Organics Recycling in Australia

Industry Statistics 2012

Recycled Organics Unit®

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This report is the 2012 financial year edition of an annual series.

Annual national data for the organics recycling industry from 2004–2005 can be freely accessed and downloaded from the publications page of the ROU website:
www.recycledorganics.com

Annual national data for the organics recycling industry from 2011–2012 can also be accessed from the DSEWPaC website:
http://www.environment.gov.au/wastepolicy/publications/index.html

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Section 1 About this report

1.1 How to cite this report

This publication should be cited in the following manner:

> Recycled Organics Unit (2013). ***Organics Recycling in Australia: Industry Statistics 2012***. Recycled Organics Unit, Sydney, Australia. Internet publication www.recycledorganics.com/publications

1.2 Availability of annual data

Annual industry data from the 2004-05 financial year is available from the publications page of the *Recycled Organics Unit* website: http://www.recycledorganics.com/publications/index.htm

1.3 Objectives

The national industry survey was initiated in 2002 by the Recycled Organics Unit (ROU) to contribute to the process of industry formation and development. The objectives of the national industry survey are:

i. To establish and maintain contact details for organics reprocessing enterprises across Australia.

ii. To collect quality data in consistent format from each jurisdiction that provides a tool for reporting; and for identifications of trends, opportunities and risks for both industry and Government.

iii. To quantify the nature and scale of the industry on a nationally aggregated basis to support industry engagement with the Australian Government.

iv. To identify and track industry issues and priorities to inform industry development programs.

v. To avoid over-surveying of the industry by conducting and publishing the results of a single national survey each year that meets the needs of both industry and government.

1.4 Acknowledgement

The national response rate for the 2012 industry survey is 99%. The ROU thanks the organics recycling industry for once again supporting the implementation of the national survey.

The ROU thanks the following agencies for providing support for implementation and reporting of the survey in respective jurisdictions:

- *Zero Waste South Australia* (ZWSA)
- Western Australian *Department of Environment Regulation* (DER) and previously *Department of Environment and Conservation* (DEC)
- *Sustainability Victoria* (SV)

- Queensland *Department of Environment and Heritage Protection* (DEHP)
- New South Wales *Office of Environment and Heritage* (OEH) and the New South Wales *Environment Protection Authority* (EPA)

Whilst state by state variations in reporting are highlighted in the body of the report, the ROU takes this opportunity to express sincere thanks for the genuine efforts of officers in each of these state agencies, without which the production of this national report would not be possible.

The ROU also thanks the Australian Government *Department of Sustainability, Environment, Water, Population and Communities* for contributing funds and support for normalisation of state data and the publication of this national report.

Section 2 National summary

2.1 Executive summary:

Overview

Biodegradable organic materials derived from urban waste and agricultural manures and residues (including processing of agricultural produce) contain nutrients, organic carbon, moisture, and microorganisms that can be returned to soil to maintain soil health and productivity, to assist rehabilitation of degraded land, and for a range or urban and amenity horticulture applications.

In all states the rate of increase in the recovery of biodegradable organic materials that are diverted from urban waste streams has accelerated substantially over the past decade. A large proportion of urban solid waste is comprised of biodegradable organic waste and the achievement of government waste reduction and resource recovery targets necessarily includes a focus on diversion of biodegradable organic materials from solid waste streams.

State government policies and programs have significantly focused on accelerated demand creation for recycled organics products to support the viability of this accelerated recovery of biodegradable organic materials. The challenge of characterising essential qualities of recycled organics products has continued, with the current version of the Australian Standard AS-4454 (2012) *Composts, soil conditioners and mulches* more clearly expressing requirements for pasteurisation (sanitisation), and more clearly defining biological stability and compost maturity. Correct characterisation of products is a precursor to quantification of reliable performance benefits of recycled organics for specific applications, including demonstrating the value of recycled organics products for agricultural markets.

These State government and industry programs continue to increase the diversion of biodegradable organic materials for beneficial use in all states. In particular:

- The NSW Government agencies have a new structure with both NSW EPA and NSW OEH having a renewed emphasis and targeted funding for expansion of organics collection and processing infrastructure, and for review of the regulatory framework.

- Sustainability Victoria has allocated funds for implementation of a multi-year organics strategy, and the Victorian EPA has prioritised review of associated regulations from 2013.

National data: biodegradable organic materials recovered for beneficial use

The total reported quantity of biodegradable organic materials received for reprocessing or land application as beneficial recycled organics products by the organics reprocessing industry across all mainland states of Australia for the 2012 financial year is reported to be 5,515,685 tonnes, which is around 815,000 tonnes or 12.9 percent lower than the 6,330,749 tonnes reported in 2011.

Table. Total quantity of raw materials (biodegradable organic materials) received for processing

State	2011 reported total (metric tonnes)	2012 reported total (metric tonnes)	net
NSW	1,788,746	1,816,619	+ 27,873
WA	732,995	698,006	- 34,989
SA	637,271	595,320	- 41,951
VIC	999,145	962,354	- 36,791
QLD	2,172,592	1,443,386	- 729,206
Total	**6,330,749**	**5,515,685**	**- 815,064**

Note that the method of data collection has significantly changed for the 2012 financial year. The majority of states have now resumed collection of data directly by the respective government agency. South Australia and Victoria have collected data directly from industry for the past few years, with ongoing communication and collaborative effort with the ROU to provide compatible data. For the first time, in 2012 the Queensland agency DEHP has also begun collecting data directly from the industry.

Disruptions from extreme weather, the implementation of new legislation, and the short lived preparation, implementation and subsequent repeal of the Queensland Waste Levy, restructuring of the responsible agency and the associated reallocation of resources of have all impacted on the current reporting period. Consequently, the data reported for 2011 and 2012 for Queensland is not directly comparable. Excluding Queensland data from analysis, the reported contraction in the industry in Western Australia, South Australia and Victoria is ~ 113,731 tonnes, and is reported to be a consequence of general economic downturn and regulatory constraints and interventions. Diversion rates in New South Wales continue to increase as additional infrastructure becomes fully operational and production capacity expands.

The ROU established the national survey and common reporting for the sector via an extended process of direct consultation and negotiation with government agencies in each state and industry over a period of two years from late 2001. This culminated in endorsement and approval by industry, and approval of a standard reporting structure by the respective government agencies in each state. Whilst all agencies are making genuine efforts, in 2012 the accumulation of small but significant changes arising from direct data collection by government now in three states has impacted significantly on data compatibility and the ability to interpret data for the purpose of national reporting. Data collection by four separate organisations, each with slightly different priorities, has resulted in incomplete data, and has progressively introduced variability of the scope of inclusions, response rates, variation in the categorisation of materials and products, non-reporting of inventories, and now variation in the units in which products are reported.

The primary focus of state government agencies is the recovery of solid waste materials that are diverted from landfill for reporting against government waste reduction and resource recovery targets. Consequently, whilst industry is interested in trends from the entire range of biodegradable materials received from forestry and agricultural sources, and from liquid waste streams such as biosolids, these materials are commonly outside the jurisdiction and reporting framework the state agencies responsible for solid waste management.

The ROU argues that direct data collection should include direct dialogue with each processor and direct comparison with their previous year return to ensure quantities are reported in the correct category of material and product type, to confirm significant changes and to clarify their underlying cause, thereby enabling informed reporting of changing industry influences and trends.

The ROU continues to conduct the survey directly in New South Wales and Western Australia, and continues to work directly with agencies in Victoria, South Australia and Queensland to support implementation and to enable national aggregation and reporting. The ROU acknowledges and thanks the agencies in all states for their genuine efforts. However, a renewed effort is required from industry and state government agencies for the consistent collection of accurate, complete and compatible state data for the purpose of reporting, to identify trends, and to inform strategy and management decisions by both government and industry.

Regulatory framework

Biodegradable organic materials can embody a range of generic physical, chemical and biological characteristics or contaminants that are associated with potential risks to environment, community health and biosecurity. When large quantities of biodegradable organic materials are aggregated together on a site, risks arise in association with potential impact on surrounding land use, including potential for odour generation and leachate. Different materials present different degrees of risk in each instance, and should be effectively handled and processed to manage risks relevant to the raw material inputs and the target product applications.

Inconsistent regulatory requirements and inconsistent interpretation of regulatory requirements has been uppermost on the list of concerns expressed by the industry in each state since the inception of the survey as the consequences of inappropriate product selection and use can affect the reputation of all recycled organics products, and because regulatory compliance imposes costs that impact business viability and commercial competitiveness.

Key issues raised by the industry each year in the survey include:

- A need for clear and consistent site regulation and planning consent to better enable establishment of new facilities in order to increase processing capacity and resource recovery.
- Inadequate/unenforced regulation of competing products, for example raw or semi-processed manures, some of which can have a similar, or a higher risk profile than source separated urban organic waste materials.
- Factors that are increasing production and compliance costs, and factors placing downwards pressure on prices.
- Physical contamination of source separated urban organic waste materials in some regions, which are costly to manage in order to manufacture high quality recycled organics products, including costs of contaminant removal and subsequent disposal.

Waste regulations and associated planning consent/licensing requirements for organics processing facilities are different in each state. State based guidelines are often interpreted differently by local government planning

consent authorities and regional compliance officers within an individual state jurisdiction. Whilst the risks to environment, health and biosecurity are embodied in the raw material inputs, very commonly infrastructure and management requirements for planning consent and regulatory compliance differ not on the basis of risk, but on the basis of whether the state EPA or Department of Primary Industry (DPI) exercises authority over the particular biodegradable materials, or whether the materials are managed by a local government authority, a primary producer, or a commercial organics processing facility. Commercial organics processors' concern is that requirements should be risk based, and that associated management and compliance costs should apply equally to all materials and facilities on the basis of risk.

State regulatory agencies are variously aware of these issues, and the need for clear guidelines for planning approval and licensing of organics processing facilities to encourage investment in additional processing capacity in order to increase resource recovery rates. This includes a requirement for clearly defined minimum buffer or separation distances that should apply in relation to potential odour risk (in different land use zonings), a clearly defined process for quantifying potential odour impact that is applied consistently to facilities processing biodegradable organic materials, and that odour impact should be policed consistently using documented and objective methods. Environmental regulation authorities often have limited jurisdiction over agricultural sector activities, and very commonly the environmental protection guidelines for commercial organics processing facilities differ for facilities processing biodegradable organic materials from urban sources, even where such facilities are located in areas with rural zoning.

Also very commonly, waste and recycling regulations exclude any integration of agricultural biosecurity regulations as these issues are commonly regulated by state DPIs through instruments derived from different Acts and are consequently outside the scope of the environmental regulatory authority. There is a need for agricultural authorities and environmental protection authorities to collaborate on the development of common minimum guidelines for management of risks associated with environmental protection, community health and agricultural biosecurity. There is also a requirement for evidence-based buffer or separation distance guidelines that apply for organics processing facilities to address risk of odour impact on surrounding land use.

There is a need for common minimum guidelines that address the compliance requirements for management of risks associated with environmental protection, community health and agricultural biosecurity. These issues are emerging as a higher priority with the renewed focus of state government agencies on increasing the diversion and recovery of food materials from urban solid waste streams.

Price signals for improved management and greenhouse emissions reduction

Whilst the landfill levy has increased the price of landfill disposal in the Sydney region, elsewhere cost control and regulatory compliance are the primary drivers for the sector.

