

Alternative Collection Technologies: The future for household organics

Vienna Butt, SULO MGB Australia, v.butt@sulo.com.au

INTRODUCTION

Organic waste forms around thirty percent of the overall domestic waste stream in Australia. This stream is commonly referred to as household organics and is comprised of two main fractions: garden organics and food organics.

Over the last five years several Australian reports have been released with respect to the processing and collection of both garden and food organics at the domestic level. The common conclusion found in these reports is that the collection of household organics is viable and in certain circumstances even economical. These reports are also supported by actual experiences in other countries that document significant increases in the diversion rates by collecting and processing household organics. These results are particularly prominent throughout Europe.

With aggressive waste diversion targets such as sixty percent by the year 2014 and 'zero waste', reductions in this sector will be vital for Australia. In recent years innovative changes in collection and processing systems have created a variety of opportunities for the diversion of organic waste. Increasingly councils across Australia are incorporating organics into their overall waste strategies and a large number are implementing collection systems. Each council area, however, is unique and there are a multitude of options available for collecting and processing household organics. This, combined with the often lengthy contract periods involved in domestic collection services, can make the decision to implement an organics service difficult.

The collection of organics, both garden and food, has been well established in parts of Europe, the United States (US) and Canada for over a decade. The main driving force for the development of these collection services and processing facilities was to achieve aggressive landfill diversion targets. In Europe both fractions of the organic waste stream are collected in MGBs either separately or combined. In the US the most prominent trend is to combine food organics with existing kerbside garden organics collection utilising an MGB. More recently collection services have commenced in various councils throughout New Zealand that utilise either an MGB or a bag. Both systems commonly collect garden and food organics.

This paper explores the current collection systems in place for household organics in Australia and those available on an international scale. Each collection system is

described and the benefits, limitations and potential fit for the Australian market is explored.

During this report the reference to garden organics specifically relates to any organic material that is generated from domestic or commercial gardening. For instance grass clippings, trees, shrubs, leaves, branches and other similar material. The term food organics relates to putrescibles waste including food preparation wastes, spoiled food and fruit, food and fibre processing waste, abattoir wastes and does not include green waste or biosolids.

THE EUROPEAN EXPERIENCE

Europe has always been at the forefront when it comes to the collection and processing of source separated household organics. In the mid 1980's Germany, Austria, Switzerland and Netherlands initiated trials for composting domestic organics. Since this time significant improvements to the collection systems available in Europe have been made along with improvements in participation rates and the processing technologies available. These have all lead to significant increases in waste diversion (CCC n.d).

In general two collection systems are in place throughout Europe. Organics are either collected separately in small dedicated MGBs or together in one larger MGB. If the collection involves food organics than a weekly service is in place, commonly accompanied by a fortnightly garbage service. This system aims to increase the volume of material diverted from the garbage bin.

Although countries throughout Europe utilise similar MGBs to those in Australia there are several technological designs specifically suited to the collection of household organics. One of the most common containers is an aerated MGB, which houses a false floor, ventilated sides and lid. The holes in the MGB allow oxygen to flow through the container, assisted by the internal structure of the MGB. The false floor further contributes to the aerobic environment by raising the material off the floor and allowing oxygen to flow freely through the centre. As the material begins to decompose leachate is produced and the excess liquid falls through the false floor and can then evaporate out (Schafer n.d, p. 3; Biologic n.d, p. 3). This style of MGB is designed to establish an optimum aerobic environment for the decomposition of organic waste and ultimately reduced the weight and moisture content. Material that is collected in an aerated MGB is ideal for facilities that utilise aerobic processing as the material has already commenced decomposition. In addition to this source separated materials that are collected in a dedicated MGB have been found to have lower levels of contamination.

In addition to the ventilated MGB specially designed lids are also available which contain micro organisms. These organisms feed off the gasses that are produced by the decomposing material and instead produce carbon dioxide and water. As a result the odours associated with the decomposing material are eliminated.

Through a separate twice weekly collection with a small 10 litre bucket, Italy achieved a diversion of around fifty-five to eighty kilograms of food waste per person per year. This was dramatically increased to around one hundred and fifty kilograms when food organics were collected together with garden organics in an MGB (CCC n.d). It was recognised however that this increase did not automatically lead to a decrease in waste diversion from landfill as the organic material was generally diverted from home composting.

