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**“Building The Vision”**

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**A TOOL FOR CRAFTING THE VISION FOR  
SUSTAINABLE WASTE MANAGEMENT**

**by**

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### Abstract

To build the vision it is first essential to address the question "What is possible?" Too often we have seen the vision delivered before the real question is asked - with consequential failed or sub-optimal outcomes.

For several years the authors have been working with government clients helping them to understand just what might be possible before they plunge headlong into *delivering* their vision.

A key element of this work has been helping clients to understand what is possible, then decide on real purpose and articulate a clear vision. Systematic modeling of options that embody complete systems covering all waste types and sources, logistics pathways and treatment schemes has followed this fundamental work. These options can then be compared using criteria that are relevant to the drivers motivating the client to seek change. A preferred direction can then be selected with confidence.

The paper presents details of the option modeling undertaken and an overview of the relative comparisons that can be used to identify a preferred strategic direction upon which the vision can be confidently built.

### Introduction

There has been a clear upward trend in the generation of waste in NSW. The following table present recent data on the amount of municipal waste created, the resources recovered and the waste disposed for metropolitan Sydney, based on data from the Department of Environment and Conservation (NSW) and private sources.

	Waste Generated (mtpa)	Resources Recovered (mtpa)	Waste to Disposal (mtpa)
<b>1998</b>	1.80	0.45	1.35
<b>2002</b>	1.80	0.46	1.34
<b>2004</b>	1.94	0.78	1.16

The *Waste Avoidance and Resource Recovery Strategy* established targets for increasing the amount of resources to be recovered from the waste stream by 2014. The present generation, recovery and disposal data indicates that the targets will not be met without intervention and concerted effort from the community.

An estimate for the additional annual resource recovery required by 2014 is in the order of some 500,000 tonnes per annum from the municipal sector. This estimate has been

made by taking the current resource recovery rate from municipal waste, and comparing this with the target set-out in the Strategy, and assuming that waste generation remains constant at the 2004 level.

This estimate represents a reduction of more than 40 percent in current disposal rates or an increase in current resource recovery rate of over 60 percent.

And this estimate is made assuming that waste generation levels remain at the 2004 level through to 2014 – an assumption that is not supported by our immediate past performance in waste generation. Therefore, this must be considered a minimum target by 2014 and strategies put in place should aim above this minimum target.

### **The Challenge for Local Government**

The additional 0.5 million tonnes per annum of recovered resources represents a major challenge to Local Government and the community at large.

Greater levels of resource recovery can be achieved through various initiatives, such as:

- ✓ encouraging waste avoidance,
- ✓ greater capture of recyclables,
- ✓ separate collection of garden waste,
- ✓ inclusion of food wastes garden waste,
- ✓ targeted hard waste collections,
- ✓ collaboration with industry led EPR schemes, and/or
- ✓ dispatch of residual waste, to AWT waste processing facilities.

However, it is fairly clear for most communities that no single waste minimisation, waste diversion or resource recovery initiative will deliver the 2014 target. So if Councils are to see effective and sustainable reduction in the waste quantities designate for disposal, the solution must lie in a mix of initiatives.

But for Local Government the questions that beg answers include –

- ? which initiatives can be relied upon,
- ? what is the quantum of waste reduction that can be achieved,
- ? when should or can those initiatives be introduced,
- ? what is the cost to the community, and
- ? which of the competing options are appropriate.

### **Identifying Options**

Two broad optional directions are available for moving forward with waste reduction initiatives.

One option is to minimize source separation and separate collections at kerbside and dispatch the bulk of mixed residual waste to a comprehensive mechanical-biological treatment facility where the various recoverable and potentially valuable fractions can be extracted. This pathway could be called the **Mixed Waste AWT** direction.

The second option involves increasing the extent of source separation required by households, increasing the number of dedicated collections and channeling separated streams to specific processing facilities for resource recovery. This pathway could be called the **Separated Waste AWT** direction.

