

# Draft Solid Waste Management Strategy

2003 - 2005



*Dedicated to a better Brisbane*

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## Vision Statement

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*“Brisbane City Council will create a clean, green and prosperous Brisbane by minimising negative impacts of the City’s waste. When waste cannot be avoided or reduced, Council will recover the embedded resources to maximise their value to society before ensuring safe disposal.”*

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## Executive Summary

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Brisbane City Council manages almost half the city's wastes through one of the most efficient and safe waste systems in the world. A state-of-the-art fleet of dedicated waste trucks and waste and recycling single pass trucks can collect both recyclable material and waste from the kerbside. Recyclable material is taken to Materials Recovery Facilities (MRF) for processing. Waste is transported to centrally located transfer stations. From the transfer station the waste is bulk hauled to fully engineered, double sealed landfills with full gas recovery and leachate treatment.

Despite this, our current system is clearly unsustainable as each household continues to send about a tonne of resources to disposal each year. Increasing consumerism and a reluctance by State and Federal Governments to force producers to be responsible for their products leaves local government with an expensive waste problem.

Those wasted resources also represent an enormous environmental and economic loss. Recycling reduces those losses through energy savings and reduced environmental impact through reprocessing. Recovered resources feed local re-manufacturing. For example the current kerbside recycling system provides an estimated economic benefit of \$20 million and 1500 jobs to Brisbane.

### **New directions?**

Brisbane residents aspire to a clean, green and prosperous City and Council has recently articulated this in its *Living in Brisbane 2010* vision. Sustainable waste management is a key part of realising that vision.

Like most environmental issues, the prioritising expenditure is the key decision. What is the most effective way to divide ratepayers' money between competing projects such as Greenways, sewerage up-grades, public transport and waste management? It is a difficult decision because many of the environmental consequences of waste lie outside of Brisbane whereas the recent up-grades of Brisbane's sewage plants have directly improved Moreton Bay.

There are a number of potentially valuable, but high capital cost, waste treatment technologies, emerging in waste management. Many target recovering energy embedded in the organics, timber or plastics for the growing renewable energy market. All of these emerging technologies require very good sorting systems to be in place before treatment to remove hazardous, inappropriate or valuable items.

While these new technologies are being assessed, Council will concentrate on the recycling of waste resources, knowing that it is money well spent in fostering re-manufacturing and reducing environmental impact. Just as importantly, it is relatively cheap compared to the more sophisticated and as yet un-proven technologies and is compatible if, or when, Brisbane chooses to adopt a specific technology.

It is vital to realise that the most environmentally sound and cheapest way to manage our waste is by reducing it. Home composting combined with increased kerbside recycling has the theoretical potential to reduce Brisbane's waste by an additional 60 percent. Well-targeted education programs that meet the aspirations of residents may be the best investment Brisbane can make over the next few years while it examines the new technologies.

Brisbane City Council's Solid Waste Management Strategy will be reviewed after the State Government publishes its own Waste Strategy and there is some certainty of both a regulatory and commercial framework. Market dynamics change constantly and so Brisbane will avoid investing in options that

limit future flexibility such as waste to energy plants that require guaranteed waste streams for 15 to 20 years to be viable.

### **The strategy – key actions**

- Council will continue to encourage home composting and mulching through targeted campaigns and incentives to reduce that 30 percent proportion of the waste stream going to landfill.
- Council will immediately examine converting the Transfer Stations from efficient disposal sites to resource recovery facilities to feed

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existing markets and reduce the consumption of expensive landfill space. This will include mechanical source separation.

- Council will continue to encourage better recycling through targeted education, incentives and market development for recyclables, particularly compost and mulch to increase the viability of organics recycling.
- Council will continue to monitor the emerging waste treatment technologies to assess their applicability to Brisbane.
- The remaining residual wastes will be disposed of in a secure landfill. Council will maintain that level of secure containment with a particular emphasis on minimising any adverse impacts on the amenity of those living next to the landfill. The organic fraction (currently more than 50 percent of Brisbane City Council's waste) that degrades into methane will be captured and recycled to power a green energy plant. Council will explore emerging landfill methodologies including bioreactors.

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## Background

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### Living in Brisbane 2010

*Brisbane 2010 is a city to look forward to living in – a city that is smart, prosperous, accessible, inclusive, creative, healthy, environmentally friendly, and that leads the region by example<sup>1</sup>.*

The Brisbane City Council Waste Management Strategy 2003 – 2005 will support the achievement of the *Living in Brisbane 2010* vision through specific strategies aimed at:

- reducing the generation of waste
- recovering those resources from the waste stream which can add value
- managing the disposal of residual waste to minimise its economic and environmental impact on the community.

By adopting the actions contained in this strategy Council will be able to deliver on aspirations detailed in the clean and green city theme<sup>2</sup>, the smart and prosperous city theme and regional and world city theme, three of the eight strategic directions of the 2010 vision.

### Waste is a loss

The presence of waste represents an environmental, economic and social loss to the community. It is an economic burden incurred through the costs of collection, disposal and landfill management. Waste sent to landfill not only represents potential lost jobs and industry development but also is an inefficient and unsustainable use of natural resources. Cities and industries can create a competitive advantage by spending less on waste generation, collection, recycling and disposal. Improved product design, waste re-utilisation and resource recovery represent major opportunities for Brisbane to become a sustainable and globally competitive city.