THE UNITED STATES AND CANADIAN EXPERIENCE

The collection of food organics in the US generally provides residents with a small kitchen tidy to contain the organic material. The tidy may or may not be required to be lined with paper or another biodegradable material. The tidy is then emptied into a larger MGB with any other acceptable organics. If the MGB is dedicated to food organics only it is likely to be no larger than one hundred and forty litres and is collected weekly. Quite often the garbage service is then changed to a fortnightly service. If the MGB is for both food and garden organics it is likely to be around three hundred and forty litres (DEC March 2007). When both garden and food organics are collected on a fortnightly basis a ventilated MGB is often used that provides for moisture and weight loss. This however is highly dependent upon the process that the material will undergo at a processing facility and the condition the material is required to arrive in.

In Canada a three bin system is the most common and includes recyclables, organics and garbage. The organics are collected in a similar way to the US and is highly dependent upon the area and processing facilities available (DEC March 2007).

THE NEW ZEALAND EXPERIENCE

A report released by the Ministry for the Environment (Manatu Mo Te Taiao), New Zealand, on the options for kerbside collection of household organics (2005) revealed that *“There is plenty of evidence that kerbside collection of organic waste is feasible and, if carefully managed, will have high participation and high organic waste-diversion rates.”*

This report analysed a variety of collection systems that were already in place or being trialled throughout New Zealand and Australia. The report focused on councils collecting garden organics only, food organics only or a combination of both. The collection containers used by these councils were either a bin, mobile or stationary, or bags. The majority of councils utilising a bag system were located in New Zealand.

Some of the benefits noted in the report for using an MGB include the automated collection with no manual handling requirements and a secure sealed container that deters animals versus bags that are easily broken to obtain the contents inside. Alternatively utilising MGBs for the collection requires a greater capital expenditure and the containers can accumulate odours and leachate if they are not aerated. Some of the benefits of using bags include the ability for early detection of contamination and minimal storage requirements. The bags however bring greater Occupational Health and Safety (OH&S) risks, require manual collection system and must be split open during the processing, which can also lead to contamination of the end product.

The systems that obtained the greatest volume of material were those that collected combined garden and food organics in one container. The single container was also found to have higher customer satisfaction levels and was generally collected on a weekly basis (MFE 2005). Most importantly the report concluded that prior to introducing a collection system consideration should be given to the type of material that will be collected, the type and number of containers that will be provided, the frequency of collection, the processing and what the end product is likely to be used for.

It is important to note that not all domestic collection services occur at individual properties and consideration should be given to all property types. Multi unit dwellings were found to require special consideration due to the minimal space available at the kerb and the environmental impacts of large volumes of organic material, for example the generation of odours and leachate can be more significant. Container choices are influenced by the number of households serviced, other waste collection services provided, the material segregation arrangements, space availability and vehicle constraints.

Case Study: Christchurch

Organic waste is the largest component of the waste stream in Christchurch and equates to thirty two percent of the total waste going to landfill. In an attempt to increase the volume of material being diverted, council conducted an organics trial to determine the feasibility and social implications of collecting food organics. Council was also mindful of the fact that kerbside collection of food organics could greatly influence the achievement of their diversion targets, which included a ninety percent reduction in the disposal of organic waste per person to landfill by 2010. If successful, the trial would lead to the purchase of an enclosed composting facility that will allow the composting of a greater range of organic material including food organics (CCC n.d).

During the trial residents were provided with a kitchen tidy and a larger container for the kerbside that was collected weekly.

The trial concluded that the collection of food organics at a domestic level, if managed correctly, provides a variety of opportunities to address a number of social, environmental and economic objectives. These included:

- The recovery of a material source from the waste stream that produces a useful compost;
- A reduction in economic and environmental costs associated with the collection, transport and disposal of municipal waste to landfill;
- A reduction in leachate and methane emissions produced by organic matter in landfill; and
- Promoting an environmentally friendly community spirit.

Christchurch reported that “*the kerbside collection of kitchen organics was a resounding success.*” The cost of a city wide collection system was estimated to be similar to a kerbside recycling system but with the added economical and environmental benefits. The report recommended further consideration of the collection container designs. Most importantly the internal kitchen bin required a detachable flip-top lid for easy use and the kerbside container would need to be wide and squat and should be a distinctive colour to stand out from other kerbside containers.

Christchurch also noted that a three bin system could be adopted longer term however several limitations specific to the area could influence its success. Firstly home composting is the councils preferred option for organic material and around fifty-seven percent of residents already conform. Secondly a council operated organics collection could be detrimental to the commercial contractors, who provide up to forty percent of residents with a private garden organic collection services.

