Final Report

National Waste Data System Requirements Study

Department of the Environment, Water, Heritage and the Arts

PREPARATION OF REPORT

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Executive Summary

Net Balance Management Group Pty Ltd (Net Balance) was commissioned by the Department of the Environment, Water, Heritage and the Arts (DEWHA) to conduct a National Waste Data System requirements study.

The aims of this report are to:

- determine the problems with the current waste data arrangements that exist at a state, territory and federal level
- identify where possible inefficiencies and inadequacies occurring in the delivery of a new National Waste Data System (NWDS) under the new National Waste Policy
- determine the requirements of the NWDS and what it could look like into the future.

Net Balance found that there is a lack of support for National Waste Reporting; datasets suffer from inconsistent waste classification and terminology; problematic data collection; limited understanding of waste's life cycle impacts; and problems with the alignment of National Waste Data Reporting. This has led to is a lower confidence in policy response as the data supporting it has been questionable.

A number of key issues need to be worked through to deliver a supportive NWDS including ownership, prioritisation, engagement, confidentiality, legislative change and comprehensive and strategic data capture.

The way forward for the NWDS is an evolving system that supports standard comprehensive reporting of waste data; it's robust and can be confidently used to inform policy and investment into sustainable waste practices.

1. Introduction

Net Balance Management Group Pty Ltd (Net Balance) was commissioned by the Department of Environment, Water, Heritage and the Arts (DEWHA) to conduct a National Waste Data System requirements study. This study follows substantial work on waste data in a national context, which had been undertaken previously and includes:

- *Australia Waste Database – Feasibility Study* (Waste Management Association of Australia - WMAA 2009).
- *Waste and Recycling in Australia Report* (Hyder Consulting 2008).

Net Balance acknowledges these reports and stakeholder input as fundamental inputs to this project.

1.1 Aims

The aims of this interim report are to:

- identify any the problems with the current waste data arrangements that exist at a state, territory and federal level
- identify where possible inefficiencies, inadequacies and challenges which may impede the delivery of a new National Waste Data System (NWDS) under the new National Waste Policy
- determine possible features of a future NWDS.

1.2 Background

In November 2008 the Minister for the Environment, Heritage and the Arts, the Hon Peter Garrett MP, announced that the Australian Government would lead the development of a new National Waste Policy (the 'Policy') for Australia. The Policy is currently developed by the Minister for Environment, Heritage and the Arts and his department (the Department of Environment, Water, Heritage and the Arts -DEWHA) in consultation the Environment Protection and Heritage Council (EPHC), state and territory governments and the Australian Local Government Association.

The new Policy can add value in a range of resource recovery and waste management issues. The Policy can also provide a coordinated national approach which is more effective and efficient than separate arrangements undertaken individually by states and territories. However, the Australian Government has identified that the new national approach does not necessarily mean adopting uniform arrangements that cannot be tailored to meet local circumstances.

1.3 Objectives

The objectives of this project are:

- To review the current waste data system requirements at a state and federal level. This review includes an analysis of what the data systems:
  - deliver without a NWDS and with no agreement on how state and territory waste data is presented in a national setting.
  - do not deliver without a NWDS including the gaps that currently occur.
- To analyse the relative importance of the problems and lost opportunities supplemented where possible by information. All of which points clearly to the need for 'better data for better decision-making'.
- To propose how to take the current situation forward and what a NWDS may look like, noting how this dovetails into other national data systems of relevance including National Greenhouse and Energy Reporting System (NGERS) and the National Pollutant Inventory (NPI).

1.4 Work Phases Undertaken

To undertake the NWDS data requirements, the following four key stages of work were undertaken by Net Balance:

- Phase 1 – Review of Current Waste Data Systems and Stakeholder engagement.
- Phase 2 – Interim NWDS Design Feature Requirements.
- Phase 3 – NWDS Key Stakeholder Workshop.
- Phase 4 – Reporting and Findings.

1.5 Phase 1 – Review of Current Waste Data Systems

1.5.1 Task 1.1 – Review of Existing Material

A number of key background reports were reviewed by the Net Balance Project Team. In order to understand current state & territory and federal waste data reporting requirements, the following references were reviewed:

- Waste, recycling and resource recovery policy: jurisdictional differences and opportunities for harmonisation (Hyder Consulting 2009).
- *Australian Waste Database Feasibility Study* (WMAA 2009).
- *Waste and Recycling in Australia* (Hyder Consulting 2008).