The \$40 million (1997-2002) spent so far on remediation of old landfills in Brisbane, illustrates a fraction of the true costs of what was once seen as 'cheap' disposal and gives some indication of the value of minimising waste disposal. There are local environmental impacts from illegal or improper waste disposal as well as the collection, transport and management of waste. Waste also adds to the cost of goods and services without adding to their value or quality and is a key indicator of the inefficiency and non-sustainability of our society.

*"99 percent of the original materials used in the production of, or contained within, the goods made in the US become waste within six weeks of sale<sup>3</sup>"*

To become both smart and prosperous and environmentally friendly means moving away from the traditional dependence Council has had on providing only best practice waste disposal.

### Becoming a smart, prosperous and environmentally friendly city

Recovering resources from material normally regarded as waste can reduce the energy or material requirements during the manufacturing process, can employ Brisbane residents in re-manufacturing industries and reduce the environmental impact of our profligate society. For example the introduction of recycling into Brisbane City Council has resulted in an industry which employs 700 people directly and an estimated 1500 jobs from ancillary businesses. The annual economic benefit to Brisbane of the recycling industry is estimated at \$20 million dollars<sup>4</sup>. For Brisbane City Council, maximising resource recovery will reduce the dependence on landfills to manage waste, reduce the environmental impacts from the Brisbane Landfill as well as provide an economic return to the residents of Brisbane.

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<sup>1</sup> *Living in Brisbane 2010* a vision for our city's future – turning vision into reality

<sup>2</sup> See Appendix C – Summary

<sup>3</sup> Factor 4 Doubling Wealth-Halving Resource Use Ernst vonWeisacker, Amory Lovins L.Hunter Lovins Allen & Unwin 1997 page xx

<sup>4</sup> Visy Industries Queensland

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## Challenges to waste reduction

In meeting the *Living in Brisbane 2010* vision as well as implementing this waste strategy Council will face a number of challenges. These challenges will have to be met if Council is to reduce the amount of waste being generated within the city.

**Jurisdictional:** Council controls waste from domestic residences and some commercial waste. Most of the city's waste lies beyond Council's legal jurisdiction and responsibility. The State Government is responsible for strategic direction and all other wastes. However, State Government waste policy has recently seen reduced funding and minimal implementation of the current Cabinet-endorsed Waste Strategy including the rejection of extended producer liability. Brisbane City Council will have to continue dealing with the waste created by producers via their products.

The State Government has approved many decades of landfill space with no mandatory recycling requirements. The flow-on effect has been to drive down of the cost of landfilling and reduce recycling opportunities for South East Queensland. This may be alleviated if the planned new State Government Waste Strategy and funding of the Queensland Waste Industry Development Strategy, designed to benefit waste management in Queensland, is implemented.

**Competition:** The State Government's introduction of private sector competition in the area of waste disposal, means that the costs associated with resource recovery will have to compete in an environment of low landfill disposal charges and State and Federal subsidies for virgin material use.

**Population and lifestyle:** The population of Brisbane has been increasing by an average two percent per year for the past five years. During this time, there has been an average annual increase of three percent in the combined domestic and privately delivered waste stream. Such a rise in waste generation may be due to a number of factors outside the control of Council, such as changing trends in the packaging of goods, increasing levels of consumption and changing lifestyle trends.

**Economic:** The economy is geared to growth and relies, to a significant degree, on increasing consumer spending which subsequently increases waste. Waste generation rates correlate closely with positive conventional economic indicators.

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## Solid Waste Management – Policy and Strategy

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### Waste policy

*Brisbane City Council will pursue sustainability by minimising the environmental, economic and social impacts of its waste. It will remain focussed on achieving a reduction in waste generated and will assist businesses and the community to do likewise. Council will endeavour to maximise the economic recovery of those resources for which there are either existing or emerging markets.*

Council supports a 'no regrets' resource recovery approach. This means recovering resources and fostering technologies that deliver a positive environmental benefit without imposing an undue burden on ratepayers or the local economy. The long-term objective is to minimise the adverse impacts of resource use and avoid the production of wastes that have significant adverse impacts. The strategy will focus on those waste streams that Council can directly control: kerbside collected mixed waste; kerbside collected recycling and customer-delivered waste.

### Waste goals

To implement this policy Council will adopt a three-year rolling program which (see **Action Plans**<sup>5</sup>) focusses on:

1. Facilitating waste reduction - reducing waste generation at its source. Waste reduction is the most cost-effective strategy for managing waste and conserving virgin resources.
2. Increasing the level of resource recovery, within Council's own operations, at the household and at commercial and industrial levels, while ensuring long-term sustainable resource recovery through long-term development of robust markets. Resource recovery reduces our dependence upon the continued extraction of natural resources by replacing them with a range of materials extracted from the waste stream.

3. Develop its waste management operations to meet or exceed recognised best practice standards minimising the environmental impact from the disposal of residual wastes.