Each optional direction forward involves specific risks for Councils and each offers specific benefits. And thus to permit informed decision making at Council, it is essential to assess the options in a manner that permits relative comparisons to be made.

However, before this can be progressed it is essential to establish two base-line criteria:

- the preferences of Council when making decisions on waste reduction, and
- the base case from which relative comparisons can be built and made.

### **Establishing Council Preferences**

Every individual and every body corporate will differ in their preferences or basis for choice when making selections between competing alternatives. When Councils put contracts out for tender, assessment criteria are determined and weightings allocated to each criteria. These weightings are intended to reflect the collective preference of Council when it comes to selecting a tender.

In the same manner, it is essential to establish assessment criteria and preferred weightings for deciding on the options for moving forward with waste minimisation initiatives. However, a key difference in the choices associated with waste minimisation initiatives, when compared to say selecting a tender for collecting waste, is that the outcomes from various competing options in waste minimisation are not as similar as those anticipated with a tender for waste collection.

Therefore, the selection criteria and the weightings form a key base-line position that Council must establish before embarking on the task of considering options, so that competing options with differing risk profiles, differing waste reduction outcomes and different cost implications can be compared against each other.

The selection criteria are framed from a set of objectives that Council wants to see achieved in respect of improved resource recovery. Experience from our various assignments indicates that many Councils – including the views of both professional staff and elected officials – are seeking objectives that satisfy concerns relating to:

- environmental outcomes,
- community acceptance and ease of participation,
- cost impost on the community,
- ease of implementation for Council, and

- risk profile assumed by Council.

A set of typical objectives might, for example include the following:

OBJECTIVE	EXPLANATION
<b><i>Resource recovery achieved (quantity)</i></b>	<ul style="list-style-type: none"> <li>▪ This reflects community interest in improved resource recovery and Council's desire to deliver on the State Waste Recovery Target of 66% by 2014.</li> </ul>
<b><i>Recovered resource value (quality)</i></b>	<ul style="list-style-type: none"> <li>▪ This reflects Council's desire that waste processing will yield products that can be used for valuable commercial or environmental purposes.</li> </ul>
<b><i>Community acceptance and convenience</i></b>	<ul style="list-style-type: none"> <li>▪ This reflects the extent to which improved resource recovery is consistent with community preference for contributing to environment protection and convenience in using the systems.</li> </ul>
<b><i>Technology and planning issues</i></b>	<ul style="list-style-type: none"> <li>▪ This reflects Council's desire to ensure that the selected contractor is able to deploy a technology system on time and budget that carries minimal commissioning and operating risk for Council.</li> </ul>
<b><i>Commercial advantage</i></b>	<ul style="list-style-type: none"> <li>▪ This reflects Council's desire to recognise commercial conditions prevailing in the waste market, in respect of disposal pricing and AWT maturity, and to ensure prudent stewardship of the commercial interests of Council and the community.</li> </ul>
<b><i>Cost containment</i></b>	<ul style="list-style-type: none"> <li>▪ This reflects Council's desire that the community waste charge should be held to a minimal increase.</li> </ul>
<b><i>Timing</i></b>	<ul style="list-style-type: none"> <li>▪ This reflects Council's desire to initiate resource recovery initiatives broadly in line with the State Waste Strategy Target timing of 66% recovery by 2014.</li> </ul>

Having established the preferential objectives for resource recovery, Council can then set about prioritising the objectives and establishing a weighting for each.

This process is best achieved in joint consultation between elected officials and professional officers. These participants should collectively bring to the process experience in environment management, community interests, waste service provision and financial responsibility. Each can contribute to the weighting process from their respective perspectives, delivering a balanced outcome that is most likely to satisfy the broad interests and needs of Council and the community.

This then formally establishes the basis that can be used later in making relative evaluations of competing options.

## **Establishing The Base Case**

When decisions are being considered on various alternatives, it is essential to be in a position to compare each alternative option with both a base case and against each other option put forward for consideration.

In the conventional tender situation, Council has a clear picture of the current cost and outcome scenario, which can be compared against the firm tendered prices and performance guarantees from invited tenderers.