THE AUSTRALIAN EXPERIENCE

A report released by the Department of Environment and Conservation of NSW (DEC) (March 2007) stated that “*council areas that generate significant amounts of garden organics, for example one hundred and seventy-five kilograms or more per household per year, should provide regular, containerised source separated collections for these materials.*” Furthermore “*councils where households generate significant quantities of garden organics and/or where containerised collection services for these materials already exists, the inclusion of food organics can be considered cost effective.*”

The report provides a financial, an environmental, a cost benefit analysis and a social assessment. Some of the key findings were:

- *The separation of garden organics provides a significant improvement in environmental performance over landfilling of these materials. Inclusion of food organics enhances this performance;*
- *For councils with high garden organics generation all options are less expensive than the ‘landfill only’ option;*

- *For councils with low garden organics generation all options are less expensive than 'landfill only' option, however the environmental benefits are also substantially reduced due to the relatively low yields;*
- *Source separation of organics always achieves better environmental outcomes than not separating these materials;*
- *The higher environmental benefits of inclusion of food organics in separate organics collection are counterbalanced by higher collection and processing costs unless garbage collection is reduced to fortnightly;*
- *In regional areas the net benefits are considerably lower compared to metropolitan areas as a result of the low landfill gate fees; and*
- *It is likely that an additional container (for use in the kitchen) will be required in order to increase the 'comfort' factor, and to reduce the odour and nuisance for the householder.*

Although these findings are significant, it is important to highlight the variations that will occur across all Australian states. In particular, NSW is governed waste levies that may not apply nationally and would therefore alter some economical outcomes presented.

For those councils that generate high levels of garden organics the report claims that a separate fortnightly collection could be around twelve dollars less expensive per household per year than disposal of the material to landfill. If these councils were to include food organics and provide a weekly collection service then the cost is likely to remain the same as landfill. If, however, the weekly garbage service is reduced to fortnightly this option would then provide a saving of around fifteen dollars per household per year (DEC March 2007). It is important to note that if food organics are to be collected additional processing facilities suited to these materials would likely be required.

For regional councils a lower landfill gate fee results in the base case, sending all material to landfill, as the least expensive option.

Overall the DEC (March 2007) report found that collection systems that are accompanied by adequate community education produce low levels of contamination and causes minimal problems during processing.

Assessment of Garden Organics Collection Systems

Another assessment by DEC (May 2005) of garden organics collection systems analysed a variety of options in the context of a total domestic waste management service. A one hundred and twenty litre MGB was used for a weekly garbage service and a two hundred and forty litre MGB for a fortnightly commingled recyclables service.

The report found that when an MGB is used the volume of garden organics increases as the frequency of collection increases. This can be largely due to the capture of small materials such as leaves and grass clippings. The report also found that *“when considering the total waste management costs, the increase in total cost for providing garden organics collections are less than five dollars per household per year (in areas of high garden organics generation) and less than fifteen dollars per household per year (in areas of low garden organics generation), assuming landfill disposal of domestic garbage.”*

The report recommends that Councils introduce a fortnightly MGB garden organics collection system in areas that have a high level of garden organics generation. The reason stated for this is it *“would be a significant step towards a more sustainable resource management system.”* Councils that do not suit a fortnightly service should implement a three times yearly tied and bundled service as this will provide similar benefits to fortnightly containerised system.

Australian Services and Trials

In Australia there are numerous councils that provide kerbside collection of garden organics. These services generally utilise an MGB or tied and bundled options (DEC May 2005). Some of these councils also offer food organics service and it is combined with the garden organics (DEC March 2007). The food organics collected in Australia, however, are generally limited to fruit and vegetable scraps and strictly exclude meat and dairy products. Some of the councils offering a combined organics collection service include:

- Colac Otway Shire, Vic: in 1998 the "Green Scheme" was introduced that separates waste into organic, inert and recyclable streams at the household. It is a two bin system that utilises a divided MGB for organics and garbage (Colac Otway Shire).
- Port Macquarie-Hastings. NSW: Provides a three bin system with a weekly organics and garbage service and fortnightly recyclables (Port Macquarie-Hastings).
- Nillumbik, VIC: Provides a three bin system with a dedicated organics MGB collected weekly and recyclables and garbage collected fortnightly (Nillumbik Shire Council).
- Lismore, NSW: Provides a three bin system with a weekly food and garden organics service and fortnightly recyclables and garbage service (Lismore City Council).
- Coffs Harbour City Council, NSW: Introduced a three bin system in 2007 with a weekly food and garden organics service and fortnightly recyclables and garbage services.