### Waste strategies

Seven broad strategies have been developed to achieve these three goals. The strategies aim to:

- increase the level of reuse or diversion of organic material at the point at which it is generated
- improve the level of sustainable diversion and reuse of timber and green waste
- establish a recycled organics industry which can produce products such as amended soils, compost and mulch
- reduce the costs and impacts of Council's own waste
- increase the level of resources recovered from the non-organic waste stream
- minimise the environmental, economic and social costs of waste to Brisbane
- minimise the negative environmental, economic and social impact of waste disposal at the Brisbane Landfill.

This strategy will also be progressively reviewed during the rolling three-year program to ensure its continued relevance. A major review will be scheduled when the State Government finalises the Queensland Waste Strategy and Queensland Waste Industry Development Strategy. At that point, it will be possible to set longer-term goals for waste management in Brisbane.

### Current trends in waste management

The strategy takes into account the current trends in waste management happening nationally. At state level, EcoRecycle<sup>6</sup>, Resource New South Wales<sup>7</sup> and the Australian Capital Territory<sup>8</sup> all recognise the need to move away from a dependence upon landfill disposal to that of recovering and reusing resources. A variety

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<sup>5</sup> Refer pages 11 to 14

<sup>6</sup> A Materials Efficient Future for Victoria – Developing a Solid Waste Strategy for Victoria September 2002  
EcoRecycle Victoria

<sup>7</sup> The Draft Waste Avoidance and Recovery Strategy 2002 Resource NSW

<sup>8</sup> No Waste by 2010 – A Waste Management Strategy for Canberra ACT Waste Management



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of approaches have been identified including reducing waste from targeted industries, the selective adoption of alternate waste technologies and market support through 'green purchasing'. Green purchasing involves buying products made from or containing recycled material, or manufactured in such a way as to produce minimal impact to the environment.

The Brisbane City Council waste management strategy will also:

- contribute to the achievement of clean and green city component of the *Living in Brisbane 2010* – a vision for the city's future<sup>9</sup>
- fulfil the legislative requirements for local government as described in the *Environmental Protection (Waste Management) Policy 2000*<sup>10</sup>.

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<sup>9</sup> Refer Appendix B – *Living in Brisbane 2010*

<sup>10</sup> Environmental Protection (Waste Management) Policy 2000  
Part 7 – Waste Management Strategic Planning by Governments  
Division 1 – Local governments

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## Brisbane – Waste

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### Current status

Council manages approximately 530 000 tonnes of waste material annually. Table 1 (see below) provides a breakdown of this waste by source and quantity.

**Table 1 – Brisbane City Council waste stream 2000/01**

<b>Source</b>	<b>Quantity (tonnes)</b>
<b><i>Kerbside Collection</i></b>	
Waste domestic	274 600
Recycling domestic	60 900
<b><i>Delivered to Transfer Stations</i></b>	
Commercial and industrial waste	86 000
Domestic and household waste	49 500
Charities waste	7 100
Brisbane City Council waste	7 100
Domestic and commercial garden organics	40 800
Domestic and commercial recyclables	6 000
<b>Total Waste Stream</b>	<b>532 000</b>

During 2000/2001, more than 100,000 tonnes (or 20 percent) of material, in the form of kerbside recyclables (approximately 60,000 tonnes) and self-delivered garden organic material (approximately 40,000 tonnes), was diverted away from landfill and reused.

While many Council operations already significantly reduce or recycle their wastes, as a first step toward coordinating the reduction of its own wastes Council conducted a review of its own internal waste generation. The review excluded those wastes generated as a result of water and sewerage treatment. Biosolids, the solid waste residue from the sewerage treatment process, are a significant waste generated by Council (140,000 tonnes per annum). A separate management plan for this material is being developed by Brisbane Water. While biosolids are not included in this strategy any options for resource recovery in conjunction with municipal solid waste will be examined to ensure that any synergies are not lost.

### The waste stream

Council conducts an annual waste characterisation study, which looks at the composition of the waste brought to Council's transfer stations for disposal from its three largest sources, kerbside collected domestic waste, household delivered waste and commercial and industrial waste. The waste characterisation survey provides a snapshot of the types of material which comprises waste and provides an approximate method for determining the quantity of each type of waste received. Council uses this information to analyse disposal and reuse options for each waste type.

Waste can be divided into two broad categories, organic and non-organic. Waste received by Brisbane City Council (Graph 1<sup>11</sup>) is roughly 70 percent organic (food, paper, vegetation, wood), 30 percent inorganic (largely inert materials such as metals, plastics, soil) and contains very minor quantities of domestic hazardous wastes.

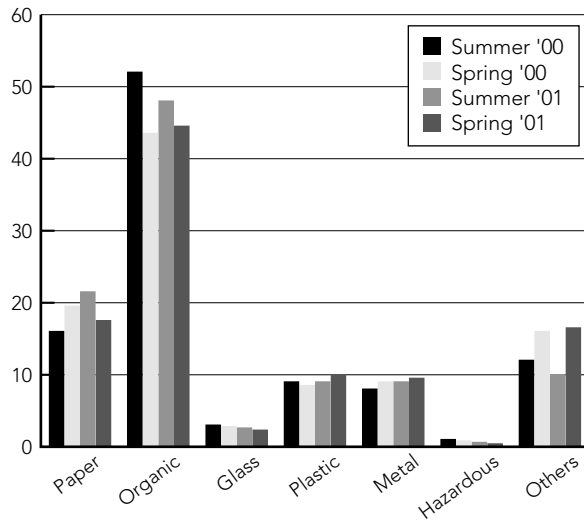
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<sup>11</sup> Refer page 10

There are organic<sup>12</sup> and non-organic<sup>13</sup> resources which are potentially recoverable and for which there are existing markets. For example, it is estimated that about 25 percent of household mixed waste is suitable for recycling through the current kerbside recycling collection, while 28 percent of commercial waste is potentially recyclable (kerbside category recyclables). Eleven percent (11 percent) of household domestic waste is suitable for home composting or mulching. Retaining this material on site would deliver significant environmental and economic benefits. Household delivered waste also contains a significant amount of timber and metal. The timber would be suitable for renewable energy generation, while metal could be recycled, saving energy and natural resources.

