under review	Linear progression of avoidance, reuse, recycling, energy recovery, repository storage, treatment and disposal/permanent containment
Australian Capital Territory	The Next Step in the No Waste Strategy (2000) No levy but ACT Government sets price of landfill aimed at full cost recovery	Waste free society by 2010 including interim progressive targets driving to zero by 2010 for domestic collected, private delivery, commercial & industrial, and building & demolition	Linear progression of avoidance, reduction, reuse, recycling, recovery, and disposal.
Northern Territory	NT Waste Management and Pollution Control Strategy and Litter Abatement and Resource Recovery Strategy (1995)	Under development	Linear progression of avoidance, reduction, reuse, recycling, recovery, and disposal

03

Waste generation is measured as the amount of materials disposed of to landfill plus the amount of recycling that occurs within a given region. Waste materials are commonly broken down into three waste 'streams' of Municipal Solid Waste, Commercial and Industrial, and Construction and Demolition.

Municipal Solid Waste (MSW) comprises materials that are generated from the domestic sector and are collected in household garbage, recycling, garden organics and Council and/ or private sector clean-up collections, in addition to waste materials collected by Councils and/or private sector as part of street sweeping, litter bins and park cleanups.

Commercial and Industrial (C&I) waste includes materials generated from fixed point sources within the manufacturing, wholesale, retail, professional services and administration sectors. Construction and Demolition (C&D) covers materials generated from construction and demolition activities, both on a large scale (high rise) and small scale (residential housing), in addition to materials from landscaping and other urban based construction activities.

Green waste consists of grass clippings, tree, bush and shrub trimmings, branches and other similar material resulting from domestic or commercial gardening, landscaping or maintenance activities.

Organic waste is composed of putrescible wastes, excluding green waste and biosolids and including food preparation wastes, spoiled food and fruit, food and fibre processing waste, bark and sawdust, wood waste, abattoir wastes and manures. Examples of regulated waste include acids, caustic, solvents, tyres, batteries and oil.⁷

Data on waste generation in Queensland is limited. Local governments are required to report on certain information such as waste and recycling data, but private industries provide waste data on a voluntary basis. For example, in 2005 this resulted in only a 26 per cent response rate from private industries. However, it should be noted that the quality of data has increased in recent years.

3.1 Disposal to Landfill

In 2005 approximately 6,025,000 tonnes of waste was landfilled in Queensland. This translates to a per capita disposal rate of 1.5 tonnes. No information is available on the material composition of waste disposed of to landfill in Queensland. National averages have been used to approximate the material breakdown of waste to landfill. Indicative commodity values have also been used to provide an estimate of the financial lost opportunity of landfill and are presented in Table 2 below.

⁷ Defined in Schedule 9 and listed in Schedule 7 of the "Environmental Protection Regulation 1998" (www.legislation.qld.gov.au)

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Table 2 – Estimated composition of material disposed of to landfill in Queensland and indicative financial value for 2004⁸

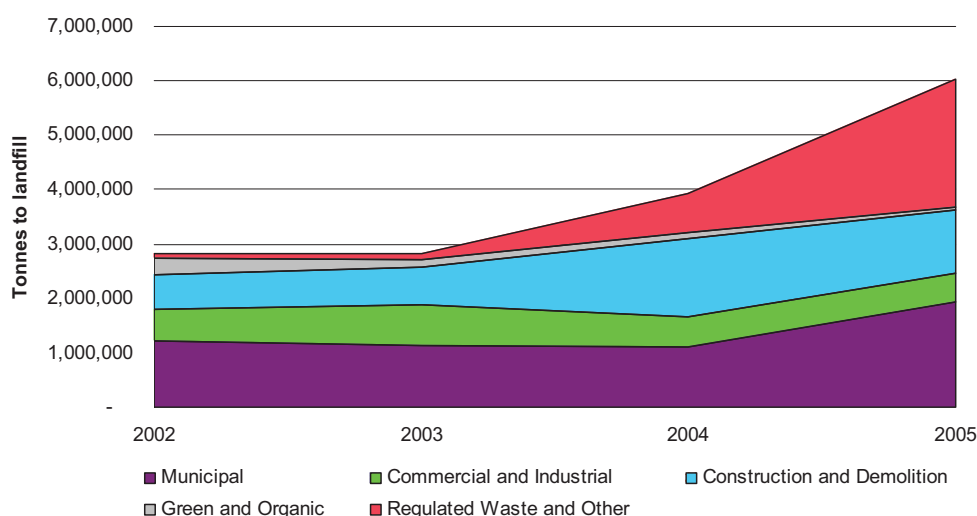
Material Type ⁹	Tonnes	Indicative Value per tonne	Commodity Value
Food and other organics	595,000	\$20	\$11,900,000
Paper & Cardboard	930,000	\$70	\$65,100,000
Garden Organics	707,000	\$20	\$14,140,000
Wood/Timber	384,000	\$20	\$7,680,000
Glass	162,000	\$72	\$11,664,000
Non-ferrous	43,000	\$1,500	\$66,500,000
Ferrous	683,000	\$75	\$51,205,000
Plastic	314,000	\$300	\$94,200,000
Soil/Rubble and Other Clean			
Excavated Material	716,000	\$15	\$10,740,000
Concrete, bricks and asphalt	1,262,000	\$15	\$18,930,000
Other Recyclables			
(inc Textiles and Rubber)	183,000	\$10	\$1,830,000
Other (waste)	46,000	-	\$0
Total	6,025,000		\$351,909,000