However, again with waste minimisation initiatives, the situation differs relative to a tendered contract for collection. The primary difference is that there are no firm tendered prices and performance guarantees available for the various options being considered. And it is neither practical, realistic or reasonable for Councils to go to the market seeking tenders for a range of options (that may or may not arise) to help them make up their mind on strategic direction. Nor is it appropriate to seek expressions of interest from service providers at this stage, as EOI responses will not deliver to Council substantive information on which to make strategic decisions.

At this stage of developing strategic direction, it is incumbent upon Councils to develop their own models of cost and performance outcomes for the various options that might be available. And this is where the base case data becomes important.

The base case establishes a set of cost and performance data for the current operations and the, very valid, option of doing nothing in the future – i.e. carry on much as now with no change from the current practices. The base case analysis also helps to establish a set of cost and performance information that allow Council to model other alternative options using a consistent set of assumptions and data.

Using this base case data and assumptions in numerical and empirical models, it is possible for Council to make relative decisions between competing alternatives, without having to determine the absolute or real cost or performance outcome for individual options.

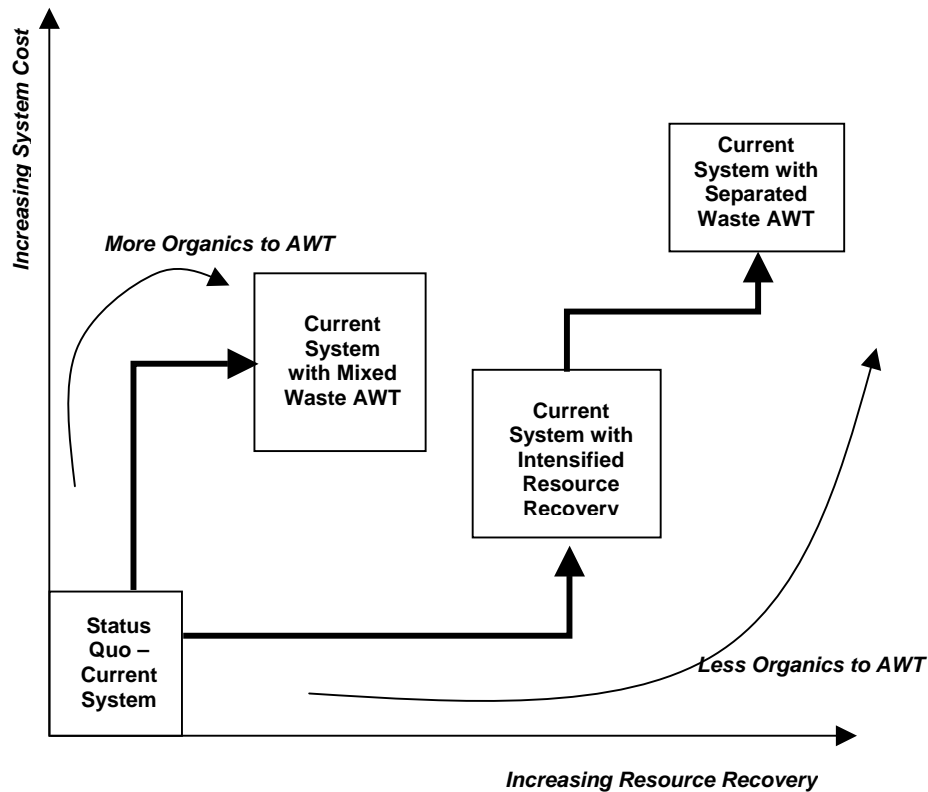
## **Considering the Options**

As mentioned earlier, there are two basic pathways forward in reducing the amount of waste destined for disposal, namely the Mixed Waste AWT direction and the Separated Waste AWT direction.

These two directions can be depicted as shown in the following figure, where:

- the Mixed Waste AWT option involves no additional source separation than currently in place and diversion of relatively high quantities of organic waste to the AWT processing facility, and

- the Separated Waste AWT option involves intensifying efforts at source separation and resource recovery at home and diverting an organics-depleted waste to the AWT facility for processing.