**Graph 1**

**Comparison of Total Waste Stream**



The need for a landfill will remain even with the implementation of resource recovery programs as a way of managing those residual materials for which there is no viable market for recoverable materials or there is no cost-effective technology to facilitate removal or reprocessing of particular resources.

<sup>12</sup> Refer Appendix A

<sup>13</sup> Refer Appendix B

## Action Plans

### Organic Waste – Action Plan

#### Waste reduction – organic waste

Strategy	Action	Task Priority
<p><b>Increase the level of reuse or diversion of organic material at the point at which it is generated.</b></p> <p>Council will:</p>	Develop and implement a home composting and mulching campaign for domestic garden and food waste. The campaign to include: <ul style="list-style-type: none"> <li>• compost and mulch information review</li> <li>• low waste garden design</li> <li>• commercial low waste garden service.</li> </ul>	1
	Develop internal trial organics reuse projects.	2
	Encourage community/small organisation organics reuse by providing appropriate information/support.	3
	Encourage and facilitate the development of: <ul style="list-style-type: none"> <li>• commercial home composting/mulching service</li> <li>• recycled organics industry and products</li> </ul>	4
	Facilitate Council-industry events that promote waste reduction, resource recovery.	5
	Investigate organics treatment technology for apartments, multiple occupancy dwellings.	6

#### Resource recovery – organic waste

Strategy	Action	Task Priority
<p><b>Improve the level of sustainable diversion and reuse of timber and green waste.</b></p> <p>Council will:</p>	Conduct regular waste characterisation studies to quantify amounts and types of organic materials.	1
	Review waste pre-treatment options and transfer station infrastructure to maximise recovery of timber and green waste and implement cost-effective options which increase resource recovery.	2
	Conduct life cycle analysis of organics disposal to landfill. Model emissions (including fugitive emissions) with green waste putrescibles removed.	3

## Resource recovery – organic waste

Strategy	Action	Task Priority
<b>Establish a recycled organics industry and develop recycled organics products such as amended soils, compost and mulch.</b>  Council will:	Develop a sustainable purchasing program which includes products which contain quality assured recycled organic products.  For example: <ul style="list-style-type: none"> <li>• Including recycled organics in landscape material</li> <li>• Including the need to comply with the appropriate Australian Standard and the requirement to demonstrate quality assurance practices in BCC tenders.</li> </ul>	1
	Assist Economic Development (CED) to establish recycled organics industry cluster.	2
	Conduct recycled organics markets study for Brisbane and communicate results to organics industry.	3
	Review "Garden to Garden" (NSW) and "Garden Organics" (Vic) recycled organics promotions. If appropriate develop parallel program for Brisbane.	4

## Non-Organic Waste – Action Plan

### Waste reduction – non-organic waste

Strategy	Action	Task Priority
<b>Reduce the costs and impacts of Council's own waste to Brisbane.</b>  Council will:	Reduce waste from the Brisbane Administration Centre (BAC) by the implementation of a waste reduction service and program delivered via the service tender for the building.	1
	Assist Council divisions, businesses and joint ventures to integrate cost-neutral waste reduction into their business plans. Actions will also include: <ul style="list-style-type: none"> <li>• waste auditing of facilities</li> <li>• provision of BAC waste reduction model.</li> </ul>	2
	Assist the development and implementation of an expanded sustainable purchasing program for Brisbane City Council.	3
	Assist the development and implementation of policies and standards in Brisbane City Council for public event recycling in Brisbane.	4
	Assist in the development, implementation and promotion of public place recycling facilities at major Brisbane City Council open spaces.	5

**Resource recovery – non-organic waste**

Strategy	Action	Task Priority
<p><b>Minimise the negative environmental social and economic costs of waste.</b></p> <p>Council will:</p>	Educate residents about the kerbside system and its benefits to Brisbane and develop the kerbside WasteBusters program.	1
	Reinforce kerbside behaviours through public event and public place recycling.	2
	Review household hazardous waste service to: <ul style="list-style-type: none"> <li>• ensure continuance of best practice</li> <li>• investigate the feasibility of collection of hazardous waste at transfer stations</li> <li>• assess the provision of education/information on alternative non-toxic products; secure storage, alternative disposal choices.</li> </ul>	3
	Lobby for national packaging reform.	4
	Establish partnerships which: <ul style="list-style-type: none"> <li>• assist/educate organisations and businesses to reduce waste and/or environmental impacts</li> <li>• educate organisations and businesses about the real costs of waste disposal.</li> </ul>	5