Table 2 shows a lost commodity value of over \$350 million worth of materials to landfill in Queensland during 2005. While it is true that high transport prices and a lack of local markets can erode the value of recycled materials, the assumed commodity values used by the WMAA (NSW Branch) were conservative. Movements in market value are more likely to be the major determining factor of financial value for materials such as aluminium, plastics and to a lesser extent, paper

and cardboard.¹⁰

Historical data is available on the amount of waste disposed of to landfill in Queensland between 2001 and 2005. Figure 2 on the next page shows the breakdown of disposal tonnages by source. (The corresponding data are presented in Appendix 1 Table 6.)

Figure 2 – Waste to landfill in Queensland 2002-2005



8 Average commodity values from WMAA (NSW Branch) 2006 and proportions derived from Hyder Consulting 2006 – totals may not add due to rounding)

9 Bio solids have been left out this overview because they are not considered part of the waste stream.

10 For example, there are industry reports of trade for recycled Aluminium, recycled Plastic and recycled Office Paper at nearly double the estimates given here.

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Figure 2 above was difficult to compile based on existing data because waste figures are incomplete and different each year. For example, total waste disposed of to landfill in Queensland in 2003 is based upon 92 out of 159 local governments providing information (representing 93% of the population) and 52 returned surveys by private service providers. 2005 data is based upon information supplied by 124 councils (representing 98.7% of the population) and 58 returned surveys.

It is clear that the steep increase in waste disposal to landfill is largely as a result of better data collection. Nevertheless factors related to the growth of Queensland's economy and population cannot be discarded. The Gross State Product shows an average increase of 4.8% between 2002 to 2005 and the Queensland population has increased from 3.7 million in 2002 to 4.0 million in 2005.¹¹

3.2 Recycling

In 2005 approximately 2,272,000 tonnes of waste has been recycled in Queensland translating into 0.6 tonne per capita. The material composition of recycled materials is presented in Table 3 below.

In 2005, there were 357,000 tonnes recovered from the Municipal stream, 233,000 tonnes from Commercial and Industrial, 816,000 tonnes from Construction and Demolition sources, 859,000 from Green and Organic and 7,000 from Regulated Waste and Other (Queensland EPA 2006). See Appendix 2 Table 7 for an overview including the years 2002, 2003 and 2004. Figure 3 on the next page shows the breakdown of recycling tonnages by material type.

Table 3 – Materials recycled in Queensland in 2005 (adapted from 'The State of Waste and Recycling in Queensland 2005')

Material Type	Tonnes
Food and other organics	7,000
Paper & Cardboard	413,000
Garden Organics	699,000
Wood/Timber	18,000
Glass	81,000
Adjusted non-ferrous	16,000
Ferrous	351,000
Plastic	23,000
Soil/Rubble and Other Clean Excavated Material	175,000
Concrete, bricks and asphalt	378,000 ¹²
Other Recyclables (inc Textiles and Rubber)	99,000
Other (waste)	12,000
Total	2,272,000

The reasons for the increase in recycling since 2002 can be attributed to improved data collection and also additional initiatives aimed at increasing recycling at a local government and industry level.