- Camden Council, NSW: Provides a three bin system, all bins are collected weekly (Camden Council).
- Broken Hill, NSW: Provides a two bin system with a weekly garbage collection and fortnightly combined food and garden organics service that utilised a ventilated MGB (Broken Hill).

Several food organic collection trials have also been conducted in Australia, three of which are detailed below:

- Burnside, SA: showed that thirty-six percent of food organics could be diverted from landfill using a kitchen tidy and fortnightly MGB collection (trial in October 2005).
- Chifley, ACT: showed that approximately sixty percent of household organics could be collected using a kitchen tidy, weekly MGB for organics and fortnightly garbage and recyclables service (trial 2001).
- Cooma Monaro, NSW: Utilised a ventilated MGB for a fortnightly collection and weekly garbage and recyclables service (DEC March 2007).

Trials of aerobic MGBs have been performed by the Institute of Horticultural Development (Vic), at Tea Tree Gully (SA), Cooma Monaro (NSW), Berridale (NSW). These trials indicated that that a ventilated MGB can reduce the weight and moisture content by up to fifty percent. In some cases this allows for a fortnightly collection frequency as odour and leachate can also be reduced. These trials are also supported by actual services in place throughout Europe that utilise ventilated MGBs.

CONCLUSION

Organic waste forms a large component of the domestic waste stream and Australia is still seeing relatively high volumes contained within the garbage stream. This presents a clear opportunity for councils to make significant increases in diversion rates and move closer to achieving both National and Regional diversion targets. As this occurs an increase in material for processing facilities will become available and subsequently more end products could be produced.

This opportunity is also supported by a mass of Australian specific reports, trials and case studies that detail 'best practice' systems and provide sound economical arguments for the implementation of organics collection systems.

On an international scale waste diversion rates are significantly higher than in Australia. The preferred system for the collection of domestic waste is a three bin system. That is a large MGB for recyclables, a large MGB for combined garden and food organics and a smaller MGB for general (residual) waste. Systems that

have been in place for many years throughout Europe, the United States and Canada clearly show that kerbside collection of both garden and food organics is successful and economically viable.

Garden organic collections are more prominent in Australia as there are relatively simple ways in which this material can be processed. The decision to offer a food organic collection service at the kerb frequently follows the development of commercial food organic programs. That is, various facilities equipped to handle and process food organics are already established or have the potential to be established and are economically viable based on larger volumes than kerbside alone can provide.

It is important to recognise that the Australian market has commenced the development of a commercial industry for the processing of garden and food organics. This is evidenced by the small number of councils currently operating food organic collections. Combined with aggressive waste diversion targets, Australia is likely to see significant increases in both garden and food organics collection services.

For Australia a three bin system would also be the most suitable option. This would ensure the existing recyclables stream is maintained and also provide residents with adequate infrastructure to easily divert their organics. A two hundred and forty litre MGB is the likely size for a combined organics service that is collected weekly, or fortnightly for if food organics are excluded. Further to this, Australia is ideally suited to using ventilated MGBs as aerobic processing is currently the most common method employed. If a ventilated bin is utilised the collection frequency could be reduced to fortnightly. The provision of kitchen containers increases diversion rates, participation rates and the level of customer satisfaction. Furthermore reducing the garbage service from weekly to fortnightly can also support higher diversion of organic material into the combined organics service, increasing recycling rates and potentially reduce the total cost of the waste service.

The main reason for a weekly collection of organics is to avoid generating unacceptable odours. Many of the reports, however, have shown that collection frequency can vary dependent upon the season, for instance weekly collections in summer reduce to fortnightly in winter. In addition various options for MGBs can also assist to reduce these odours, for instance aerated MGBs or odour eliminating lids.

All reports detailed in this paper indicate that organics collection in any form are an important part of the domestic waste services council provide and will ultimately play a significant role in achieving aggressive diversion targets. Importantly they all clearly recommended conducting a trial and testing a variety of collection systems before implementing any new services. This is to ensure all facets of the system are designed to suit the area and assist in achieving high participation rates and customer service satisfaction levels that will ultimately lead to increased diversion rates.

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