## Waste disposal – non-organic waste

Strategy	Action	Task Priority
<b>Increase the level of resources recovered from the non-organic waste stream.</b>  Council will:	Conduct a thorough evaluation of its current transfer station operation, to facilitate a change from waste disposal to resource recovery and implement cost effective options from the evaluation to improve resource recovery.	1
	Investigate the markets and separation costs for the resource streams it controls to identify viable resource recovery programs.	2
	Configure the franchise agreement with City Waste Services, so that there is a clear financial encouragement to recover resources.	3
	Investigate extra recycling bin collection or provision of second recycling bin to determine demand, yields and costs.	4
	Review inner-city recycling systems and options for alternatives to current 240 litre recycling service.	5
	Develop and implement Construction and Demolition waste recovery programs which: <ul style="list-style-type: none"> <li>• investigate incorporating requirements into the town planning process to maximise the recycling of C&amp;D waste</li> <li>• assist the establishment of Nudgee Hardfill site as best practice C&amp;D resource recovery site</li> <li>• facilitate the establishment of a C&amp;D recovery facility, possibly on the Willawong recycling precinct.</li> </ul>	6
	Map the wasted resources potentially available to re-manufacturers.	7
<b>Minimise the negative environmental, economic and social impact of waste disposal at the Brisbane Landfill.</b>  Council will:	Use only best practice waste disposal facilities to minimise adverse environmental impacts, concentrating on the tipping face as highest priority.	1
	Maximise the economic value of airspace at the Brisbane landfill as a means of reducing the environmental impacts and costs to the community.	2
	Facilitate the recovery of landfill gas for conversion into renewable energy.	3
	Use its disposal facilities to generate funds to increase their environmental performance and retain a positive influence on disposal practices and the commercial market.	4

## Appendix A

### Resource analysis - organic waste

Organic material is the largest single category of waste (40 percent-50 percent) of each of the three waste streams (kerbside domestic waste, commercial and industrial waste and fixed-fee vehicle delivered waste) brought to Council transfer stations. This percentage is even greater (up to 70 percent) if paper and cardboard (normally classified as recyclable) are also included.

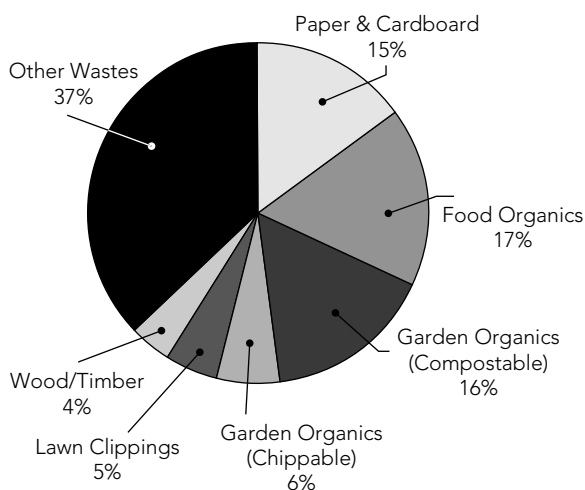
#### Domestic organic waste

Food organics, compostable garden organics and lawn clippings make up 38 percent (see Graph 2 below) of the domestic waste stream. This represents approximately 100 000 of the more than 270 000 tonnes of kerbside domestic waste collected during 2000 – 2001.

Paper and cardboard makes up approximately 15 percent of domestic waste. The kerbside recycling collection is the best way to recover this type of waste.

#### Graph 2

##### Domestic Waste (Organic Component)



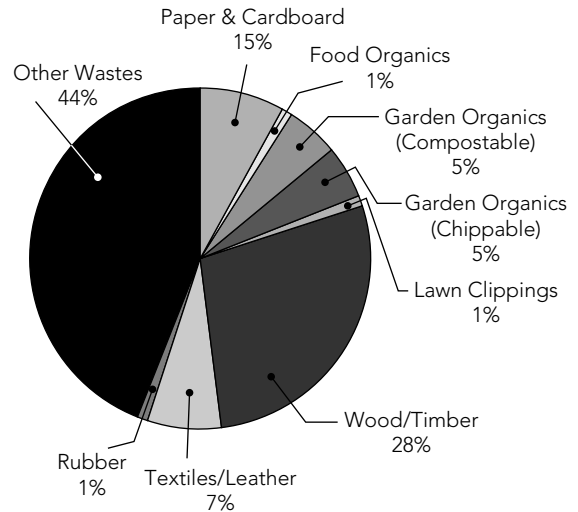
#### Customer-delivered organic waste

Timber, hard garden waste, paper and cardboard comprise 41 percent of the customer-delivered waste arriving at Council transfer stations (see Graph 3). This represented about 20,000 tonnes of material during 2000 - 2001. While some may be suitable for recycling, some is better suited for energy recovery.