¹¹ GSP in "Australian National Accounts: State Accounts 2001-02/ 2004-05" and population count in "Qld Stats Jul 2007" and "Demography Queensland 2003", published by ABS

¹² adjusted by adding 229,000 tonnes to match national recycle data better (Nationally 67% of ' Concrete, bricks and asphalt' category is recycled, in Queensland now 23%)

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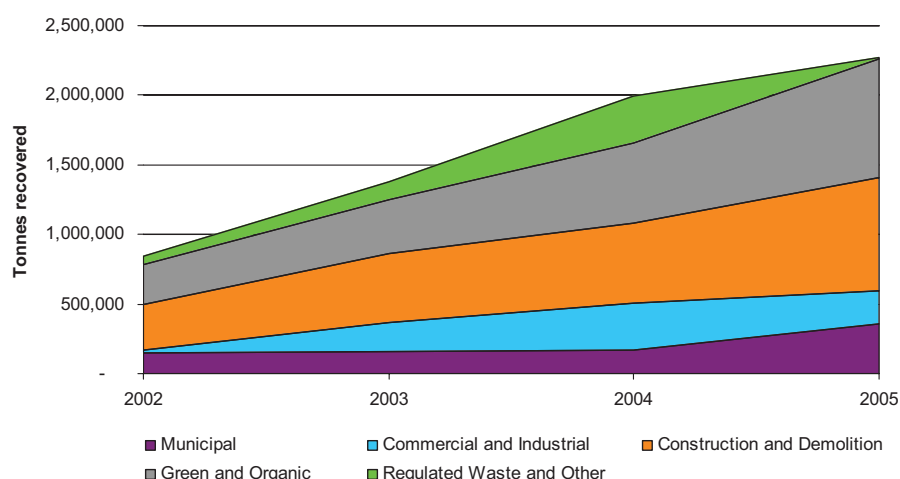


Figure 3 – Materials recycled in Queensland 2002-2005

3.3 Waste Generated

Based on the preceding analysis, the estimated amount of waste generation in Queensland for 2005 is approximately 8,300,000 tonnes. (Note that data on biosolids have been left out to make a comparison with national data possible.) A breakdown of this amount by waste stream is presented in Table 4 below and a breakdown by material type is presented in Appendix 3. Queensland recycles 27 per cent of its waste, with the remaining 73 per cent is disposed of to landfill.

Figure 4 below shows the trendline of 2001-2005 of the total tonnes of waste generated, comprising tonnes disposed to landfill and tonnes of resources recovered. This figure shows a steep growth of total waste generation, which is mostly caused by better data collection, and in lesser extent through population and GSP growth. The increase in recycling is attributable to additional efforts in recycling as well as improved data collection.

3.4 Comparative Performance

A comparison of Australian per capita disposal, recycling and waste generation rates provides an opportunity to benchmark waste performance in Queensland. As shown in Table 7 below, national averages are: 1.1 tonnes of waste disposed of to landfill, 0.8 tonnes recycled, and a per capita waste generation rate of 1.9 tonnes (total tonnages are provided in Appendix 5).

The per capita rates on a state and territory basis shows Queensland as the third highest waste generator and the second highest landfiller of waste in Australia. The Queensland per capita total comprises 0.6 tonnes recycled (2.3 million tonnes) and 1.5 tonnes disposed to landfill (6.0 million tonnes).¹³ This level of waste generation presents a number of future challenges for major improvements in resource recovery.

Table 4 – Estimated amounts of waste generated in Queensland in 2005

Waste Stream	Disposed of to Landfill	Recycled	Total Waste Generated	% Disposal	% Recycling
Municipal	1,950,000	357,000	2,307,000	85%	15%
Commercial and Industrial	520,000	233,000	753,000	69%	31%
Construction and Demolition	1,154,000	816,000	1,970,000	59%	41%
Green and Organic	68,000	859,000	927,000	7%	93%
Regulated Waste and Other	2,333,000	7,000	2,340,000	100%	0%
Total	6,025,000	2,272,000	8,297,000	73%	27%

¹³ Total waste landfilled of 6.0 Mt plus total waste recycled of 2.3 Mt = 8.3Mt of waste generated, divided by ABS population of Queensland for 2005 of 3,977,100 gives 2.1 tonnes disposal per person.