Outside of metropolitan Sydney and Perth, the common practice for processing biodegradable organic materials involves aggregating biodegradable materials outdoors into open piles (most commonly windrows), with varying levels of management of these piles. The commercial viability of outdoor windrow facilities simply cannot

support the fixed capital investment required to install forced aeration technology in the form of concrete aerated floors, in-vessel composting technology, or enclosed composting infrastructure.

The process employed at all commercial *Advanced Waste Technology* or *Alternative Waste Technology* (AWT) plants in Australia for stablilising putrescible biodegradable organic materials is force aerated composting using aerated floor/aerated static pile (ASP) technology. Stripping away the rhetoric, the section of these plants that stabilises the organic fraction is correctly described as "force aerated composting" (refer to Section 6 below for details).

ASP or aerated floor technology is the chosen practice for force aerated facilities regardless of whether a facility is processing source segregated commercial sector food waste, kerbside co-collected food plus garden organics (FOGO or biowaste), or mixed solid waste. In some instances the decomposing biomass is completely covered (eg. with a semi-permeable membrane), or conducted in a large enclosed composting hall, or conducted in a fully enclosed in a concrete tunnel installation. In each instance, aerated floor/aerated static pile (ASP) technology is technology of choice.

Force aerated composting to continuously maintain a minimum specified oxygen level is correlated with avoidance of methane emissions from the composting process in Kyoto compliant Clean Development Mechanism (CDM) methodologies.

However, to date the cost of implementation of facilities with enclosed/covered and force aerated composting systems has been restricted to high population density metropolitan areas where landfill levies and high waste disposal costs apply (Sydney), areas with a distinctive environmental regulatory framework (Perth), and a handful of coastal population centres where a source of biosolids requiring management is available as a secure and sufficiently high value feedstock to justify the viability of such high levels of capital investment in operational plant.

Force aerated facilities are uncommon because the capital costs and civil works costs of services and fixed infrastructure are much higher than for unturned/unmanaged stockpiles or for systematically turned and managed compost piles/windrows. Even where disposal costs and landfill levies are high, it is only viable to implement such intensive and higher cost processing for the initial stage of decomposition until materials are no longer considered putrescible.

Outside of mixed solid waste processing AWT facilities in metropolitan Sydney and Perth, the common practice for processing biodegradable organic materials involves aggregating biodegradable materials outdoors into open piles (most commonly windrows), with varying levels of management of these piles.

Cost control is a primary constraint for all organics processing facilities. Open air composting facilities that "process" biodegradable organic materials via a) unturned manure stockpiles, b) unturned vegetation stockpiles, and c) open air turned windrow/pile facilities represent the overwhelming majority of organics processing facilities in Australia precisely because these management practices are economically viable.

The commercial viability of outdoor windrow facilities cannot support the fixed capital investment required to install forced aeration technology, particularly in the form of fixed concrete aerated floors, enclosed composting halls or in-vessel composting technology.

There is opportunity for significant and measurable reduction in greenhouse emissions from established facilities and proposed new facilities processing biodegradable organic materials from both urban and agricultural sources. However, widespread uptake of forced aeration technology required to continuously maintain oxygen levels above a specified threshold throughout compost pile requires additional investment, which in turn requires a clear price signal or financial incentive to encourage upgrade of infrastructure and improve management practices across the industry:

- To support the development of performance based recycled organics products and associated agricultural markets; and
- To achieve real, measurable, additional and verifiable reduction in methane emissions from the decomposition of biodegradable organic wastes, manures and agricultural residues, consistent with Australian Government policy objectives.

2.2 Scope of survey data

Data reported in this document includes biodegradable organic materials received for reprocessing or land application as beneficial recycled organics products for the financial year to 30 June 2012 from:

- All licensed commercial organics reprocessing facilities in all mainland states of Australia.
- All AWT reprocessing facilities[1], including those that process source segregated organics and also those that process mixed solid waste (MSW), including anaerobic digestion facilities.
- Organics processing facilities where a group of local councils have jointly formed a separate entity and have collectively invested in the establishment and operation of shared processing infrastructure (eg. the Southern Metropolitan Region of Councils – SMRC facility at Canning Vale in Perth; and the Eastern Metropolitan Region of Councils – EMRC facility at Red Hill in Perth).

This data does not include:

- Small, unlicensed on-farm facilities processing materials primarily for their own on-farm use.

[1] AWT reprocessing facilities with biological treatment via anaerobic digestion and/or composting are included. Energy from Waste (EfW) facilities that implement thermal treatment or combustion of organics for stabilization or to extract energy are excluded.

- Facilities in Tasmania, the Northern Territory, or the Australian Capital Territory.

- Facilities operated directly by individual local councils (with the exception of Queensland where local council figures are included, with deliberate effort to avoid risk of double counting). State government agencies obtain waste and recycling data survey from local councils as a component of their broader annual data collection and survey of local government sector in each respective state jurisdiction,

- Finally, the survey is not an agricultural industry survey. The survey records data relating to quantities received by processing facilities and does not capture generation data directly from intensive livestock or agricultural production industries. Although a significant quantity of feedlot manures, paunch, animal bedding, and animal mortalities are received by the industry for processing, there are large quantities of poultry manures and other manures that are not captured as they are either directly applied as fertilizer via different market channels or are otherwise managed and utilised by the generator on their own properties as an agricultural input. The feedlot industry alone (mammalian livestock, excluding poultry) is estimated in reports for that industry to generate in excess of 5 million metric tonnes of manure per year. Historically, agricultural manures and crop residues have not been treated, disposed of, or counted as "waste" by the authorities (see background documents and classification system for the Australian Waste Database: http://awd.csiro.au/).

2.3 Direct employment across the organics recycling industry

The ROU historically collaborated with *Compost Australia* to establish a relationship between quantity of raw materials processed and direct employment via direct consultation with a cross section of organics processing enterprises of different scale, processing type and complexity of production systems (in relation to the diversity of materials processed and the breadth or product types manufactured).

Applying this average employment coefficient of one Full Time Equivalent (FTE) employee per ~ 5,000 tonnes per annum (tpa) of material processed to the total reported quantity of 5,515,685 tonnes of biodegradable organic materials for the 2012 financial year equates to the direct employment of over 1,100 FTE personnel in compost operations and operational management. Again, it is noted that the significant reduction in reported quantities for 2012 is primarily responsible for the reduced tonnages reported, primarily in Qld is a consequence of reporting biosolids on the dry weight basis, which is not the basis upon which the employment coefficient has been originally established. Consequently there is every reason to believe that employment is relatively unchanged the 1,260 FTE personnel figure reported in 2011 for direct employment across the industry.

This average employment coefficient does not take into account any year-to-year variation in supply and demand ratios or year-by-year changes in establishment of new processing infrastructure across the sector. The viability of rural and regional facilities (including manure composting facilities) relies on lower staffing levels per tonne of material processed. Metropolitan AWT facilities have a higher degree of engineering complexity, and a higher corporate and administrative employment levels per tonne of material processed. Facilities producing bagged

product lines have higher employment levels per tonne of material processed than facilities that distribute only bulk product.

This total does not account for additional indirect employment in associated corporate or administrative activities, product development, compost marketing and sales, plant and equipment maintenance, transport of raw materials to processing facilities and transport of recycled organics products to application sites, product spreading and application, research and development, corporate and local government planning/procurement/management/contract management, community education, state and commonwealth government strategy, regulation and planning.

Section 3 Significant developments: state by state

3.1 Significant developments: New South Wales

3.1.1 New South Wales number and type of facilities

A total of 64 organics recycling facilities have participated in the 2012 survey. Newly established facilities initially included in the 2010 survey are now operating at capacity during the 2012 reporting period.

Open air windrow composting remains the overwhelmingly dominant method for reprocessing a wide range of non-putrescible materials, including garden vegetation and woody materials, and also a range of highly putrescible materials such as grease trap and organic sludges, manures and other agricultural residuals.

As a consequence of high landfill and waste disposal costs there has been significant move in the Sydney metropolitan area to the collection and processing of co-collected kerbside food and garden organics. There has also been a strong move towards AWT infrastructure for processing mixed solid waste, including the recovery of a stabilised organic rich fraction that is physically separated after collection from other mixed waste materials using a sequence of Materials Recovery Facilities (MRF) technologies. Retail centres are now calculating that combined costs of collection and disposal (or mixed waste treatment) are approaching the level of $300 per tonne of waste collected.

Additional facilities for processing food plus garden organics are under construction outside the Sydney region, and will be reporting processing quantities in the 2013 survey.

There are also widespread anecdotal reports of notable increases in direct land application of food wastes and organic liquids/sludges, and also of the use of food waste as animal feed. There are widespread reports of food waste being transported to farms as animal feed in a manner that contravenes New South Wales DPI and Australian Government biosecurity laws and regulations in order to avoid the costs of waste disposal (and payment of the New South Wales Government landfill levy). It is anticipated that these practices will be revised now that the refurbishment of the anaerobic digester in western Sydney is complete and the facility is again receiving commercial sector food waste, and as a consequence of the proposed revision of the *New South Wales EPA Resource Recovery Exemptions*.

3.1.2 New South Wales quantities of organic material received and processed

The total reported quantity of biodegradable organic materials received for reprocessing or land application as beneficial recycled organics products has increased from the ~1,788,750 tonnes of raw materials reported in 2011 to a total of 1,816,619 tonnes reported in 2012.

Note that facilities that are directly operated by individual local councils are not accounted for in this data as OEH/EPA conducts an annual survey of local government, including the organics processing data for annual

reporting, however kerbside materials generated from the greater Sydney region (GSR), are overwhelmingly processed by commercial contractors and this pattern is increasing in regional areas as councils contract out the processing of biodegradable organic wastes.

Notable developments:

- Reported quantities of **garden organics** diverted from the waste stream for reprocessing into beneficial recycled organics products have reportedly decreased from a total of ~637,300 tonnes reported in 2011 to a total of 600,634 tonnes reported in 2012, reversing the reported increase from the previous financial year.
- Reported quantities of **wood and timber** diversion from commercial and industrial sources, and quantities of **barks** and **sawdusts** from forestry sources have all shown a notable decrease from the quantities reported in the 2011 financial year.
- Reported quantities of **mixed solid waste** reprocessing and associated recovery of the organic rich fraction has increased substantially as recently completed infrastructure has achieved full capacity. Reported quantities of the organic fraction of this mixed waste have stabilised at 191,000 – 192,000 tonnes per annum.
- Reported quantities of source segregated **food waste** diverted from the waste stream for reprocessing into beneficial recycled organics products have decreased from 102,670 tonnes in 2010 to 95,490 tonnes in 2011, and further to 40,253 tonnes in 2012. This is a consequence of the major food waste processing facility being decommissioned for overhaul, and reported food waste quantities are expected to increase significantly in the following 12 months now that the anaerobic digester is western Sydney has been recommissioned, with a design capacity of 50–80,000 tpa of food waste. In the interim, a significant quantity of food waste is reportedly being transported to the Woodlawn bioreactor landfill. There are also widespread anecdotal reports of notable increases in direct land application of food wastes and organic liquids/sludges, and also of the use of food waste as animal feed. These quantities are not captured by this survey. Note that quantities for MSW reported in this survey include the biodegradable organics fraction only, using performance data from each facility.
- Whilst reported quantities of food waste have decreased, it should be noted that the quantities reported for **MSW (organic fraction)** and for **biowaste (co-collected food plus garden organics)** have increased significantly over the two preceding years and both contain a significant proportion of food waste. Whilst this represents an increase in the quantities of food organics and garden organics being reprocessed, this data is not readily disaggregated into separate subcategories of organic materials.
- Reported quantities of **biosolids/grit/screenings diversion** from the waste stream for reprocessing into beneficial recycled organics products have significantly **increased** from ~ 245,670 tonnes reported in 2011 to a total of 326,863 tonnes in 2012. It is again noted that there are significant cross-border transfers of biosolids between northern New South Wales and southern Queensland for direct land application (both in conformance with the New South Wales EPA biosolids guidelines), and that total biosolids quantities can

vary significantly depending on moisture content as quantities are reported on a fresh weight, or wet weight basis.