#### Graph 3

##### Customer-delivered (Organic Component)

##### Commercial and industrial organic waste

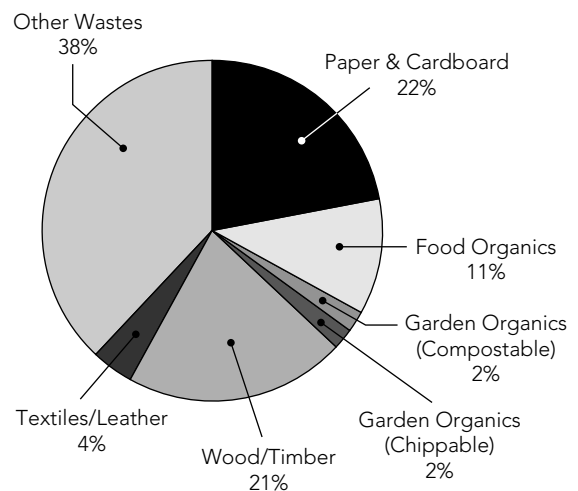


Timber, chippable garden organics and paper and cardboard comprise 45 percent of the commercial and industrial waste stream (see Graph 4 below). These three resources have ready markets.

#### Graph 4

##### Commercial & Industrial Waste (Organic Component)

Where appropriate, the timber component could be reused or used in the generation of green electricity, while paper and cardboard



may be suitable for recycling. Recovery could be facilitated by using recycling/waste screening facilities, which offer differential pricing for pre-separated loads and/or discounts for quantities of



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resources recovered. Wastes could also be sorted at the transfer station to separate resources.

The estimated 36,000 tonnes of these resources received during 2000 – 2001 is likely to vary significantly due to competition from private waste disposal companies. The use of large compactor vehicles will also reduce resource recovery opportunities. While transfer station infrastructure changes will be based mainly on quantities of kerbside domestic and customer-delivered waste to the transfer station, Council is evaluating technology which may provide scope to recover resources, such as metal, from this waste stream.

### **Environmental issues with organics reuse**

Beneficial reuse of organic material usually involves composting the material. United States EPA studies indicate that the most environmentally beneficial management of organic material is to have the household compost it. Home composting is also the most economically beneficial.

There are several environmental issues associated with commercial composting.

**Odour:** Decaying organic matter can cause odours at the landfill and be a nuisance to neighbours. The alternative treatment of this material by composting or anaerobic digestion has, if poorly managed, the potential also to cause odours.

**Pest control:** The distribution of green waste and compost can provide opportunities to spread weed seeds (if poorly composted) and pests such as fire ants.

**Gas emissions:** A poorly managed (anaerobic) composting process can produce methane gas and exacerbate greenhouse gas emissions.

**Run-off:** Although non-toxic, organic wastes can damage the health of rivers and streams through nutrient-rich run-off.

Each tonne kept out of the kerbside collection and retained at the household saves Council ratepayers an estimated \$37 in avoided landfill and waste transport costs. It is estimated that 100 percent diversion of household compostable

materials (food, compostable garden material, lawn clippings, paper and cardboard) would save approximately about \$5.3 million annually. One hundred percent diversion of the traditionally composted materials (eg. soft garden trimmings and lawn clippings but not food organics) would save approximately \$2.1 million annually.

Opportunities are emerging to use hard organic material as a source of fuel in waste to energy projects. Council will treat the use of waste-to-energy technology with caution. As well as its potential to affect local and regional air quality, the performance of some of the emerging technology in this field is yet to be fully proven.

### **Economic opportunities for organic waste**

Separated garden organics can be classified into two types – a hard, woody fraction (approximately 5.2 percent) and a soft high water fraction such as leaves and grasses (approximately 11 percent).

The soft fraction is suitable for composts and mulches, which assist soil fertility and water conservation. The current market for recycled organic materials in South East Queensland is underdeveloped and opportunities for major agricultural use of recycled organics are not yet viable. Subsidies for agricultural usage could help to develop this stagnant market.

The woody fraction is suitable for combustion or gasifying to produce renewable energy. Renewable energy currently has a low financial return but has a strong market demand. The emerging technology of gasification is more environmentally benign than combustion, but is a more expensive technology. The main issues for gasification are air quality impact and economic viability. No profitable, well-established opportunities currently exist for recycled organics.

Anaerobic digestion in a contained vessel produces renewable energy (through methane generation) and compostable sludge, but is very expensive at more than \$100/tonne net.

Once separated, organic materials can be composted or anaerobically digested or gasified for energy recovery. Separation (about \$30/tonne) and digestion or gasification currently

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costs at least \$100/tonne plus. The Brisbane landfill collects more than 90 percent of the gas and generates renewable energy for the cost of approximately \$70/tonne.

### **Market analysis of organic waste**

**Recycling:** An established market exists for recycled paper and cardboard. This market is capable of absorbing any quantities of paper and cardboard recovered from the kerbside or transfer stations. The economic cost of separating these materials from mixed loads may not yet be viable.

**Energy:** The introduction of the Commonwealth's Renewable Energy (Electricity) Act 2000 has created a stable, high-volume, low-return market for the hard fraction of garden organics and timber waste. Stanwell Corporation's newly established waste-to-energy project at the Rocky Point Sugar Mill has indicated it would be capable of absorbing 180 000 tonnes of hard green waste annually. Other waste-to-energy projects are also proposed. It is appropriate for hard green waste, timber and wood to be diverted to such a scheme, providing that social, environmental and economic benefits can be demonstrated. The development of private sector waste-to-energy landfill bioreactor market may provide a future opportunity for the organic fraction recovered from appropriately pre-treated mixed municipal solid waste.