- *Management of Australia's Waste Streams - including consideration of the Drink Container Recycling Bill 2008* (The Senate - Standing Committee on Environment, Communications and the Arts 2008).
- *Waste Management, Report no. 38*. (Productivity Commission 2006).

In order to understand the future requirements of the NWDS, the following key background papers were also reviewed:

- *A National Waste Policy: Managing Waste to 2020, Consultation Paper.* (DEWHA 2009).
- Various submissions on the *National Waste Policy: Managing Waste to 2020. Consultation Paper*.
- *Draft National Waste Policy Framework, Discussion Paper.* (DEWHA 2009) and
- Other referenced documents – see Section 8 for full reference list

Additional background documents reviewed by Net Balance are provided in the Reference List of this report (Section 8).

1.5.2 Task 1.2 – Stakeholder Engagement

Net Balance contacted key stakeholders who work with and make decisions based on waste data. Stakeholders from state and territory departments, leading waste consultants, Local Government Associations, regional waste authorities and waste associations were contacted by phone and via email to gather feedback on the following issues:

- positive and negative aspects of existing state and territory waste data systems.
- gaps and the lost opportunities arising from current databases.
- feedback on their requirements of a national waste database.

A list of the departments, authorities and organisation engaged during this project in contained in Appendix A.

1.6 Phase 2 – Interim NWDS Design Requirements Determination

1.6.1 Task 2.1 – NWDS Design Feature Requirements Determination

Net Balance conducted a teleconference with representatives from DEWHA. The objective of the meeting was to brainstorm a number of questions that were posed at the NWDS Workshop based on the work completed in Phase 1.

The principles and business requirements developed and used by similar national systems, such as the National Greenhouse and Energy Reporting System (NGERS) and the Energy Efficiency Opportunities (EEO) program, were also used to inform this phase of the project.

1.6.2 Task 2.2 – NWDS Linkage Brainstorming Session

The Net Balance Project Team held an internal brainstorming session to determine how the preferred NWDS will link to, or be informed by, other federal reporting systems including the NGERS, the Online System for Comprehensive Activity Reporting (OSCAR) and the National Pollutant Inventory (NPI). This information was provided to DEWHA via teleconference on the 3rd August 2009.

1.7 Phase 3 – NWDS Workshop

1.7.1 Task 3.1 – NWDS Workshop Briefing Paper

A NWDS Workshop Briefing Paper was created by Net Balance which summarised the information collected from the Review of Current Waste Data Systems and stakeholder engagement (Phase 1). The Briefing Paper was made available to workshop attendees, ahead of the NWDS Workshop, together with an agenda for the event. Where appropriate, information from that briefing paper has been used in drafting this interim report.

1.7.2 Task 3.2 – NWDS Workshop

The NWDS Workshop was attended by State, Territory and Commonwealth Agencies, consultants in addition to representatives from local government. During the workshop, Net Balance facilitated discussions around the following questions:

- What should the NWDS look like in the future?
- What issues must be managed to deliver this future?
- What does the road map to the new system look like?

These questions were supported by presentations from DEWHA and Net Balance.

1.8 Phase 4 – Reporting and Findings

1.8.1 Task 5.1 – Development of NWDS Requirements Report

The Net Balance Project Team has developed this report which outlined the findings of the following phases:

- Phase 1 – Review of Current Waste Data Systems
- Phase 2 – Interim NWDS Design Requirements
- Phase 3 – NWDS Workshop

A draft version of this report was made available to DEWHA for review and comment. The final version will be made available to DEWHA for use, as appropriate, by the Environment Protection and Heritage Council (EPHC) in further developing and implementing a National Waste Policy.

2. Assessment of Waste Data Systems in Australia

2.1 State and Territory Waste Data Systems

2.1.1 Background

The following subsection provides an assessment of the State and Territory waste data systems and the legislation that supports these. This has been assembled through both stakeholder engagement and a broad literature search.

There are significant differences in the way in which various States and Territories collect and store waste (and resource recovery) data. These differences are largely due to spatial nature, associated population and supported levy systems within each state.

2.1.2 Australian Capital Territory

Legislation

Waste legislation in the Australian Capital Territory (ACT) is provided within two Acts: *The Environmental Protection Act 1997* and the *Waste Minimisation Act 2001*.

The *Waste Minimisation (Container Recovery) Amendment Bill 2008* amends the Waste Minimisation Act to provide an action to include a beverage container deposit scheme if recycling targets in the *National Packaging Covenant (2005)* are not met.