3.1.3 New South Wales quantities and type of recycled organic product sold

Notable developments:

- A further increase in sales of **composted soil conditioner** has again been reported from ~ 538,000 m^3 (2010) to ~ 587,000 m^3 (2011) and now to ~ 630,892 m^3 in 2012. Reported sales of **pasteurized soil conditioner** have remained stable at around 24,000 – 25,000 m^3.
- Sales of mulch have remained relatively stable, with a relatively small decrease in reported sales of **raw mulch** being reported as a marginal reversal of the large increase reported in the previous year.
- Reported quantities of organic materials going to **direct land application** increased significantly to 253,000 m^3 in 2012, increasing from ~160,000 m^3 reported in 2011, up from ~110,000 m^3 reported in 2010 and ~ 99,000 m^3 reported in 2009.

3.1.4 New South Wales inventories

Total inventories represent the combined quantity of raw materials, materials being processed, and stockpiles of finished product on-site at the end of the financial year. There is little value in attempting to distinguish between these categories as materials in process will be held back or pushed through to final product to meet sales orders. There has been a strong drive since the 2006 survey to clarify the question asked in relation to inventories, and to encourage industry to provide a more accurate response. The current year survey continues this emphasis and the total inventories in New South Wales have remained stable.

Reported inventories have increased significantly from 893,701 m^3 reported in 2011 to 1,090,680 m^3 reported in 2012. Increasing inventories has been raised as a concern by some compost manufacturers in association with concerns about lower cost, unprocessed or "aged" garden organics mulch being "dumped" into markets from local council facilities, and also the increase in low priced Mixed Waste Organics Outputs (MWOO) products placing downwards pressure on prices and reputation in some regional agricultural applications.

Note that in the reporting of issues and priorities for industry, although the rate of organics resource recovery for beneficial application to land has increased very rapidly over the past decade, there is no longer any expressed concern or suggestion that any markets for recycled organics products are at risk of saturation.

3.1.5 New South Wales industry issues and priorities

The key issues expressed by the industry are listed below in order of priority, with comparison to expressed priorities from the previous two survey years.

Table. Issues and priorities for the recycled organics industry in New South Wales.

Rank	Prioritised issues 2012	Prioritised issues 2011	Prioritised issues 2010
1.	Market reputation and protection: - Cheap sub-standard products that have not been effectively pasteurised/composted being marketed as compost. - Local government is price driven and local government run facilities (often unlicensed) are producing and distributing low quality products as "compost" with the effect of compromising market price and perception. - Non certified products being presented as standards compliant based on limited laboratory test results which can only assess compliance of an individual batch with specifications (and cannot assess not compliance with all requirements of the standard). -Organics with high physical contamination being sold as "compost"; Market perceptions of compost.	Site regulation and planning consent - inconsistent, unnecessarily costly, requirements don't support policy.	Factors placing downwards pressure on prices and increasing production costs (oversupply, competition from non-commercial facilities, fuel price, absence of incentives for growers).
2.	Inadequate / unenforced regulation of competing products (manures, fertilisers); No regulation or control of direct land application of food waste undermines the viability of processing infrastructure.	Inadequate / unenforced regulation of competing products.	Site regulation and planning consent - inconsistent, unnecessarily costly, requirements don't support policy.
3.	Industry structural economics and government incentives; viable product price is unaffordable for customers key markets (market capacity to pay); need for financial incentives for growers (eg. rebate) to overcome capacity to pay in key development markets. Site regulation and planning consent is inconsistent and unnecessarily costly.	Raw materials contamination.	Inadequate / unenforced regulation of competing products.
4.	Need for development of new products/markets (particularly agriculture); need for industry participation in applied field research in agriculture for compost performance data.	Cheap substandard products being marketed at low price or free as “compost” from mixed waste processing and from local government shredding facilities undermining agricultural market development.	Raw materials contamination.
5.	Raw materials contamination.	Carbon Farming Initiative readiness and carbon sequestration.	Development of new products/markets (particularly agriculture).

3.2 Significant developments: Western Australia

3.2.1 Western Australia number and type of facilities

A total of 30 organics recycling facilities have participated in the 2012 survey, increasing from 29 in 2011 and 28 facilities in 2010. Open air composting in windrows remains the dominant method for reprocessing all manner of materials, however the industry in Western Australia is characterised by a significant diversity of organics processing technologies (see Section 2 above), including two AWTs processing mixed waste and additional anaerobic digestion facilities at various stages of development. It should be noted that the one enclosed composting facility processing biosolids, food waste and other putrescible materials has since initiated closure, and that the biodegradable organic materials previously processed at this facility will be transferred to open air facilities for processing.

3.2.2 Western Australia quantities of organic material received and processed

The total reported quantity of organics recovered in Western Australia has decreased by around 35,000 tonnes from ~733,000 tonnes reported in 2011 to a total of 698,006 tonnes reported in 2012. This reverses the 36,860 tonnes increase reported from 2010 to 2011, and returns to an equivalent level to the 696,129 tonnes of raw materials reported in 2010.

Notable developments:

- Reported quantities of **garden organics**, and **wood/timber** (from commercial and industrial sources) in aggregate have fallen by around 15,000 tonnes from 2011, with a total of 228,847 tonnes reported for the 2011 financial year.
- Reported quantities of source segregated **food waste** diverted from the waste stream for reprocessing into beneficial recycled organics products have continued to increase significantly, from 7,453 tonnes reported in 2010, to 14,338 tonnes reported in 2011, and to 21,730 tonnes reported in 2012.
- Reported quantities of **mixed solid waste** reprocessing and associated recovery of the organic rich fraction has increased from 143,420 tonnes reported in 2010 to 162,580 tonnes reported in 2011, representing an increase of around 19,160 tonnes. This growth trend from previous years results from the commissioning of the most recently completed AWT infrastructure (Mindarie) and increased operational throughput to design capacity. This trend has reversed for 2012 as other AWT plants processing mixed waste have been subject to scrutiny and reduced throughput as a consequence of odour complaints. Consequently, the reported quantities of **MSW** reprocessing and associated recovery of the organic rich fraction has decreased in 2012 by ~27,800 tonnes to a total of 134,802 tonnes.
- Reported quantities of **biosolids/grit/screenings**, and **oils/greasetrap/organic sludges** in aggregate have also continued the growth trend from the previous year, with ~ 57,000 tonnes reported in 2010 to ~ 60,500 tonnes reported in 2011, and now to 65,808 tonnes reported in 2012.

3.2.3 Western Australia quantities and type of recycled organic product sold

- The trend of increasing sales of composted **soil conditioner** has continued, from ~ 322,450 m^3 in 2010, to ~ 353,817 m^3 in 2011, and 374,346 m^3 in 2012. This is offset by a reduction of around 5,000 m^3 in sales of pasteurised soil conditioner to a reported total of 78,498 m^3 in 2012, which has stabilised after the very large increase in reported sales of pasteurized soil conditioner in previous years, from ~ 26,790 m^3 (2010) to ~ 83,736 m^3 (2011).

- The trend of increasing sales of **composted mulch** and **pasteurised mulch** from previous years has stabilised with the total quantity of raw mulches decreasing by around 11,000 m^3 since 2011, however there is a large reported decrease in raw mulch sales from ~215,000 m^3 in 2011 to a total of 154,666 m^3 reported as being sold in 2012.

- Reported sales of **manufactured soils** have also reduced from ~ 226,000 m^3 reported in 2011 to 191,250 m^3 reported in 2012. From previous years, the fluctuating quantity of sales of manufactured soils tends to align with the level of urban housing development and the general level of activity in the Western Australia economy, reinforcing such suggestions from processors.

3.2.4 Western Australia inventories

Total inventories represent the combined quantity of raw materials, materials being processed, and stockpiles of finished product on-site at the end of the financial year. There is little value in attempting to distinguish between these categories as materials in process will be held back or pushed through to final product to meet sales orders. There has been a strong drive since the 2006 survey to clarify the question asked in relation to inventories, and to encourage industry to provide a more accurate response. The current year survey continues this emphasis.

- Reported WA inventories have fallen from 569,623 m^3 reported for the 2011 financial year to 512,329 m^3 reported for the 2012 financial year. This is encouraging given the additional quantity of material in production and increased quantity of product manufactured at the recently developed and now fully operational facility at Mindarie.

3.2.5 Western Australia industry issues and priorities

The key issues expressed by the industry are listed below in order of priority, with comparison to expressed priorities from the previous two survey years.

Table. Issues and priorities for the recycled organics industry in Western Australia.

Rank	Prioritised issues 2012	Prioritised issues 2011	Prioritised issues 2010
1.	Site regulation and policing: - inappropriate response from regulators in assuming compost facilities are responsible for odour; - increasing compliance costs; - cost and time frame for achieving planning consent and license; and - inconsistent, unnecessarily costly, requirements don't support policy.	Site regulation and planning consent is inconsistent, unnecessarily costly, requirements don't support policy.	Factors placing downwards pressure on prices and increasing production costs (oversupply, competition from non-commercial facilities, fuel price, absence of incentives for growers).
2.	Industry structural economics and government incentives (absence of coordinated government policy support with local government, state government and national government agencies all working independently of each other).	Industry structural economics and government incentives (absence of coordinated government policy support with local government, state government and national government agencies all working independently of each other).	Site regulation and planning consent is inconsistent, unnecessarily costly, requirements don't support policy.
3.	Factors placing downwards pressure on prices and increasing production costs, including transport distances and fuel price.	Factors placing downwards pressure on prices and increasing production costs, including transport distances and fuel price.	Market and political perception of composts and industry (external); promoting the national industry brand; industry organisation and communication (internal); delivering value for CA members
4.	Industry organisation and strategic industry development.	Shred and give away cheap greenwaste as "compost" and mulch; cheap substandard products being marketed as “compost” making equivalent performance claims and undermining reputation and market price of quality products.	Raw materials contamination
5.	Shred and give away cheap greenwaste as "compost" and mulch; cheap substandard products being marketed as “compost” making equivalent performance claims and undermining reputation and market price of quality products.	A need for application-specific performance based product specifications and market education to better differentiate products in the market, and for associated cost/benefit performance data.	Need application of specific product standards/product standards need revision.
6.	Raw materials contamination from “source separate” collection systems.		
7.	A need for application-specific performance based product specifications and market education to better differentiate products in the market, and for associated cost/benefit performance data.		

3.3 Significant developments: South Australia

3.3.1 South Australia number and type of facilities

Open air composting in windrows remains the overwhelmingly dominant method for reprocessing all manner of materials, including garden vegetation (elsewhere green organics, garden organics, green waste) and highly putrescible materials such as grease trap and organic sludges, manures and agricultural residuals. Food organics (elsewhere food waste) is now being composted outdoors in covered piles using aerated static pile technology, however the reported quantity of food waste being composted is very low.