**Compost/mulch:** The compost/mulch market is an undeveloped but emerging market. The soil amending/composting industry can, given appropriate development, deal with the soft organic fraction. The potential market for recycled organic material is very large, comprising the urban residential sector, the horticultural sector and the agricultural sector. The environmental benefits from the use of correctly recycled organic materials in all three sectors are well known. Presently it is the urban market, which is absorbing the output from the adjacent licensed soil-conditioning industry. There is an emerging high value market for organically grown food while the issue of long-term sustainable food production is significant. Queensland farmers are yet to be convinced of the value of compost. Composts returned to soils in the Moreton Bay catchment also reduce soil and chemical run-off into the bay. Waste-to-energy provides an alternative to landfilling hard garden organics, timber and wood. In diverting this material, Council should ensure that the smaller woody fraction and softer fraction is not lost to the soil amending/composting industry.

## Economic analysis<sup>14</sup> of organic waste

Recovery option	Resource/s recovered	Net cost per tonne of waste†	Benefits
Landfill	Landfill gas	\$35-\$40/tonne	Reduced greenhouse emissions Renewable energy
Pre-treatment (separation into organic and non-organic)	Energy value Nutrient value (dependent upon treatment method)	\$30/tonne separation costs plus cost to gasify or anaerobically digest material (see gasification, anaerobic digestion costs)	Reduced greenhouse emissions Renewable energy (See compost benefits)
Landfill bioreactor	Landfill gas Remediation grade compost	\$35-\$40/tonne	Reduced greenhouse emissions Improved soil fertility
Gasification (energy recovery)	Energy value Ash (biofertiliser)	\$80-\$170/tonne	Reduced greenhouse emissions Renewable energy (See compost benefits)
Anaerobic digestion (energy recovery)	Energy value Nutrient value (biofertiliser)	\$70-\$150/tonne	Reduced greenhouse emissions Renewable energy (See compost benefits)
MSW incineration (energy recovery)	Energy value Ash (Road construction/compost)	\$180-\$260/tonne	Reduced greenhouse emissions Renewable energy Reduced demand on virgin resources
Commercial Composting Home composting	Nutrient value	\$25-\$40/tonne windrow compost In-vessel \$70/tonne* nil cost	Improved soil fertility Reduced greenhouse emissions Reduced use of chemicals and mineral fertilisers Reduced water pollution
Kerbside recycling	Raw material Energy (in manufacture)	\$35/tonne	Reduced greenhouse emissions Reduced demand on virgin resources

† Figures do not include collection costs.

\* Estimated figure only as no clear figure available for in-vessel technology.

<sup>14</sup> All economic costs derived from Report of the Alternative Waste Management Technologies and Practices Inquiry – State Government of NSW April 2000 unless indicated otherwise.

## APPENDIX B

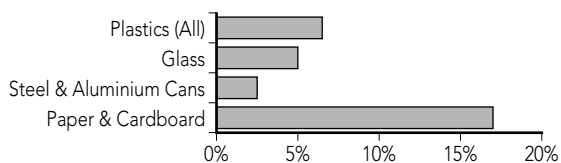
### Resource analysis – non-organic waste

The non-organic waste makes up between 50 percent to 60 percent of the three waste streams (kerbside domestic, customer-delivered waste and commercial and industrial) brought to Council transfer stations for disposal. This waste is largely inert in nature.

### Domestic non-organic waste

Council's annual waste characterisation studies show that up to 25 percent of the material in the household refuse bin could be recycled at little extra cost. This would offer savings of approximately \$23/tonne in avoided, deferred and postponed landfill costs.

### Recoverable Resources in Domestic Waste

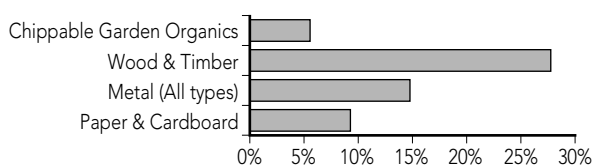


Recovering that material would double the current amount of kerbside recycled material. Council will need to focus on behaviour change to improve diversion of this material away from landfill.

### Customer-delivered non-organic waste

Residents and smaller commercial operations deliver mixed wastes to Council's transfer stations. There are some obvious targets for recovery at the transfer stations such as timber, metals and reusable household goods. Council is examining how to increase the level of recycling at transfer stations.

### Recoverable Resources Customer-Delivered Waste



### Environmental issues for non-organic waste

Current recycling is environmentally positive (when the environmental costs are included, the savings are valued at \$42/household per annum – Nolan ITU 2001). The disposal of residuals to landfill can result in contaminated leachate unless contained. Those residuals also represent environmental negatives in the loss of resources and embedded energy and effort. The amenity of landfill neighbours is at risk from odours, dust and noise.

### Household hazardous waste

Council currently facilitates the safe disposal of domestic quantities of hazardous wastes such as used oil and expired biocides. This is undertaken through a series of free drop-off days rotated around the city. Council needs to inform the residents about safer alternatives to household hazardous products and how to minimise residuals by buying the correct amount for their needs. As the legally designated 'generator' of these wastes, very clear tracking is required for Council to discharge its environmental duty.