03 QUEENSLAND WASTE GENERATION

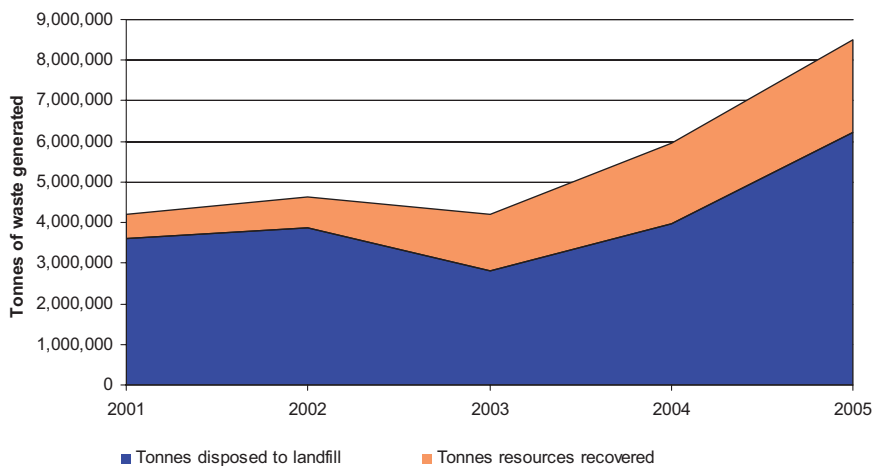


Figure 4 – Total waste generated in Queensland 2002-2005 composed of landfill disposal and resource recovery

3.5 Note on Waste Data and Queensland Waste Strategy Discussion Paper

The Queensland Environmental Protection Agency released a Queensland Waste Strategy discussion paper for public consultation while this report was in the final stages of preparation. The discussion paper presents data on waste generation in Queensland based on the year 2006, whereas this study is using data from 2005. This may explain some of the data discrepancies, especially differences between reported tonnages from different sources within the waste stream. However, the 2006 data is presented in summary form in the discussion paper and no disaggregated data is available for comparison. The following observations are made to highlight key differences:

- waste generation rate for Queensland presented as over seven million tonnes (p10), as opposed to 8.3 million tonnes in this study

- 'around 40 per cent of the solid waste is diverted from landfill' (p10). This estimate is for household waste only and does not include C&I, C&D or Regulated Waste and Other. As such the recycling rate of 27 per cent in this study is suggested to be more representative of the entire Queensland Waste Stream

- Figures 3, 4, and 5 (p12-13) on waste generation, disposal and recovery, do not account for Garden and Organic or for Regulated Waste and Other, and thus underestimate total waste.

The discussion paper does show waste generation, disposal and recovery volumes increasing from 2005 to 2006. One important factor for clarification during the public consultation process will be a reconciliation between the data analysis in this study and the summary data presented in the Queensland Government discussion paper.

Table 5 – Per Capita comparison of Queensland Resource Recovery Performance in tonnes¹⁴

Category	Qld	NSW	Vic	WA ¹⁵	SA	TAS	ACT	NT	AU Average
Disposed	1.5	0.9	0.8	1.9	0.8	1.0	0.6	0.4	1.1
Recycled	0.6	0.9	0.9	0.4	1.4	0.1	1.5	0.1	0.8
Generated	2.1	1.8	1.7	2.3	2.2	1.0	2.1	0.5	1.9

¹⁴ Derived from Hyder Consulting 2006b using ABS population estimates for all states except Qld. Current Qld estimates are used to provide a more accurate picture of performance (2002/2003 data showed waste generation at around 1 tonne per capita). Note that this table is an update of the previous WA State of Waste report published by Total Environment Centre see http://www.tec.org.au/dev/index.php?option=com_docman&task=doc_download&gid=18.

¹⁵ Estimates for Perth per capita disposal were used for all of WA

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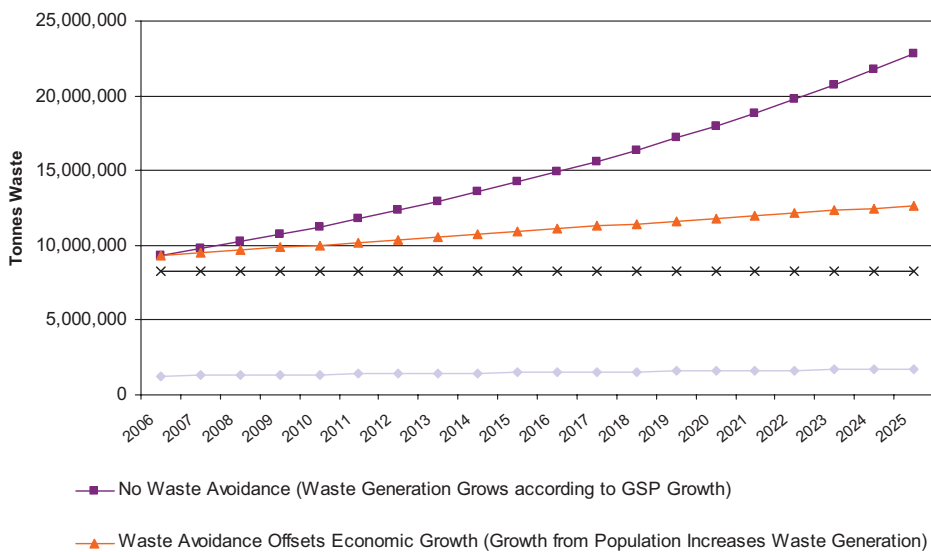