The number of facilities reporting data and the response rate is not reported by Zero Waste South Australia. 33 organics recycling facilities have historically been involved in the survey. Response rates are not reported, consequently limiting interpretation of trends.

3.3.2 South Australia quantities of organic material received and processed

The total reported quantity of biodegradable organic materials received for reprocessing or land application as beneficial recycled organics products has continued to decrease to 595,320 tonnes for the 2012 financial year, down from 637,271 tonnes of raw materials reported in 2011 and 678,587 tonnes of raw materials reported in 2010. The general downturn in economic activity is affecting the recycled organics industry, and the nursery and garden industry as a whole.

Notable developments:

- Reported quantities of **garden organics** diverted from the waste stream for reprocessing into beneficial recycled organics products have deceased from ~222,700 tonnes in 2011 to a total of ~203,058 tonnes reported in 2012. This reverses the marginal increase from the previous financial year.
- Reported quantities of **food organics** diverted from the waste stream for reprocessing into beneficial recycled organics products have continued to increase gradually, from 4,379 tonnes over the 2011 financial year to a total of ~5,630 for the 2012 year. Though the total quantity is relatively small, this increasing trend is highlighted for observation as facilities seek to address issues of collection and contamination of post consumer commercial sector food waste, and evaluate the commercial viability of increased food waste processing.
- Reported quantities of **manure** diversion for reprocessing into beneficial recycled organics products have increased from ~66,500 tonnes over the 2011 financial year to a reported total of ~88,500 for the 2012 year, continuing the increasing trend from previous years..
- Reported quantities of **barks and sawdust** (from forestry) for reprocessing have continued to decrease from a total of ~201,000 tonnes over the 2011 financial year to ~174,772 tonnes reported for the 2012

financial year. Zero Waste South Australia has reinstated reporting of barks and sawdust (from forestry) as a separate line item to support national reporting.

- A large reduction is reported in the quantity of **paper pulp/sludge** being processed, falling from over 50,000tpa in 2010 to 16,881tpa in 2011, and falling again in 2012 to 7,584 tonnes.
- Note that there are no facilities attempting to process mixed waste in South Australia, and the state government has a clear policy position that discourages the composting of MSW, with strong encouragement of source segregated collection and processing of biodegradable organic materials.

3.3.3 South Australia quantities and type of recycled organic product sold

Notable developments:

- Reported sales of composted **soil conditioner** have continued to increased from ~89,700 m^3 reported in 2011 to 123,744 m^3 reported in 2012. This is offset to a degree by a decrease of around 19,000 m^3 in reported sales of manufactured soils, a proportion of which is recycled organics in the soil blend.
- Reported sales of **composted mulch** products have decreased from ~162,400 m^3 in 2011 to 139,388 m^3 in 2012. Similarly reported sales of **raw mulch** products have decreased from ~494,000 m^3 of composted mulch in 2011 to 452,604 m^3 in 2012, reversing the large increase in the reported quantities of raw mulch sold between 2010 and 2011 years.
- Total reported sales of recycled organics products have reduced by ~63,000 m^3 during this period of economic downturn.
- Note that the format of data collection in South Australia does not allow breakdown of reported sales quantities by market segment, consequently total quantities only are by product category are reported.

3.3.4 South Australia inventories

The method of surveying industry in South Australia underwent transition in 2011, and total inventory data for end of 2011 financial year is not available. In collaboration with the ROU, Zero Waste South Australia has reinstated reporting of inventories as of end of financial year to support interpretation of data and national reporting. However, inventory is reported in tonnes rather than volume, which is more readily estimated by ground survey and is not subject to changes in moisture content that are weather dependent. Total reported inventory at end of 2012 financial year is estimated as 492,528 m^3, which is significantly reduced from the 984,301 m^3 of total inventory last reported at end of financial year 2010.

3.3.5 South Australia industry issues and priorities

The key issues expressed by the industry are listed below in order of priority, with comparison to expressed priorities from the previous two survey years. Issues and priorities expressed in 2012 are consistent with those expressed in previous years, with the emergence of supply side driven pressures and suppressed demand during a

period of downturn in the general economy. Operational and administrative costs associated with regulatory compliance are highlighted this year, as are the costs of managing contamination of received organic materials for processing, and the consequence of reduced value of compost in the market due to imperfect removal of contaminants.

Table. Issues and priorities for the recycled organics industry in South Australia.

Rank	Prioritised issues 2012	Prioritised issues 2011	Prioritised issues 2010
1.	Factors placing downwards pressure on prices, including downturn in economy and a saturated market.	Factors placing downwards pressure on prices and increasing production costs (oversupply, competition from non-commercial facilities, fuel price, absence of incentives for growers).	Factors placing downwards pressure on prices and increasing production costs (oversupply, competition from non-commercial facilities, fuel price, absence of incentives for growers).
2.	Increasing operational costs, including high licence fees for small farm based operators, record keeping requirements, contamination management costs.	Site regulation and planning consent is inconsistent, unnecessarily costly, requirements do not support policy.	Site regulation and planning consent is inconsistent, unnecessarily costly, requirements do not support policy.
3.	Contamination of incoming raw materials affecting processing costs and value of the end products.	Raw materials contamination.	Raw materials contamination.
4.	Competing products, and the inadequate / unenforced regulation of competing products that are consequently subject to lower production costs.	Inadequate / unenforced regulation of competing products.	Inadequate / unenforced regulation of competing products.
5.	High level of price competition in the market.	Market and political perception of composts and industry (external); promoting the national industry brand; industry organisation and communication (internal); delivering value for industry association members.	Market and political perception of composts and industry (external); promoting the national industry brand, Industry organisation and communication (internal); delivering value for industry association members.

3.4 Significant developments: Victoria

The survey of the recycled organics industry in Victoria is conducted directly by Sustainability Victoria, with the ROU consulting with the agency to assist in identifying gross anomalies and normalise data for integration into the national report. Due to the later timing of production of the 2011 national report, complete data was available with all 33 facilities reporting quantity data for the 2011 report. For the 2012 report, one additional facility that recovers pre-consumer food and confectionary for stockfeed has been included in the survey.

However it should be noted that eight processors that reported a total of ~ 36,080 tonnes in of biodegradable organic materials received in 2011 (including 18,900 tonnes of garden organics, 14,400 tonnes of Commercial and Industrial (C&I) wood/timber/sawdust, ~ 2,700 tonnes other organics, and zero tones of food organics) have not reported in 2012. These facilities are still in operation, and consequently their reported quantities of biodegradable organic waste in 2011 have been included in the 2012 data without change. Consequently it is not valid to conduct direct comparison between 2012 and 2011 data. The response rate for processors in Victoria was increased to 100% in 2011 due to the efforts of Sustainability Victoria staff, however industry has not been as supportive of the survey in 2012. Of the eight processors included in 2011 that have not responded for the 2012 survey, of these five are small processors, each receiving quantities below 3,000 tonnes per annum.

Open air composting in windrows remains the overwhelmingly dominant method for reprocessing all manner of materials, including garden vegetation (elsewhere green organics, garden organics, green waste); food organics (elsewhere food waste); and highly putrescible materials such as grease trap and organic sludges, manures and other agricultural residuals. However, the quantities of food waste reprocessed via composting are largely C&I sector source segregated food wastes that are processed at an enclosed and force aerated tunnel composting facility in Dandenong.

3.4.1 Victoria quantities of organic material received and processed

The total reported quantity of organics recovered in Victoria has decreased by around 37,000 tonnes (3%) from ~999,150 tonnes reported in 2011 to a total of 963,354 tonnes reported in 2012. However, the actual contraction is around 52,000 tonnes as the total is bolstered by the inclusion of a previously unreported feed production company recovering pre-consumer food waste from food and confectionary production for use as supplementary stock feed.

- The total reported quantity of garden organics has increased from ~421,800 tonnes in 2011 to 478,339 tonnes reported in 2012, an increase of ~ 56,500 tonnes (13.4%).

- Reported data indicates an increase of 37% in the quantity of food organics recovered, from ~22,370 tonnes reported in 2011 to a total of 30,696 tonnes reported in 2012. This increase is entirely a consequence of the inclusion of data from an additional large stockfeed production company that recovers pre-consumer foodstuffs from food processing facilities for use as supplementary stock feed. This increase does not

represent an increase in the food waste processing capacity of recycled organics facilities in Victoria which have in otherwise reported a decline of over 6,000 tonnes for the 2012 year compared to 2011.

- The reported quantity of forestry barks and sawdusts recovered has increased by ~ 18% from 126,345 tonnes reported in 2011 to a total of 149,630 tonnes reported in 2012.

- Note that numerous categories of data are reported as "other" organics in 2012 that have previously been reported in individual categories. Quantity data for biosolids, oils/greasetrap/sludges, agricultural organics, and other organics are all reported as "other" organics, limiting analysis of the 2012 results. In aggregate, the reported quantity of these "other organics" has significantly decreased from ~321,430 tonnes in 2011 to a reported 187,504 tonnes reported in 2012.

- Because this data has been reported only in aggregate, it is not possible to identify whether the significant reported increase in the quantity of garden organics or forestry barks/sawdusts recovered in 2012 represents actual increase in recovery rates or whether it represents a variation in the categorization of recovered organic materials. Consultation with industry suggests that there has not been a large increase in the actual quantity of garden organics being processed over this period, and consequently the changes suggested by the current data may potentially be misleading.

- It is hoped that 2013 data will be reported in all relevant material subcategories and from all facilities to enable improved reporting of trends.

3.4.2 Victoria quantities and type of recycled organic product sold

Notable developments

- Reported sales of **composted soil conditioner** have continued to increase from ~109,000 m^3 in 2011 to 118,419 m^3 in 2012. This is complemented by a larger reported increase in sales of **pasteurised soil conditioner** which has continued to increase, from ~24,000 m^3 in 2011 to 37,130 m^3 in 2012. This is offset to a degree by a decrease of around 19,000 m^3 in reported sales of manufactured soils, a proportion of which is recycled organics in the soil blend.

- Reported sales of **composted mulch** products have increased dramatically, rising from 21,050 m^3 reported in 2011 to 113,237 m^3 reported in 2012 (see last dot point below for analysis). Sales of pasteurised mulch have remained relatively stable, but a similarly large increase in quantities of **raw mulch** products is reported, increasing from ~325,830 m^3 of composted mulch reported in 2011 to 478,914 m^3 reported in 2012.

- Reported sales of **manufactured soils** products have also increased from ~125,000 m^3 reported in 2011 to 162,085 m^3 in 2012.

- Reported quantities of other products have remained relatively stable.

- These large increases in reported quantities of recycled organics products manufactured and sale are not supported by corresponding increases in the quantity of raw material inputs received for processing. In the absence of inventory data it is not possible to identify the degree to which this is a consequence of inconsistent reporting or sale of previously stockpiled inventory. Direct consultation with processors indicates that the reported additional quantities of product sold are most likely to be a consequence of inconsistent reporting by processors. The format of data collection in Victoria does not allow breakdown of reported sales quantities by market segment, consequently total quantities only are by product category are reported.

3.4.3 Victoria inventories

Inventory data for Victoria at end of 2012 financial year has not been reported.

It is hoped that 2013 data will include reporting of total inventory data in cubic metres. The ROU will continue to support Sustainability Victoria's ongoing efforts to ensure quality data is reported.

3.4.4 Victoria industry issues and priorities

The key issues expressed by the industry are listed below in order of priority, with comparison to expressed priorities from the previous years.