In this respect, the option involving intensified resource recovery may include some or all of the following types of initiatives:

- ✓ encouraging waste avoidance through consumer awareness and education,
- ✓ greater capture of conventional dry recyclables and packaging materials,
- ✓ source separation , separate collection and processing of garden waste,
- ✓ inclusion of source separated food wastes and food contaminated paper with collected garden waste,
- ✓ targeted hard waste collections with resource recovery of timber, metals and hard plastics,
- ✓ collaboration with industry led EPR schemes for recovery of nominated products targeted in the State EPR initiative, and/or
- ✓ dispatch of residual waste, with or without separate collections for organics, to residual waste processing facilities in lieu of disposal.

In terms of the typical objectives set out above, these two alternative directions might be compared on a subjective way as follows, using the relative ratings of **Low**, **Moderate** and **High** to indicate the level of acceptability in meeting the objectives:

OBJECTIVE	MIXED WASTE AWT	SEPARATED WASTE AWT
<b>Resource recovery achieved (quantity)</b>	<ul style="list-style-type: none"> <li>▪ <b>Moderate</b> – primary resource recovery will be through kerbside recycling, while secondary resource recovery through the mixed waste AWT will involve organics and some dry recyclables and possibly some inert RDF-candidate materials.</li> </ul>	<ul style="list-style-type: none"> <li>▪ <b>High</b> – significant primary resource recovery will be achieved at kerbside, while minor secondary recovery of inert RDF-candidate materials.</li> </ul>
<b>Recovered resource value (quality)</b>	<ul style="list-style-type: none"> <li>▪ <b>Moderate</b> – the kerbside recyclables will be of high quality, as could be the quality of the organic fraction and/or energy at the AWT depending on the technology used; however plastic recyclables recovered at the AWT will be of significantly lower quality and inert fractions destined for RDF will be contaminated; potential will be high for contamination of most products from household hazardous wastes included in the mixed waste.</li> </ul>	<ul style="list-style-type: none"> <li>▪ <b>High</b> – the primary resource recovery through source separation will yield high quality materials for processing with relatively low contaminants in products; products recovered from the residual waste will be subject to contamination by household hazardous wastes.</li> </ul>
<b>Community acceptance and convenience</b>	<ul style="list-style-type: none"> <li>▪ <b>High</b> – with kerbside recycling as the only primary resource recovery activity, convenience and ease of use will be at a very high level for most households; to satisfy community acceptance as to the real level of total resource recovery achieved through the system it will be essential to have full transparency as to the beneficial use achieved for AWT products.</li> </ul>	<ul style="list-style-type: none"> <li>▪ <b>Moderate</b> – the system will appeal to those parts of the community seeking high levels of participation and clear signs that resources are being recovered from the waste stream; however, the relative inconvenience of source separation with materials retained around the household until collection, and multiple collections to remember, will cause concern for some in the community, with potential for moderate levels of non-compliance to contamination guidelines.</li> </ul>
<b>Technology and planning issues</b>	<ul style="list-style-type: none"> <li>▪ <b>Low</b> – the technical and financial veracity of mixed waste AWT processing is yet to be fully demonstrated and realised. This will most likely lead to a delay in the implementation of full mixed waste AWT processing until these issues can be addressed with full confidence. This delay has both beneficial and detrimental ramifications (see below).</li> </ul>	<ul style="list-style-type: none"> <li>▪ <b>Moderate</b> – many of the elements in large-scale recovery and reprocessing of source separated resources are yet to be demonstrated to be financially viable and sustainable; however, a likely staged implementation of the various initiatives (see below) will allow time for technologies to be developed and demonstrated before commitments must be made.</li> </ul>
<b>Commercial advantage</b>	<ul style="list-style-type: none"> <li>▪ <b>High</b> – with the potential for full introduction of mixed waste AWT processing likely to be delayed (see below) Councils would be afforded considerable flexibility in the current competitive market for waste disposal, providing short-term benefit. Also, a delayed introduction of mixed waste AWT processing could allow time for additional facilities to be commissioned, leading to competitive pricing for processing.</li> </ul>	<ul style="list-style-type: none"> <li>▪ <b>Moderate</b> – the staged introduction of various source separation resource recovery initiatives will delay introduction of AWT processing for some time, allowing Council to take advantage of short-term competition in the disposal market.</li> </ul>
<b>Cost containment</b>	<ul style="list-style-type: none"> <li>▪ <b>Moderate</b> – this option can deliver short-term commercial advantage (see above), and potentially longer-term commercial advantage if full commitment is delayed until more AWT facilities are in operation, demonstrated and competing in fully functioning markets.</li> </ul>	<ul style="list-style-type: none"> <li>▪ <b>Low</b> – with multiple collection services for the various source separated materials, costs can be expected to be relatively high; this will be off-set somewhat, by the higher levels of resource recovery achieved with higher quality products (see above).</li> </ul>