Figure 5 –Forecast waste generation rates for Queensland

3.6 Forecast Waste Generation Rates in Queensland

The gap each year between actual waste disposed and resource recovery will grow unless both planned waste avoidance activities and an innovative market based solutions are used to stimulate a more robust recycling industry in Queensland. Figure 5 shows that waste generation in Queensland could rise to over twenty million tonnes per annum by 2025, with over eighteen million tonnes of materials wasted to landfill. This ‘worst case’ scenario would occur where waste avoidance activities do not counter economic growth Australia (no decoupling between waste generation and economic growth).¹⁶

Even if waste avoidance is successful in countering an increase in waste generation from economic growth, the anticipated population increases in Queensland to 2025 will add over four million tonnes of waste generation that would need to be recycled in order to prevent an increase in the amount of waste disposed of to landfill.¹⁷ If waste disposal to landfill is to be reduced, an increase in recovery rates over and above growth in population is required, in addition to waste avoidance efforts.

The challenge is compounded by technical barriers to increased recycling rates, such as inherent contamination in mixed kerbside recycling systems and stringent quality requirements for feedstock materials. For example, the quality specifications for amber glass bottles are at odds with the current system of collection and sorting used to transform glass bottles into a furnace ready product. A decreasing amount of glass is being recycled into new glass bottle products, with an accompanying increase in glass fines. System-wide improvements are required to increase the volume of glass recovered and the quality of recycled material produced (APC 2006).

The scale of the challenge facing Queensland is highlighted by the potential increases in waste generation, combined with the fact that Queenslanders are the third highest waste generators and the second worst recyclers in Australia. This poor performance combined with the lack of a comprehensive waste management and resource recovery strategy that emphasises the need for innovative solutions to increase the recovery of resources and reduce waste generation.

¹⁶ An average of the Gross State Product growth rates to from 2000/2001 to 2005/2006 (4.8%) were used for years 2007 – 2020 (Source: ABS 2006), Waste generation rates were calculated as an estimate of waste generation per \$million of GSP using 2004 and 2005 waste data against 03/04 and 04/05 financial years. This gave a waste generation rate of 55 tonnes per \$million of GSP.

¹⁷ Forecasts from the Queensland Government Department of Local Government, planning, sport and Recreation, “Queensland’s future population 2006 edition” were used (http://www.lgp.qld.gov.au/docs/planning/information_and_forecasting/QFP2006/Queenslands%20Future%20Population%202006.pdf)

04

Although Queensland has yet to articulate a comprehensive waste management and resource recovery strategy, there are a number of initiatives being planned in Queensland. What is clear, however, is that Queensland will need drastic changes at a policy and regulatory level, if the state is to meet national best practice standards. In particular the 'goal of zero' as of a vision for a sustainable and waste free Queensland needs to be included as a cornerstone in any future resource recovery strategy.

Some of the changes required to deliver sustainable outcomes include redesigning current infrastructure for waste management as an industrial ecosystem that delivers resources back into the productive economy at their highest resource value. Queensland also faces some unique challenges arising from market size, geographic location and a variable population caused by high tourist numbers. Both tasks of transforming current infrastructure and overcoming barriers to increased resource recovery can be overcome through innovative use of Market Based Instruments (MBIs). This section explores how MBIs can assist Queensland to improve resource recovery performance.