Table. Issues and priorities for the recycled organics industry in Victoria.

Rank	Prioritised issues 2012	Prioritised issues 2011	Prioritised issues 2010
1.	Lack of clear guidelines, treatment standards, unambiguous separation distance for planning and licensing causes delay and unnecessary costs for establishing a licensed facility.	Site regulation and planning consent is inconsistent, unnecessarily costly, requirements don't support policy.	Site regulation and planning consent is inconsistent, unnecessarily costly, requirements don't support policy.
2.	Raw materials contamination: physical contaminants in source separated collections and the cost of removal and disposal of removed contaminants.	Guidelines for the establishment and regulation of compost and related facilities.	Factors placing downwards pressure on prices and increasing production costs (oversupply, competition from non-commercial facilities, fuel price, absence of incentives for growers).
3.	Lack of clear guidelines and treatment standards for licensed facilities causes councils to have unrealistic expectations regarding necessary investment in infrastructure	Factors placing downwards pressure on prices and increasing production costs (oversupply, competition from non-commercial facilities, fuel price, absence of incentives for growers).	Raw materials contamination.
4.	Lack of infrastructure grants and product application incentives from all levels of government.	Suitable product standards and costs of certification.	Demand creation and product performance data for agricultural applications.
5.	Need for investment market development and field trials to establish compost performance data.	Raw materials contamination.	Suitable product standards and costs of certification.
6.	Organic waste generators dumping waste on farmland or application as animal feed without EPA license or environmental controls.		

7.	Council willingness to use unprocessed mulches and limited willingness to purchase pasteurised or quality assured compost products		

3.5 Significant developments: Queensland

3.5.1 Queensland number and type of facilities

Significant disruptions have occurred in Queensland over the 2012 year and subsequent period of survey implementation.

Significant variations in reported quantities can arise due to economic upturns and downturns, droughts, floods and widespread storm/cyclone damage. The 2012 period coincides with significant rain and weather events, and the DEHP requested local governments to report on wastes arising from disaster events as a separate item in an effort to deal with the surges in waste generation. Notably this includes the ongoing cleanup storm damage and debris from Cyclone Yasi (February 2011) that has significantly contributed to additional garden organics/vegetation generation into the 2012 financial year.

This period also coincided with uncertain preparation for, and short lived implementation of the Queensland Waste Levy, and the subsequent repeal of the levy. Relevant data about waste processed by several private landfills during the seven-month period of the now repealed Waste Levy was extracted from the Queensland Waste Online Levy System (QWOLS).

The waste levy's commencement and repeal has created discontinuities in waste reporting. In particular, data from private landfills was provided by a different methodology for the pre-levy period July to November 2011, and the levy period from December 2011 to June 2012.

A point of difference between recovering organic waste versus recovery of dry recyclables at MRFs is that organics are reprocessed at the organics facilities, generally in the regions where the organic waste is generated. By contrast MRFs aggregate material by type and bulk loads are transported elsewhere (including overseas) for actual reprocessing.

The 2012 financial year is the first time that DEHP has directly surveyed organic processors. Previously the department had received consolidated data from ROU survey implementation.

The *Environmental Protection Act 1994* (s.13) defines waste as materials surplus to, or left-over, or unwanted by products from domestic, commercial, industrial and other activities. This definition includes waste gases, liquids, solids and energy. Chapter 7 of the *Waste Reduction and Recycling Act 2011* establishes waste reporting requirements for local governments and other waste management organisations ('reporting entities').

This change has enabled the department to compel local government and industry to provide responses in a format that suits DEHP requirements.

Whereas previously the agency interacted with the ROU to avoid risk of double counting between the recycled organics industry survey and the local government survey to support combination of data from different sources, via the new arrangements, DEHP has collected raw data directly and integrated the data from organic processors

with the green waste and biosolids data from local governments and private landfills. The intention is to improve analyse of organic waste on a regional level.

Queensland data draws together data provided by local government and private sector waste managers to build a picture of waste generation and management in Queensland.

In 2012, a total of 43 organisations have reported data from 52 facilities (including local government facilities), compared to the 42 commercial organics processing facilities that participated in the 2011 and 2010 surveys.

Consequently, comparison between 2011 and 2012 survey data is not practical.

Open air composting in windrows remains the overwhelmingly dominant method for reprocessing all manner of materials, including garden vegetation (elsewhere green organics, garden organics, green waste); food organics (elsewhere food waste); and highly putrescible materials such as grease trap and organic sludges, manures and other agricultural residuals.

Commercial organic processing facilities are more widely dispersed throughout Queensland than facilities processing dry recyclables, which tend to be concentrated in the south-east corner of the state. While South East Queensland dominates in terms of quantities of organics processed, significant amounts are also processed in other regions. For example, significant amounts of grease trap wastes and other sludges, manure and other agricultural residuals are processed by composters and soil conditioners in the Fitzroy and Darling Downs regions, while significant amounts of timber, wood and sawdust from industrial sources are processed in the Wide Bay/Burnett region. In contrast, abattoir waste recovery is concentrated in the Brisbane region, while the processing of forestry residuals is concentrated in the Sunshine Coast region.

3.5.2 Queensland quantities of organic material received and processed

The total reported quantity of organics recovered in Queensland has notionally decreased by 729,206 tonnes from ~2,172,600 tonnes reported in 2011 to a total of 1,443,386 tonnes reported in 2012. Caution is advised in the interpretation of these figures due to the changes and disruptions identified above.

Additionally, in contrast with survey implementation from previous years, DEHP has implemented significant changes in the collection of data, including:

- Inventories at end of financial year are not reported. This undermines interpretation of product quantity data.
- Recycled organics products quantities are reported in tonnes (in some instances based on bulk densities reported in literature), which has required reconversion to cubic metres for national compatibility.
- Biosolids quantities have been reported on a dry weight basis. This is a major contributor to the reduction in total quantity reported for Queensland from 2011 to 2012, and the transition is justified on the basis of fluctuating reportage of biosolids quantities in previous years, but cannot be readily

converted to fresh weight basis for comparison with 2011 data as the moisture content of biosolids, can vary from 20% to 90%, depending on plant and prevailing weather. Reporting by dry solids equivalent, if implemented consistently, should provide for greater consistency. In South East Queensland the situation for reporting biosolids is complicated biosolids that are landfilled are disposed of into private landfills in the Brisbane region, whereas recovered biosolids are sent to composters in the West Moreton region.

The challenge of reporting inventories and product quantities by weight is that weight is weather dependent and is subject to significant variations as a consequence of seasonal weather. This introduces the same variability that reporting biosolids on a dry weight basis aims to correct. Composts and mulches are predominantly sold into urban markets on a volumetric basis. Where composted manures or soil blends are sold by weight, processors use a standard conversion factor for mass to volume allowing the processor providing the data to make the conversion based on the actual product, which is more accurate than use of an assumed or average conversion factor from a different source. Similarly, inventories are estimated by volume using ground survey techniques and volume of total inventory (all material and product on site) is directly relevant to capacity constraints for the facility.

The recording of recycled organics product quantity information in tonnages rather than cubic metres requires re-conversion to cubic metres for reporting nationally. Whilst the ROU has access to the conversion factors applied by DEHP, it is always more accurate to report direct quantities provided by each processor, and where necessary to use the processors own internal conversion factor. The use of either published or generic conversion factors will invariably introduce inaccuracy.

3.5.3 Queensland industry issues and priorities

Industry issues are not reported for 2012. Significant issues based on ROU interaction with industry across South East Queensland include

- The repeal of the Waste Levy, which provided a short lived incentive for increased diversion and recovery of biodegradable organic wastes for processing.
- The demise of the Queensland government agency Department of Environment and Resource Management, including defunding of all programs and staff established under Waste Levy funds targeted to support increased diversion and recovery of organics, the implementation of quality assurance and industry training programs, and the acceleration of market development for recycled organics products.
- The additional defunding of the Market and Industry Development Officer and associated program.
- The absence of clear and consistent guidelines for licensing of organics reprocessing facilities—Environmentally Relevant Activity (ERA) 53 *Compost and Soil Conditioner manufacturing* is unclear and inconsistent; the environmental controls for the processing of organics defined under ERA53 are

not applied to the processing of competing organics materials under ERA2, ERA3, ERA4, and ERA16; and the revised ERA53 is not considered to provide clarity for consistent use by local government to support evaluation of proposals for planning consent.

The key issues expressed by the industry across Queensland as a whole from previous year surveys are listed below in order of priority, with comparison to expressed priorities from the previous two survey years.

Table. Issues and priorities for the recycled organics industry in Qld.

Rank	Prioritised issues 2011	Prioritised issues 2010	Prioritised issues 2009
1.	Site regulation and planning consent is inconsistent, unnecessarily costly, requirements don't support policy.	Factors placing downwards pressure on prices and increasing production costs (oversupply, competition from non-commercial facilities, fuel price, absence of incentives for growers).	Factors placing downwards pressure on prices and increasing production costs (oversupply, competition from non-commercial facilities, fuel price, absence of incentives for growers).
2.	Factors placing downwards pressure on prices and increasing production costs (oversupply, competition from non-commercial facilities, fuel price, absence of incentives for growers).	Site regulation and planning consent is inconsistent, unnecessarily costly, requirements don't support policy.	Site regulation and planning consent is inconsistent, unnecessarily costly, requirements don't support policy.
3.	Inadequate / unenforced regulation of competing products.	Inadequate / unenforced regulation of competing products.	Inadequate / unenforced regulation of competing products.
4.	Product standards and associated certification or verification systems.	Development of new products / markets (particularly agriculture).	Development of new products / markets (particularly agriculture).
5.	Product specifications applied by government agencies and the absence of transparency in the methods used assess product suitability and select suppliers.	Market and political perception of composts and industry (external), Promoting the national industry brand, Industry organisation and communication (internal), delivering value for CA members.	Product quality standards need revision.

3.6 Australian Capital Territory, Tasmania and Northern Territory

The Australian Capital Territory, Northern Territory and Tasmania have not participated in the 2011 national industry survey, it is hoped that these jurisdictions will participate in future years. Please refer to *Organics Recycling in Australia: Industry Statistics 2006* report for ACT data from that year survey, available online from www.recycledorganics.com

Section 4 Recommendations for subsequent survey implementation

4.1 Recommendations:

i. Implementation of the survey should begin at the beginning of August each year, close to the end of the financial year and prior to the busy spring sales period. This is required both for the purpose of achieving superior data quality and for timeliness of reporting of results for use by industry and government for planning and to inform current year sales and programs. Whilst reporting later in the subsequent financial year can satisfy the reporting requirements of the various state and federal government agencies that contribute funding for survey implementation, earlier implementation and reporting can yield more accurate data.

ii. There is a need for the collection of annual inventory data to support analysis of market and sales trends in all states. It is preferable to collect total inventories (representing the combined quantity of raw materials, materials being processed, and stockpiles of finished product on-site) at the end of the financial year, at 30 June. Historically the ROU has found it counterproductive to draw a line between material in production and finished product for sale as large batches move from one category to another with the stroke of a pen, and materials in process can be held back or pushed through to finished product via increased intensity of management to meet sales orders.

iii. To establish a common practice baseline for the industry and to support Australian Government reporting requirements, the ROU has developed an additional set of standard questions for inclusion into the industry survey in each state. These additional questions can be completed in under two minutes by processors, and enable the classification of different types of "composting facilities" on the basis of technology and management practices employed. The ROU is working with government agencies and industry to progressively include this additional information into the industry survey for each state. Interested stakeholders should contact a.campbell@recycledorganics.com for details.