### Economic opportunities for non-organic waste

Studies show that waste actually costs businesses between five and twenty times more than the simple disposal charges. Brisbane business will not remain globally competitive unless it minimises the costs of waste management. Discarded residuals represent a potential for re-manufacturing. Diversion has an opportunity saving of \$37/tonne, composed of \$14/tonne avoided transport cost and \$23/tonne avoided landfill costs. Strength of markets and costs of separation determine the viability of recovering these resources. Significant economic and employment benefits (most external to Council's budget) can flow from re-manufacturing in Brisbane.

### Market analysis of non-organic waste

**Reduction:** While there are savings available to industry in waste reduction, this area is still underdeveloped due to the low apparent financial impact of waste disposal on most businesses. Unless there is a massive increase in landfill costs or a subsidy for recycling, most businesses will not focus on reduction without

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government facilitation or the true costs of waste to business.

**Recycling:** Council has a number of resource recovery programs in place. The fortnightly kerbside recycling collection diverts approximately 60,000 tonnes of recyclable material for beneficial reuse each year. An average of 5000 tonnes of recyclable material, largely metal, is recovered at the transfer stations while an estimated 2600 tonnes of metal will come through the kerbside large item collection per annum. Most non-organics have a commodity value to add to the avoided costs of landfill. Markets exist for metals, glass, paper and cardboard and some plastics. Separation by the generator is far cleaner and more cost-effective. Separation at the transfer station is simply a matter of investment. Thus, solid market analysis is needed for each potential resource to establish the most appropriate technology and degree of separation process investment.

**Construction and demolition (C&D) waste:**

Construction and demolition wastes comprise up to 40 percent, by weight, of the total waste stream but it is largely inert material. Council has some control over the generation of these wastes through its planning approval authority. Council can focus on policies that promote economic reuse of materials. Council has facilitated C&D recycling at the Nudgee hardfill which will continue. Council can also use the development approval system to improve the design of buildings to minimise future waste. These initiatives will be faced with a very low cost disposal market. C&D material is often used to fill sites or excavations and the transporters of this material are difficult to regulate. Many of the disposal sites are beyond Council's jurisdiction and are approved by the EPA. The inert construction wastes generated through Council's own works are to be utilised through a program to recycle concrete and re-manufacture soil.

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## Appendix C

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The *Living in Brisbane 2010* vision will guide the work of Council and play a major role in corporate planning and budget processes. *Living in Brisbane 2010* identifies 8 key themes to guide the development of the city.

The Living in Brisbane 2010 vision is to create:

1. a clean and green city
2. an accessible city
3. a city designed for subtropical living
4. a smart and prosperous city
5. a creative city
6. an inclusive city
7. an active and healthy city
8. a regional and world city.

Council's waste management strategy will support the *Living in Brisbane 2010* vision by addressing those waste issues identified in the vision.

The *Living in Brisbane 2010* clean and green city theme identifies the following waste related issues:

- Produce energy from landfill.
- Investigate incentives to commerce and industry to conserve energy and reduce waste.
- Lead by example by improving Council's environmental standards and performance, including setting standards on contracts and expanding the Green Purchasing Program.
- Explore opportunities to encourage development of eco-industrial complexes with shared waste recycling and clean energy.
- Use waste as a resource rather than as an end product for disposal. Look at the potential for waste to be reused to generate electricity, condition soils and provide raw materials for innovative products.
- Encourage manufacturers to plan for reuse of materials they produce.

*Living in Brisbane 2010* includes the following waste strategy to help achieve a regional and world city:

- Develop cooperative arrangements to deliver services such as water and waste management for the wider region, providing better value for ratepayers.

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## Glossary of Terms

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<b>BAC</b>	Brisbane Administration Centre
<b>C&amp;D</b>	Construction and demolition.
<b>EPA</b>	Environmental Protection Agency.
<b>Food organics</b>	Processed and unprocessed plant and animal products.
<b>Garden organics</b>	General term covering all types of plant waste. Usually classified further into soft garden organics or hard garden organics. Examples of soft green (compostable) organics are grass clippings, potted plants, tree and shrub prunings less than 20 millimetres in diameter. Examples of hard green (chippable) organics are whole shrubs, small trees, large branches and trunks.
<b>Hardfill</b>	A landfill for inert waste materials such as fill material, construction and demolition wastes.
<b>Life cycle analysis</b>	Comparing the environmental credentials of products, processes or practices with respect to materials and energy on a 'cradle-to-grave' basis.
<b>MSW</b>	Municipal solid waste. Mixed waste generated by domestic households.
<b>MRF</b>	Material recovery facility. A plant where recyclables collected from the kerbside are sorted by type then sent for reprocessing.
<b>Organic material</b>	Waste material originating from plants or animals.
<b>Recycled organics</b>	Products derived from organic wastes (eg. garden organics) that have been reprocessed through composting or like facilities. Examples of recycled organic products are mulches, composts and soil amendments.
<b>Recyclables</b>	Materials of various types (usually consumer packaging), which is suitable for re-processing into new goods.
<b>Residuals</b>	Material that remains after all resources of value have been recovered.
<b>Timber and wood</b>	Untreated wood, which has been machine-processed for a variety of general uses (eg. pallets, planks, off cuts) as well as wood wastes (shavings and sawdust).

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