4.1 Planned Future Initiatives

Future initiatives of the Queensland Government aimed at improving waste management performance include:¹⁸

- looking at regulatory tools to promote waste minimisation and sound waste management, where voluntary mechanisms are not effective
- closer collaboration with local government to identify problems and evaluate solutions

- developing an education campaign to inform industry and the public of the need and benefits of effective waste management
- ensuring waste management standards are sufficient to protect public health and the environment
- licence fees and charges under the Environmental Protection Act that will reflect real costs of minimising the environmental risk of that discharge and act as an incentive to reduce emissions
- reviewing charging structures to ensure they do not inadvertently discourage minimisation
- developing several voluntary initiatives to promote clean technology production, recycling options and waste minimisation
- future improvement of waste and recycling data outputs through (amongst other things):
 - endeavour to increase number of local governments reporting
 - provide interaction possibilities with local governments on reporting
 - seek to improve data collection from private waste service providers
 - improve data validation.

In our view the above actions are very limited in addressing the change that is required to improve waste management, let alone the challenge of sustainable resource recovery. For example, there are no diversion targets against which to benchmark resource recovery performance and there are no mechanisms to drive improvement, such as a landfill levy.

¹⁸ Personal Communication, Queensland EPA, August 2007.

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4.2 Alignment with National Best Practice: a Zero Waste Vision

The goal of 'zero waste' is one key element in transitioning to a sustainable economy where patterns of production and consumption are based on the principles of nature – the 'biomimetic economy'. For example, Janine Benyus (1997) in her book 'Biomimicry' puts forward nature as a model, measure and mentor, citing nine key lessons regarding the operation of natural systems, including 'nature recycles everything'.

In addition to having a sound philosophical basis, the recovery of resources for recycling is, in and of itself, a value adding activity. The value proposition of recycling to society is (ACOR 2006):

- less energy requirements for the same unit of material resource - savings in associated greenhouse gas emissions arising from energy generation through conserving embodied energy
- avoided depletion of primary resources - extends the life of given stocks
- replacement of fossil fuels - where the calorific value of materials are recovered for energy generation
- nutrient cycling - through the composting and anaerobic digestion of organic materials for application to land)
- provision of waste management services as a by-product - society still has a need to handle the bulk flows of materials that are discarded. Recycling provides this service as a by-product of recovering resource value for the economy.

One version of an industrial ecology has been developed by the Strategic Planning and Infrastructure Group (SPIG) which resides under the umbrella of the Waste Management Association of

Australia. Figure 2 below identifies the key characteristics of an infrastructure able to deliver zero waste.

Broadly materials at their end-of-life can fit into one of three categories: dry recyclables (#4 on Figure 6); organics (#5); and residuals (#3). For both dry recyclables and organics there is existing infrastructure and technology that can process and beneficiate collected materials.

There is, however, a requirement for ongoing development to improve recycling participation amongst business and individuals, in addition to improving output quality. It is in the recovery of value from 'residual' materials that the bulk of innovation and development is required.

Under a zero waste model, all by-products from production and consumption need to have a beneficial use. Technology and infrastructure will be required to transform residual waste (3) into its generic material types including metals (6), inert materials (7), organics / lignocellulosics (woody materials – 8) and high calorific (energy content) hydrocarbon based fractions (9). These generic recovered resources can then be recycled for new metal manufacture, used for civil works, converted into soil improvement products, and used as coal or gas replacement fuels respectively. In order to optimise this system of residuals processing it will be necessary to use Extended Producer Responsibility (Product Stewardship – EPR/PS) schemes to remove products or items with special value recovery potential, or with toxic characteristics that could disrupt residual processing (Glover and Wainberg unpublished). EPR/PS can also be used to improve recovery rates, such as through the use of container deposits.

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related to resource recovery is the UK Landfill Allowance Trading Scheme (LATS) that will dramatically reduce Biodegradable Municipal Waste disposed of to landfill.

- Subsidies - include tax concessions, low or no interest loans and exemptions from fees and charges to improve the financial viability of organisations undertaking desired actions intended to bring about an environmental improvement. Also involved is the elimination of perverse subsidies, those mechanisms that actively accelerate environmental deterioration; for example, any subsidies that promote the use of fossil fuels like coal, or provide an incentive for increased primary production (OECD 2001).
- Deposit/Refund Schemes - apply the principle of Extended Producer Responsibility to products and packaging by including a deposit in the purchase price of the product such as beverage containers, but can also be applied to chemical drums, paint tins or mobile phones and computers. The deposit is redeemable when the container is returned either to collection depots. A well known example is container deposit legislation (CDL) such as the 5 ¢ deposit on beverage containers in South Australia, in addition to the streamlined Californian model.
- Market Friction Reduction - addresses forms of market distortion through non-financial means such as reducing transaction costs and improving information flows. Examples include ecolabelling, information and technology transfer and research programmes to facilitate market exchanges (Whitten et al 2003).