There has been significant change to the organisation of the sector across 2011 and 2012 calendar years. The ROU has developed an action plan for continuation of national survey. This plan is currently being implemented in cooperation with state government agencies and industry

Section 5 National results for 2011- 2012 financial year

Please refer to subsequent pages. Please note: The Australian Capital Territory, Tasmania and the Northern Territory have not been included in the 2012 survey, as identified in sections 3.6 above. Comments on data from each state are addressed in Section 3 of this report, and general explanatory footnotes on the structure of data in these are provided at the end of this report.

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ORGANICS PROCESSING INDUSTRY: Annual national survey National Aggregate Survey 2011/12 Financial Year		National total	NSW total	WA total	SA total	VIC total	QLD total
SECTION A - Organisation details							
2 Facility type	**Total No.**	**126**	**64**	**30**	**28**	**32**	**52**
On-farm operation		20	17	3			
Council facility		3	1	2			
Licensed commercial facility		99	42	25		32	
Other [1]		4	4				
	Response rate%	99	98	100	see note	100	see note
SECTION B: Raw materials received/processed							
3 Total quantity of raw materials processed	**t**	**5,515,685**	**1,816,619**	**698,006**	**595,320**	**962,354**	**1,443,386**
4 Types of raw materials processed							
Garden organics (green organics / garden vegetation)	t	1,886,051	600,634	194,681	203,058	478,339	409339
Wood/timber/sawdust (from commercial/industrial sources)	t	351,198	75,689	34,166	11,351	116,175	113,817
Sawdust (from forestry residuals)	t	106,179	78,575	26,831	773		
Barks (from forestry residuals)	t	775,762	116,490	133,386	174,772	149,640	201,474
Food organics (food waste)	t	163,759	40,253	21,730	5,630	30,696	65,450
Biosolids/grit/screenings	t	628,506	326,863	29,255	9,998		262,390
Oils, grease trap, sludges	t	301,355	100,670	36,553	33,807		130,325
Straw	t	18,459	2,295	6,000	10,164		
Manure	t	451,465	183,016	31,395	84,555		152,499
Animal bedding	t	12,094		10,200	1,894		
Animal mortalities	t	12,618	6,794	4,932	892		
Paunch	t	92,042	500	1,750	8,200		81,592
Other - Miscellaneous agricultural organics	t	66,202	39,550	9,000	17,652		
Other - Paper pulp/sludge	t	7,584			7,584		
Other - MSW (organic fraction)	t	353,177	191,875	134,802			26,500
Other - Biowaste	t	36,997	36,997				
Other - Miscellaneous	t	252,237	16,418	23,325	24,990	187,504	

In relation to reported totals for "Recycled organics product types and quantities sold" in the table below, note that totals are correct as reported, however the sum of individual market segments may not equate to the total as not all processors are able to provide market breakdown due to the manner in which company sales records are structured. Market breakdown is not reported in Victoria or South Australia by product category.

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ORGANICS PROCESSING INDUSTRY: Annual national survey National Aggregate Survey 2011/12 Financial Year		National total	NSW total	WA total	SA total	VIC total	QLD total
SECTION C: Recycled organics product types and quantities sold							
5 Total quantity of product sold, recycled organics content [2], market breakdown (where reported) [3 6]							
Composted soil conditioner							
Quantity product sold [3]	**m³**	**1,581,531**	**630,892**	**374,346**	**123,744**	**118,419**	**334,130**
Recycled organic content	%	439	1,900	97	100	100	
Intensive agriculture	m³	62,133	39,864	22,270			
Extensive agriculture	m³	291,235	172,257	118,978			
Urban amenity	m³	597,501	381,099	216,402			
Rehabilitation	m³	25,597	20,170	5,427			
Enviro-remediation	m³	18,793	5,190	13,603			
Pasteurised soil conditioner							
Quantity product sold	**m³**	**245,707**	**24,700**	**78,498**	**5,879**	**37,130**	**99,500**
Recycled organic content	%	74	100	92	80	100	
Intensive agriculture	m³	7,252		7,252			
Extensive agriculture	m³	21,237		21,237			
Urban amenity	m³	27,736		27,736			
Rehabilitation	m³	25,218	24,700	518			
Enviro-remediation	m³	21,755		21,755			
Composted mulch							
Quantity product sold	**m³**	**617,818**	**38,780**	**120,095**	**139,338**	**113,237**	**206,368**
Recycled organic content	%	78	100	92	100	100	
Intensive agriculture	m³	13,720	12,137	1,583			
Extensive agriculture	m³	2,106		2,106			
Urban amenity	m³	118,636	22,221	96,415			
Rehabilitation	m³	16,421	3,975	12,446			
Enviro-remediation	m³	8,046	500	7,546			
Pasteurised mulch							
Quantity product sold	**m³**	**160,091**		**105,867**	**33,097**	**17,127**	**4,000**
Recycled organic content	%	80	100	100	98	100	
Intensive agriculture	m³	405		405			
Extensive agriculture	m³	0					
Urban amenity	m³	105,462		105,462			
Rehabilitation	m³	0					
Enviro-remediation	m³	0					
Raw mulch							
Quantity product sold	**m³**	**1,408,241**	**154,757**	**154,666**	**452,604**	**478,914**	**167,300**
Recycled organic content	%	78	100	89	100	100	
Intensive agriculture	m³	27,498		27,498			
Extensive agriculture	m³	15,000		15,000			
Urban amenity	m³	193,655	94,287	99,368			
Rehabilitation	m³	47,330	34,530	12,800			
Enviro-remediation	m³	1,000	1,000				
Manufactured soil							
Quantity product sold	**m³**	**1,173,219**	**456,722**	**191,250**	**93,215**	**162,085**	**269,947**
Total RO content in product	m³	421,570	274,073	92,500	54,997		
Recycled organic content	%	20 - 100	40 - 100	45 - 100	59	50-100	
Intensive agriculture	m³	42	42				
Urban amenity	m³	633,970	406,720	227,250			
Rehabilitation	m³	42,460	42,460				
Enviro-remediation	m³	2,500	2,500				
Potting mixes							
Quantity product sold	**m³**	**810,584**	**205,067**	**167,950**	**164,556**	**60,568**	**212,443**
Total RO content in product	m³	371,809	119,949	90,595	161,265		
Recycled organic content	%	20 - 100	20 - 100	45 - 100	98	80-100	
Intensive agriculture	m³	8,842	4,352	4,490			
Urban amenity	m³	363,914	200,904	163,010			

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ORGANICS PROCESSING INDUSTRY: Annual national survey National Aggregate Survey 2011/12 Financial Year		National total	NSW total	WA total	SA total	VIC total	QLD total
SECTION C: Recycled organics product types and quantities sold *(continued)*							
Playground surfacing							
Quantity product sold	**m^3**	**106,620**	**16,300**		**15,153**	**61,339**	**13,828**
Recycled organic content	%	67	67		100	100	
Urban amenity	m^3	16,300	16,300				
Biofuels/biogas (energy from methane)							
Quantity product sold	**kWh**	**0**	**0**				
Biofuels/solid fuel							
Quantity product sold	**m^3**	**565**				**565**	
Other - Composted products							
Quantity product sold	**m^3**	**168,154**	**25,394**	**10,200**		**33,800**	**5,000**
Recycled organic content	%	50	100	100			
Intensive agriculture	m^3	0					
Extensive agriculture	m^3	0					
Urban amenity	m^3	114,460	20,700				
Rehabilitation	m^3	0					
Enviro-remediation	m^3	10,500	300	10,200			
Other - Organic fertiliser							
Quantity product sold	**t**	**4,677**					**4,677**
Recycled organic content	%	#DIV/0!	#DIV/0!				
Intensive agriculture	t	0					
Extensive agriculture	t	0					
Urban amenity	t	0					
Other - Composted manure							
Quantity product sold	**m^3**	**458,168**	**168,582**	**25,815**	**52,821**		**210,950**
Recycled organic content	%	60	100	100	98		
Intensive agriculture	m^3	117,249	116,900	349			
Extensive agriculture	m^3	6,959	1,493	5,466			
Urban amenity	m^3	70,139	50,139	20,000			
Rehabilitation	m^3	0					
Enviro-remediation	m^3	50	50				
Other - Raw manure							
Quantity product sold	**m^3**	**103,681**	**42,440**	**10,000**	**32,961**		**18,280**
Recycled organic content	%	100	100	100	100		
Intensive agriculture	m^3	597	597				
Extensive agriculture	m^3	37,343	37,343				
Urban amenity	m^3	14,500	4,500	10,000			
Other - Direct land application							
Quantity product sold	**m^3**	**562,782**	**253,000**				**309,782**
Recycled organic content	%	50	100				
Food organics	m^3	0					
Biosolids	m^3	202,000	202,000				
Other	m^3	100,000	100,000				
Other - Aqueous compost extracts							
Quantity product sold	**L**	**0**					
Intensive agriculture	L	0					
Extensive agriculture	L	0					
Urban amenity	L	0					
SECTION D: Total inventory on site							
6 Total all material on site at end of finanacial year [4]	**m^3**	**2,095,537**	**1,090,680**	**512,329**	**492,528**	see note	see note

Notes:

1. Other types of facilities include: vermiculture facilities, rendering facilities (for tallows and oils), animal feed production facilities, on-site facilities, direct land application, facilities of unknown license status.

2. *Recycled organics* refers to a range of products manufactured from the reprocessing of a variety of biodegradable organic materials including: garden organics (elsewhere garden vegetation, green organics, green waste, yard waste); food organics (elsewhere food waste); residual wood and timber; biosolids; agricultural organics (including manures, crop residues, post harvest residues, animal bedding and animal mortalities); and other biodegradable organic materials.

3. Totals for "*Recycled organics product types and quantities sold*" are correct as reported, however the sum of individual market segments may not equate to the total as not all processors are able to provide market breakdown due to the manner in which company sales records are structured. Market breakdown is not reported in Victoria or South Australia by product category.

4. Whilst inventory figures for larger processors may arise from formal quantitative survey, for smaller processors inventory figures provided are commonly an "informed estimate" provided by the same yard manager year after year. Note: South Australia does not record inventories; and Victoria records only stockpiled product rather than total inventory, and has received a very low response rate for this question that is inadequate for reporting.

6. Product quantities reported in Section C may be sold to markets located outside the region, the structure of reporting state by state is not intended to suggest that all products sold are used within the reporting jurisdiction.

Section 6 Types of organics processing facilities

6.1 Introduction

To date the survey has not distinguished between different practices at "composting" facilities, classifying facilities only as "anaerobic digestion" facilities, "vermiculture" facilities or "aerobic composting" facilities. The generic "aerobic composting" classification was historically intended to only to distinguish composting and shredding facilities (of all types) from the other two generic categories (in particular, from *anaerobic* digestion). However, differentiation of composting on the basis of management practice or associated performance attributes has historically been outside the scope of the survey. Clearly with regard to **Recommendation iii)** above, the needs of government have changed with the emergence of national greenhouse gas (GHG) inventory reporting as the applicable GHG emissions coefficients are dependent on environmental conditions (particularly oxygen levels) throughout the composting biomass mass. Kyoto compliant, approved Clean Development Mechanism methodologies for composting align the continuous maintenance of oxygen throughout the composting biomass with the avoidance of methane emissions. In the initial stages of processing oxygen is depleted rapidly after turning a compost pile, and forced aeration technology is required to continuously maintain oxygen levels above the specified threshold. level.