### **Timing**

- **Low** – the current availability of mixed waste AWT processing is relatively low; when this is combined with the rating on technology and planning issues, Councils would most likely be faced with a reasonable delay before a confident decision can be made to commit all residual waste to this system. This will lead to a delay in delivering on waste reduction outcomes and a “gamble” that mixed waste AWT will deliver in the end, but allow flexibility in the short-term on commercial advantage (see above).
  - **High** – staged introduction of source separated resource recovery initiatives will deliver progressively on waste reduction outcomes and allow time for new technologies and processes to be demonstrated fully before final commitments are made to consign wastes or recovered resources to specific processes.
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To complete this consideration process, it is possible to use a typical multi-criteria analytical approach to the foregoing subjective assessment by using numerical scores as opposed to the relative terms Low, Moderate and High. Then the whole-of-Council weightings can be applied to the numeric scores for each option giving a weighted preferential direction forward.

### **Modeling The Options**

While the subjective assessment and multi-criteria numerical analysis is critical in the process of considering competing options, numerical modeling of the costs and resource recovery expectations provides a pragmatic and quantifiable means of making relative comparisons between competing options. It also helps to provide some substance to the above considerations in the above assessment in respect of cost and resource recovery objectives achieved.

The structure of the numerical model used is such that assumptions on cost, performance and quality can be made and reflected throughout every relevant scenario or option. On this basis, each option is evaluated on common assumptions so that the relative differences between options provides a reliable basis for making relative preference decisions.

It is critical to note that in this numerical modeling work, data from the Base Case is used as the benchmark and all options are modeled on common data and assumptions. While this provides a reasonably reliable estimate of a possible real outcome in performance and cost, it must be stressed that the purpose of the modeling is to make relative comparisons between options, based on common data and assumptions.

By combining both the subjective consideration and the outcomes from the numerical modeling, it is possible to achieve a high level of confidence in the preferred strategic direction that Council intends to pursue.

### **Testing The Market**

At this time in the process, Council has some clearly defined strategic directions and preferred options. Now is the time to talk with the service providers and seek reliable data on cost and performance expectations.

The market will be appropriately informed of Council's preferences to respond with good data, and Council will then be well positioned to move forward with confidence in its preferred waste reduction directions.

## **Conclusions**

The State waste reduction targets for 2014 will not be achieved without significant intervention by Local Councils. Several, apparently competing, directions forward are feasible, but Councils need the tools to make informed decisions. Early-stage "testing" of the market by calling for expressions of interest, or even tenders, have proven unsuccessful for Councils and unsatisfactory for service providers.

A productive and successful path forward has been the development of Council-based objectives and tools for assessing options. These tools comprise numerical modeling for financial and performance analysis and multi-objective analysis to enable relative decisions to be made between alternative options.

Once Council has determined the most preferable route to follow in pursuing resource recovery targets, then the market can be engaged to develop firm financial and performance predictions.