The benefits highlighted with a market based approach include (OECD 2001 and UNEP 2004):

- static efficiency – the achievement of environmental pollution abatement at the minimum cost and the equalisation of marginal abatement costs across companies
- dynamic efficiency - ongoing incentives to reduce the costs of pollution abatement, over and above meeting an arbitrary performance level
- double dividend - the realisation of both an improved environmental outcome and a reduction in other taxes such as labour taxes
- self enforcement and transparency - trading mechanisms are by necessity transparent and information on trades is more accessible than reports generated under 'command and control' regulations.

These benefits are contrasted with potential limitations that need to be addressed in the design

phase including (OECD 2001, Murtough et al 2002, Whitten et al 2003):

- institutional weaknesses - the free rider problem caused by companies not participating in an MBI programme
- legal gaps - there needs to be a legal authority that assigns the necessary property rights and enforces contracts
- strong opposing political factions - well organised and funded special interest groups may disrupt the process of establishing an MBI if it is perceived to disadvantage their financial interests
- community perception – there is the potential for MBIs to be perceived as representing the ability to pay to pollute, especially with cap and trade programmes.

For an MBI to be effective within the Australia context it would need to create a price signal that includes the post consumer management of products and packaging; reward those companies adding value through additional recovery of resources over and above baseline performance; provide an incentive to invest in reverse distribution and reprocessing infrastructure; and influence the design of products and packaging so that they fit into a planned beneficiation option at their end-of-life.

05 CONCLUSION - OPTIONS FOR CONSIDERATION IN QUEENSLAND

05

Queensland is at the crossroads. It is the only mainland state in Australia without a defensible waste strategy that incorporates targets and associated action to improve resource recovery. Actions for Queensland to consider include:

- developing a strategy with targets and the immediate implementation of a landfill levy as the basis for encouraging action to improve recycling performance across the state.
- a UK style of Landfill Allowance Trading Scheme (LATS) - with the obligation on local government to reduce the amount of putrescible waste sent to landfill. A series of allowances is allocated in line with the reduction timeline. Those Councils able to exceed their diversion targets would have surplus allowances that could be traded to Councils unable to meet their obligations. The ceiling price of the allowances would be set by the price of the penalty for not having enough allowances to cover the amount of putrescible waste sent to landfill.
- establishing embodied energy as a form of carbon abatement under the proposed National Emissions Trading Scheme - it is well known that recycling saves energy, especially for materials like aluminium and plastic. Recycled materials are said to have a lower embodied energy than their primary resource counterparts. Because a lower energy profile produces less greenhouse gas emissions, savings in embodied energy are a form of carbon abatement. One way to drive greenhouse gas friendly recycling would be to establish embodied energy under an emissions trading scheme, such as the proposed National Emissions Trading Scheme (NETS) or Australian Emissions Trading Scheme (AETS)¹⁹.

- resource recovery certificates - RRCs would seek to support a sustainable resource recovery sector, similar in purpose to renewable energy certificates (RECs). There are three general areas where an RRC could be applied. Firstly upstream, creating a market pull for material inputs with recycled content; secondly downstream, creating a supply push of recovered resources; and finally a midstream approach, aiming for balance by combining supply push and market pull. Of the three options, a simplified downstream MBI applied to landfill owners/operators and requiring them to divert increasing amounts of material away from landfill toward beneficial use, has the greatest potential due to (relative) administrative simplicity.

Other potential approaches include targeting elements within the packaging supply chain and establishing a recovery liability based on the amount of packaging they handle;²⁰ application of a levy benefit scheme for products similar in operation to the national Used Oil Product Stewardship scheme; or a mechanism to reward the eco-system services of recycling, as advocated by the Australian Council of Recyclers.

Each potential instrument has its own set of strengths and weaknesses, with varying impacts and benefits on participants within the recycling value chain.

It is hoped that this 'State of Waste in Queensland' report, and the associated workshop for key stakeholders, will provide impetus to deliver sustainable systems of resource recovery.

¹⁹ NETS is the scheme proposed by Australian states, and AETS is the scheme being developed by the Prime Ministerial Task Group on Emissions Trading.

²⁰ For example Packaging Recovery Notes in the UK - see 'Packaging and Packaging Waste' at <http://www.defra.gov.uk/environment/waste/topics/packaging> .