Previous editions of this national report have been applied to the new national greenhouse inventory reporting obligations, and in this process the expression "aerobic composting" as historically used in the annual *Organics Recycling in Australia* report has been misinterpreted. The term "aerobic composting" has been incorrectly read as having a specific meaning in a greenhouse gas emissions context to indicate that the all materials reported under this category have composted in a manner that maintains sufficiently aerobic conditions within the entire composting mass at all facilities included under this category. Force aerated composting is not common practice, and this is an incorrect interpretation of previous volumes of this report. It is also noted that the only enclosed and force aerated facility in Victoria (NRS), the enclosed and force aerated GRL UR-3R facility in Sydney, and the enclosed and force aerated SMRC facility in Perth were all established to generate verified GHG emissions reduction under the previous Greenhouse Friendly scheme via demonstration of *financial additionality*.

Consequently, from 2012 the survey will progressively include additional questions to identify the actual management practices employed at facilities in order to classify facilities into more accurate groupings that can better identify the common practice baseline for different regions and better inform the Australian Government's new purpose of greenhouse emissions reporting. This will require complementary field work to correlate defined practices with actual performance as relevant to methane emissions.

In an effort to improve understanding of the operation and context of this industry sector, this section of the report provides an overview of the different types of organics processing facilities operating across Australia at a commercial scale. "Composting facilities", can be reasonably differentiated into one of the following five types of operation, characterised below in order of increasing cost per tonne of material processed:

a) **Facilities that stockpile materials (such as feedlot manures) in unturned piles to decompose and dry with age.** Aging is associated with a darkening in colour and results in a material that can have similar visual appearance (colour) to products that are actively composted. This is the least cost option for managing large quantities of manures, but does not cause pasteurisation of materials, nor even decomposition, and is not consistent with the definition of "composting" in the AS4454 Australian Standard.

b) **Facilities that stockpile vegetative materials** (commonly for months) until sufficient quantity of material is available to justify the expense of engaging a commercial shredding contractor to bring a machine to site to shred the material (commonly referred to as "campaign shredding"). Shredding commonly occurs only when the available area is full in order to obtain best value from floating in a contract shredder. Shredded material may be directly applied to land, but commonly sits in an adjacent stockpile to age, with shredded material being dispatched progressively for use as required. This process is colloquially referred to as "*shred and spread*", and is the most common practice for regional councils as the least cost alternative to disposal (other than burning). As above, this practice does not cause pasteurisation of materials, nor even decomposition, and is not consistent with the definition of "composting" in the AS4454 Australian Standard.

c) **Facilities that compost materials in actively turned and managed compost piles or windrows** (with or without prior shredding), with the intent of making more intensive use of available land area (as required for commercial viability), and/or to manage the biological risks embodied in the raw material inputs, to manage risk of impacts from the composting process on surrounding neighbours and local environment, and/or to manufacture products of more consistent quality and more reliable performance. Such practices are common (to varying degrees of quality) around the major metropolitan areas where the recycled organics products are to be used in retail home lawn and garden applications. Such practices are sometimes found at facilities around large regional population centres (in some states) products are to be used in retail home lawn and garden applications. Such practices are often found at on-farm composting facilities where the scale of production and the agricultural residues being processed usually do not require a license or additional planning consent and compost production is targeted to the manufacture of quality products for self use, or as an input into local agricultural production systems. This practice can be implemented in a manner that is consistent with the definition of "composting" and other requirements specified in the AS4454 Australian Standard, which necessarily requires the implementation and verification of a validated method of pasteurisation to manage biological risks that may be present in the raw materials (for the destruction of plant propagules and disease organisms, destruction of human and animal pathogens).

d) **Facilities that compost source segregated biodegradable organic materials using force aeration** (whether in open piles, covered piles, or enclosed structures). Force aeration is not common practice as additional infrastructure costs and the costs/risks of transition to a new production system have been prohibitive. Such technology is usually implemented only where mandated under applicable regulations and guidelines and where higher disposal costs (and levies) can support higher gate fees for receiving materials at the facility (see listed viability conditions below). Where space and business economics allow, after pasteurisation and initial stabilisation such facilities commonly further mature compost products in outdoor turned windrows or piles. This practice can be implemented in a manner that is consistent with the definition

of "composting" and other requirements specified in the AS4454 Australian Standard, which necessarily requires the implementation and verification of a validated method of pasteurisation to manage biological risks that may be present in the raw materials.

e) **Facilities that receive and process mixed solid waste**. Such facilities de-package and separate materials post collection via MRF type mechanical separation technologies, and subsequently homogenise and compost the organic rich fraction in an enclosed or semi-enclosed structure with an aerated floor, and biofiltration of process gas prior to release to atmosphere (see listed viability criteria below). Where space and business economics allow, such facilities commonly further mature compost materials in outdoor turned windrows or compost piles, or some facilities dispatch a relatively immature product with lower moisture content for application to land, or to a contractor who further processes the material. This practice can be implemented in a manner that is consistent with the definition of "composting" and other requirements specified in the AS4454 Australian Standard, which necessarily requires the implementation and verification of a validated method of pasteurisation to manage biological risks that may be present in the raw materials.

All facilities tend to sell or distribute their products under the generic title of "compost" and/or "mulch" irrespective of the process employed, and irrespective of whether the products comply with the requirements detailed in the AS4454 (2012) Australian Standard (ie. classification requirements, processing requirements, process control and verification requirements, compost maturity requirements, labelling and user information requirements, and physical/chemical/biological specifications).

A key point is that cost control is the primary objective for many facilities. Facilities in groups a), b), and c) above represent the overwhelming majority of organics processing facilities in Australia. Outside of metropolitan Sydney and Perth, the common practice for processing biodegradable organic materials involves aggregating biodegradable materials outdoors into open piles (most commonly windrows), with varying levels of management of these piles. The commercial viability of outdoor windrow facilities cannot support the fixed capital investment required to install forced aeration technology, particularly in the form of fixed concrete aerated floors, in-vessel composting technology, or enclosed composting infrastructure.

There is opportunity for significant and measurable reduction in accredited greenhouse emissions reduction from established facilities and proposed new facilities processing biodegradable organic materials from both urban and agricultural sources. However, widespread uptake of forced aeration technology requires a clear price signal or incentive to encourage additional, higher investment required to upgrade of infrastructure and improve management practices in order to avoid or minimise methane emissions from the decomposition of biodegradable organic materials.

6.2 What is Advanced Waste Technology (AWT)?

The term AWT entered into use in NSW around the year 2000 with the New South Wales government enquiry into *Alternative Waste Technologies and Practices*, referring to alternatives to landfill. AWT as an acronym for *Advanced Waste Technology* has since entered into common use as a means of marketing higher capital cost

resource recovery technologies and infrastructure to governments and communities that meet EPA requirements for metropolitan installations, and commonly include fully enclosed organics reprocessing as a component process. The "advanced" in AWT intends to differentiate such facilities as being better than "compost facilities", or at least offering greater control over odour risk that outdoor composting. The term is variously and often selectively applied to facilities in groups c), d) and e) above, but is most commonly applied to facilities that are designed to process putrescible organic materials such as food waste with the associated higher odour generation risk potential. While outdoor composting facilities processing source segregated food waste in South Australia via covered ASP technology have been cited as evidence of the successful implementation of AWTs, the term is otherwise exclusively applied to facilities that completely enclose the composting process in addition to force aeration of the composting mass to maintain adequate oxygen levels in the composting mass in order to maintain continuously aerobic conditions and minimise risk of generating problematic odours.

AWT facilities provide an alternative to the direct landfilling of solid waste. The most common expression of metropolitan AWT facilities involves the processing mixed solid waste (MSW), or residual MSW (red bin) materials. Such mixed waste processing facilities have historically been referred to as *Mechanical Biological Treatment* (MBT) facilities when using biological rather than thermal processes.

Mixed waste is received and pre-sorted using a succession of manual and mechanical processes to recover recyclable materials and to remove contaminants from the biodegradable organic fraction that is the largest component of the household waste stream and MSW kerbside collection. These "mechanical" methods and technologies are also similar to those employed at materials recovery facilities (MRFs) for dry recyclables recovery. All facilities are constructed to a price point and to comply with prevailing regulations, and the inclusion of individual components of the diverse grab bag of separation and treatment technologies differs facility by facility, depending on regulations, performance objectives and business economics. More recent MBT evolutions include more sophisticated pneumatic and dynamic physical separation processes, and depending on priorities and cost structures (including levy settings) newer facilities may integrate additional "mechanical" systems to increase the rate and range of materials recovered, such as near infrared scanning for plastics and/or induction scanning for metals separation.

Irrespective of the political and market sensitive language used to promote AWT infrastructure, the "biological" process predominantly employed for treatment of the organic rich biodegradable fraction derived from MSW at current AWT plants includes force aerated composting (using aerated floor or aerated static pile (ASP) technology. The more sophisticated facilities integrate mechanical mixing mechanisms, with some using near-continuously turned dynamic mixing systems (eg. *GRL UR-3R* facility in New South Wales; *Biomass Solutions* facility in New South Wales, proposed expansion of the *SITA SAWT* facility in New South Wales). The inclusion of regular mixing throughout the duration of the aerated composting process is particularly suited to the processing mixed source feedstock, providing improved homogenisation and more consistent and rapid biological stabilisation during the initial stages of the composting process that are implemented in the very expensive, fully enclosed structures. This improves the effectiveness of subsequent mechanical separation mechanisms, supporting increased recovery rates from MSW feedstock and lower levels of visible contamination of the resulting MWOO recycled organics products.

The biodegradable organic fraction of incoming waste includes putrescible organic materials, containing a range of food wastes, soiled paper and cardboard in addition to vegetation. In some instances the initial stage of composting process is conducted under cover, in some instances in fully enclosed composting halls or concrete tunnels. The initial composting process at the facilities is differentiated by the presence and type of mixing and turning technology employed during the initial stages of decomposition, and the means by which decomposing putrescible material is contained to avoid exposure to atmosphere and vectors (birds, insects, mammals). Aerated composting is commonly followed by composting or maturation in outdoor windrows once the material has been pasteurised and is no longer putrescible (ie. the risk of vector attraction and of odour and leachate generation have been reduced to acceptable levels). After "biological" treatment, different AWT plants variously employ a range of mechanical processes to grade the finished product for use, and to remove physical contaminants to enable compliance with New South Wales EPA Resource Recovery Exemptions.

The performance of AWT facilities can be differentiated by:

- the rate of diversion from landfill, which is influenced by the streaming of kerbside materials collection, whether a single bin or a two bin or three bin collection service is in place, and the effectiveness of separation at source where source segregation collection systems are in place;
- the recovery rate of the organic fraction from the incoming waste stream;
- the quality of recycled organics products produced and the associated resource value or environmental benefit that results from the use of the treated organic fraction (eg. deposited to landfill as alternative cover, combusted as fuel, or beneficial application to land as a recycled organics product); and
- the rate and range of materials recovered for recycling, and the quality and value of recovered recyclables, (note that some facilities recover materials for recycling, whereas others removed materials from the organic rich fraction as contaminants for disposal. This is also influenced by the collection systems in place, whether a two bin or three bin collection service is practiced, and the effectiveness of separation at source).

New South Wales is the only jurisdiction with specific regulations for mixed solid waste via the New South Wales EPA *Resource Recovery Exemption* for MWOO which defines scope and conditions under which the specified material can be applied to land to manage risk of harm to the environment or human health. The MWOO *Resource Recovery Exemption* allows land application of composted MWOO only for:

- *Mine site* rehabilitation.
- *Plantation forestry* and *"non-contact agriculture"* applications where the land is used for the growing of fruit or nut trees or vines, but not where fallen produce is or may be collected off the ground.
- *Broad-acre agriculture,* but excluding land used for the keeping and breeding of poultry or pigs, food root crops, or vegetables or crops where the harvested parts touch or are below the surface of the land.

Under the MWOO *Resource Recovery Exemption*, application rates are contamination limited and other constraints apply similar to the controls that apply for biosolids application (such as boundary offsets, landform or gradient). The New South Wales EPA *Resource Recovery Exemptions* can be accessed via the EPA website: http://www.epa.nsw.gov.au/waste/generalRRE.htm

Whilst the preparation of materials for composting differs, all force aerated commercial scale composting facilities in Australia are utilising a aerated floor whereby air distribution pipes, channels or plenums located at the base of the pile enable air to be forced into the composting mass under fan generated pressure. This forced aeration aims to maintain oxygen levels and aerobic conditions within the composting mass at sufficiently high levels to prevent the development of anaerobic conditions that are associated with formation of putrescible and obnoxious odours. Processes to maintain suitable moisture content in the composting mass are also required.

If well designed, operated, monitored and maintained, this approach can achieve pasteurisation of the entire composting mass and should accelerate the rate of decomposition and minimise odour risk compared to compost piles that are simply turned periodically without forced aeration.

All force aerated commercial scale composting facilities in Australia are applying a similar aerated floor or aerated static pile (ASP) technology whereby air distribution pipes, channels or plenums at the base of the pile allow air to be forced into the composting mass under fan generated pressure. This forced aeration allows oxygen levels and aerobic conditions within the composting mass to be maintained at sufficiently high levels to prevent the development of anaerobic conditions that are associated with formation of putrescible and obnoxious odours, and if well designed and operated should accelerate the rate of decomposition compared to turned compost piles.

Whether a facility is processing mixed solid waste, source segregated food waste, or source segregated biowaste (co-collected food plus garden organics), ASP or aerated floor technology is the common practice for force aerated facilities. Whether the decomposing biomass is completely covered (eg. with a semi-permeable membrane), conducted in a large enclosed composting hall, or conducted in a fully enclosed in a concrete tunnel installation, aerated floor or ASP technology is technology of choice for force aerated facilities.

The actual process employed at all commercial AWT plants in Australia for stablilising putrescible biodegradable organic materials is force aerated composting using aerated floor/ ASP technology[2]. Stripping away the rhetoric, these facilities are, amongst other things, correctly described as “force aerated composting facilities”.

The cost of implementation of facilities with enclosed/covered and force aerated composting systems has been restricted to high population density metropolitan areas where landfill levies and high waste disposal costs apply (Sydney), areas with a distinctive environmental regulatory framework (Perth), and a handful of coastal population centres where a source of biosolids requiring management is also available as a secure and sufficiently high value feedstock to justify the viability of such high levels of capital investment in operational plant.

[2] Note there are three facilities that additionally include an anaerobic digestion phase, also described as AWTs, only one of which dries the solid digestate, whereas the other two subsequently compost the solid digestate.

With the exception of metropolitan Sydney and Perth, such facilities are highly uncommon because the capital investment and civil works costs of fixed infrastructure are much higher than for management via outdoor turned piles/windrows. Even where disposal costs and landfill levies are sufficiently high (metropolitan Sydney), it is only viable to implement such intensive and higher cost force aerated and enclosed processing for the initial stage of decomposition until the biodegradable material is sufficiently decomposed that it is no longer considered to be putrescible. Once the material has achieved a demonstrable reduction in potential for odour generation, leachate generation and vector attraction (including insects and birds), where the material is further processed to a higher degree of maturity such additional or extended duration of processing is conducted in open air windrows.

Like Sydney, the Perth metropolitan area has also significantly moved to enclosed and aerated processing facilities for treatment of putrescible biodegradable materials from the household solid waste streams and commercial sector biodegradable effluents, but not as a direct consequence of the price signal of high disposal costs.

If development of enclosed processing infrastructure in Perth has not been driven directly by the price signal of high disposal costs, why has it occurred? Perth suffers limited water availability and has a reliance on groundwater for public water supply. Perth is situated on the Swan Coastal Plain with porous sandy geology over a vulnerable aquifer. A Western Australia Parliament Select Committee report on *Recycling and Waste Management* (1995) recommended a range of measures to protect water quality of the aquifer, including a clear recommendation that no new landfill sites should be established on the coastal sand plain because of their potential to pollute groundwater (this policy was subsequently reflected in the 1997 Western Australia *State Planning Strategy* and a Western Australia Department of Water *Water Quality Protection Note*). At this time, the City of Sterling putrescible landfill was under orders to cease receiving putrescible waste due to the concerns related to impact on expanding residential developments in the immediately surrounding area. Government agencies are required to consider the recommendations from these select committee reports and requirements of the *State Planning Strategy* when assessing proposals for infrastructure development, and consequently no new putrescible landfill has been established on the Swan Coastal Plain. The limited availability of putrescible waste disposal capacity has underpinned the high capital investment in enclosed and force aerated processing infrastructure for putrescible waste treatment within the specified boundaries of the catchment for this aquifer. Development of processing infrastructure in Perth has therefore been driven by regulation of what is permitted and what is not permitted, and has not been directly driven by the price of landfill disposal.

These circumstance highlight the two key influences on development of the sector: price signal and regulation.

Note that New South Wales EPA is currently initiating an additional survey of AWT facilities for the 2012 financial year (implemented by the ROU), to capture all details of materials, including organics, inert recyclables (glass, metals, plastics) and also the residual quantity being landfilled. In this New South Wales EPA project, only facilities receiving and processing mixed solid waste are included as AWT facilities.

6.3 Conditions that have motivated investment in large scale fully enclosed facilities

Whether a facility is processing mixed solid waste, source segregated food waste or source segregated biowaste (co-collected food plus garden organics), aerated static pile (ASP) or aerated floor technology is the common practice for force aerated facilities. Whether the decomposing biomass is completely covered (eg. with a semi-permeable membrane), conducted in a large enclosed composting hall, or conducted in a fully enclosed in a concrete tunnel installation, aerated floor /ASP technology is technology of choice for force aerated facilities.

The actual process employed at all commercial AWT plants in Australia for stablilising putrescible biodegradable organic materials is force aerated composting using aerated floor /aerated static pile (ASP) technology[3]. Stripping away the rhetoric, these facilities are, amongst other things, correctly described as "force aerated composting facilities".

The cost of implementation of facilities with enclosed/covered and force aerated composting systems has been restricted to high population density metropolitan areas where landfill levies and high waste disposal costs apply (Sydney), areas with a distinctive environmental regulatory framework (Perth), and a handful of coastal population centres where a source of biosolids requiring management is available as a secure and sufficiently high value feedstock to justify the viability of such high levels of capital investment in operational plant. Enclosed and force aerated facilities are uncommon because the capital costs and civil works costs of fixed infrastructure are additional to those required for turned compost piles/windrows. Even where disposal costs and landfill levies are high, it is only viable to implement such intensive and higher cost processing for the initial stage of decomposition until materials are no longer considered putrescible.

Note however that the assessment of putrescibility or absence thereof is inadequately defined in relation to odour/leachate generation and vector attraction risks for solid waste or organic waste, either for field inspection or for confirmatory quantitative analysis. The AS4454 Australian Standard (2012) *Maturity Index* provides methods for the assessment of biological stability, specifically the SOUR test as adapted for assessment of solid waste and composts that can be reasonably applied to provide quantitative assessment and confirmation of absence of putrescibility.

Historically facilities with enclosed/covered and force aerated composting systems are established in situations where a number of the following conditions coincide to underpin the viability of the high capital investment required:

- Limited remaining putrescible landfill capacity causing heightened consideration of cost and challenge of development of new landfill sites.
- Lack of availability of alternative long term landfill sites, often associated with community and/or environmental risks.

- Environmental regulations and planning consent obstruct the construction of new landfills (to a greater degree than to which such instruments obstruct the establishment of organics processing infrastructure).

- State government expresses a commitment to implement a significant waste disposal levy per tonne of waste disposed of at landfill (it should be noted that in the Sydney region, the acceleration of infrastructure development did not occur until the New South Wales waste levy was formally gazetted to increase annually on 1 July by specified amount, providing a reliable price signal for private sector investment in infrastructure).

- Projected costs of landfill disposal (over 10 to 20 years) justify the capital investment in processing infrastructure.

- The local authority responsible for solid waste management is also the responsible authority for management of the sewage system, creating opportunity for a single plant and a single contract to provide an option for both putrescible solid waste and biosolids.

- A financial contribution from carbon financing as a certifiable emissions offset is available. The SMRC facility at Canning Vale (Perth), the NRS facility at Dandenong (the only fully enclosed and aerated food waste composting facility in Melbourne), and the GRL UR-3R facility at Eastern Creek (Sydney) all benefited from an additional revenue stream and marketing benefit from the sale of certified emissions offsets of avoided landfill emissions under the Howard Government's *Greenhouse Friendly* carbon trading scheme,

- A financial contribution from government via infrastructure grants and/or research and development tax concessions is available to reduce the commercial barriers to innovation.

- Active encouragement and incentives from state government for neighbouring local government authorities to partner on the establishment of processing facilities for collective use.

Outside the Sydney and Perth metropolitan areas, adequate concurrence of such conditions has resulted the implementation of only a very small number of facilities with enclosed/covered and force aerated composting systems designed to compost biosolids and other putrescible solid waste materials, these facilities are located to service coastal population centres on the east coast of Australia (Port Stephens, Cairns, Port Macquarie, and Coffs Harbour).

There are clearly barriers to financial viability that obstruct the development of fully enclosed and aerated organics reprocessing facilities, and the necessary circumstances do not apply generally in other major populations centres nor across rural and regional Australia. This is demonstrated by the rarity of facilities with enclosed/covered and force aerated composting systems beyond the areas of Sydney and Perth.

In New South Wales and Victoria the landfill levy and state government incentives funded by the levy may motivate additional local government and private sector investment in infrastructure; however this is unlikely to have significant impact beyond the high population metropolitan centres.

In rural and regional areas the common practice is to stockpile, or to stockpile and periodically shred (as infrequently as possible, commonly when the available area is full) as the least cost management alternative to disposal (other than burning).

Open air windrow composting remains the dominant method for reprocessing non-putrescible biodegradable organic wastes around high population metropolitan centres.

Facilities with enclosed/covered and force aerated composting systems for processing food and other putrescible organic materials are becoming more common only where high disposal costs and high landfill disposal levies provide a sufficient, and sufficiently reliable price signal (Sydney).

Improved management practices for the composting of biodegradable organic materials, whether from regional centres or from agricultural activities requires a price signal to motivate the additional investment and expense required to effectively manage biosecurity risks via management of moisture and effective management of piles for pasteurization, and via forced aeration to avoid emissions to atmosphere, including risk of both methane and odour generation.

Comments on this section of the report are welcome. Please address comments to the author Angus Campbell: a.campbell@recycledorganics.com