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07

7.1 Appendix 1 - Waste to Landfill 2001-2005

Table 6 - Waste disposed of to landfill in Queensland (Queensland Government, 2002, 2003, 2004, 2005)

Waste Stream	2001	2002	2003	2004	2005
Municipal		1,223,000	1,139,000	1,100,000	1,950,000
Commercial and Industrial		577,000	747,000	565,000	520,000
Construction and Demolition		645,000	678,000	1,428,000	1,154,000
Green and Organic		286,000	159,000	112,000	68,000
Regulated Waste and Other		91,000	95,000	730,000	2,333,000
Total	3,610,000²¹	2,822,000	2,818,000	3,935,000	6,025,000

7.2 Appendix 2 – Resources Recovered 2001-2005

Table 7 - Resource Recovery in Queensland (Queensland Government, 2002, 2003, 2004, 2005)

Waste Stream	2001	2002	2003	2004	2005
Municipal		150,000	158,000	169,000	357,000
Commercial and Industrial		21,000	212,000	333,000	233,000 ²²
Construction and Demolition		330,000	488,000	583,000	816,000 ²³
Green and Organic		344,000	391,000	569,000	859,000
Regulated Waste and Other		59,000	131,000	341,000	7,000
Total	588,000	904,000	1,380,000	1,995,000	2,272,000

²¹ Likely to still include bio solids

²² Floc has been subtracted because this material is not recycled

²³ Fly ash has been subtracted because the recycling of fly ash is not part of the urban waste stream

07 APPENDICES

7.3 Appendix 3 - Summary material composition of Queensland waste generation

Table 8 - Summary material breakdown of waste generation in Queensland during 2005 (averages for disposal from WMAA 2006).

Material Type ²⁴	Tonnes Wasted to Landfill	Tonnes Recycled	Total Waste Generation
Food and other organics	595,000	7,000	602,000
Paper & Cardboard	930,000	413,000	1,343,000
Garden Organics	707,000	699,000	1,406,000
Wood/Timber	384,000	18,000	402,000
Glass	162,000	81,000	243,000
Adjusted non-ferrous	43,000	16,000	59,000
Ferrous	683,000	351,000	1,034,000
Plastic	314,000	23,000	337,000
Soil/Rubble and Other			
Clean Excavated Material	716,000	175,000	891,000
Concrete, bricks and asphalt	1,262,000	378,000 ²⁵	1,640,000
Other Recyclables			
(inc Textiles and Rubber)	183,000	99,000	282,000
Other (waste)	46,000	12,000	58,000
Total	6,025,000	2,272,000	8,297,000

7.4 Appendix 4 - Total Waste Generated in Queensland

Table 9 -Total waste generated in Queensland

Waste Stream	2001	2002	2003	2004	2005
Municipal		1,373,000	1,297,000	1,269,000	2,307,000
Commercial and Industrial		598,000	959,000	898,000	753,000
Construction and Demolition		975,000	1,166,000	2,011,000	1,970,000
Green and Organic		630,000	550,000	681,000	927,000
Regulated Waste and Other		150,000	226,000	1,071,000	2,340,000
Total	4,198,000	3,726,000	4,198,000	5,930,000	8,297,000

²⁴ Biosolids have been left out this overview because they are not considered part of the urban solid waste stream.

²⁵ Adjusted by adding 229,000 tonnes to match national recycle data better (Nationally 67% of 'Concrete, bricks and asphalt' category is recycled compared to Queensland estimate of only 23% - have assumed that this is an underestimate)

07 APPENDICES

7.5 Appendix 5 - Comparison of Queensland waste generation against other Australian jurisdictions

Table 10 - Tonnage comparison of Queensland Resource Recovery Performance (2002/03) (derived from Hyder Consulting 2006b²⁶)

Category	QLD	NSW	Vic	WA	SA	TAS	ACT	NT	AU Totals
Disposed	6,025,000	6,341,000	4,180,000	3,706,000	1,277,000	497,000	207,000	83,000	22,316,000
Recycled	2,272,000	5,830,000	4,429,000	826,000	2,156,000	38,000	467,000	10,000	16,028,000
Generated	8,297,000	12,171,000	8,609,000	4,532,000	3,433,000	535,000	674,000	93,000	38,344,000

²⁶ Estimates for Queensland derived from this current analysis and are used to overcome under reporting in 2002/2003.

NOTES



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