The ACT Environment Protection Agency (EPA), a division of the DECCEW, is the regulatory authority with regards to waste and its associated legislation, including waste policy. TAMS NoWaste division is responsible for data collection and monitoring waste service providers. The ACT Commission of the Environment provides independent advice the ACT Government on its environmental performance through the annual State of the Environment Report.

Waste is defined under the *Environment Protection Act 1997* under four waste classifications: inert (broadly industrial and demolition), solid (broadly municipal waste), industrial and hazardous.

Data Systems

The ACT has one major functional landfill which is Territory Government owned. There are two datasets captured by TAMS NOWaste:

- Waste disposed to landfill (tonnes per annum-tpa) under the four waste streams mentioned above.
- Resource Recovery Survey.

The government also has the ability to download data from weighbridges any time of the day.

2.1.3 New South Wales

Legislation

Waste legislation is administered under two Acts and supporting regulation: the principal legislation being the *Protection of the Environment Operations Act (POEO Act, 1997)* and the *Waste Avoidance and Resource Recovery Act (WARR Act) 2001*.

The Department of Environment, Climate Change & Water (DECCW) is the Government department controlling the waste policies and their implementation. The enforcement and legislation is undertaken by the Environment Protection and Regulation Group. The Climate Change, Policy and Programs Group formulate waste management strategies and programs associated with these.

Unlike other states, NSW is split into three geographic areas, Sydney Metropolitan, the Extended Regulated Area which covers the Hunter, Central Coast and Illawarra regions; and the Regional Regulated Area which covers councils north of the Hunter up to the Qld border and Blue Mountains and Wollondilly. These geographical areas are only in relation to the application of the Waste and Environment Levy. Landfill data is collected from this region on a monthly basis, landfill data outside this region is collected annually.

Waste in NSW is classified into five major classes: special, hazardous, restricted solid, general solid (putrescible), general solid (non-putrescible). There are almost 40 descriptive sub-classes beneath these. This classification is for the purposes of appropriate disposal, not for data collection purposes.

Data Systems

Hazardous waste data is collected using a waste tracking system. This is an on-line system that uses the Controlled Waste NEPM (refer to Section 2.2.3) waste codes to describe waste types.

As part of the NSW Waste & Environment Levy, scheduled licensed waste facilities are required to report tonnages to landfill on a monthly basis, via uploading to an online system.

Waste facilities that do not pay the waste and environment levy and are located in rural areas report annually.

Table 2-1 provides a summary of waste data systems in New South Wales.

Table 2-1 Summary of Waste Data Systems in NSW

Waste Data	Landfill	Hazardous Waste
Collectors	NSW Landfills	Transporters trackable waste
Receivers	EPA	EPA
Mechanism	Legislation	Legislation
Availability	Confidential – aggregate financial year data reported in annual report (State of Environment and WARR strategy)	Confidential – aggregate financial year data reported in annual report (State of Environment and WARR strategy)
Purpose	Administers the levy and informs policy an regulation	Administers the levy and informs policy an regulation

2.1.4 Northern Territory

Legislation

Legislation is administered under the *Waste Management and Pollution Control Act 2009*. The Department of Natural Resources, Environment, The Arts and Sport (NRETAS), Waste Management and Resource Recovery Group enforces legislation under this Act. The Environment Protection Authority (EPA) (within the Department) focuses on improving guidelines and standards for environmental practice, monitoring and evaluation, however is not responsible for undertaking environmental regulation directly.

The Waste Management and Pollution Control (Administration) Regulation 2001 defines waste classes and other licensing and enforcement requirements.; and specifies the content requirements of Infringement Notices issued for offences under the Act.

There are four waste classes classified in the Northern Territory: domestic garbage, hazardous waste, clinical waste and putrescible waste.

Data Systems

Northern Territory landfill licences require annual reporting of total quantities of wastes landfilled during the preceding period for fee calculation. Licences are only required for landfills servicing the waste disposal for communities above 1,000 people. The NT is looking to move to a system to capture data such as

inflow/outflow, recycling rates, progress on reduce and recycling programs and independent auditing.

2.1.5 Queensland

Legislation

Legislation in Queensland is administered under the Environmental Protection Act 1994. There are two major policies under the Act, *The Environmental Protection (Waste Management) Policy 2000 (Waste EPP)* and the *Environmental Protection (Waste Management) Regulation 2000*. The policies define principles, and practices to co-ordinate waste management within Queensland. They also provide for the waste tracking system that collects data on the movement of regulated waste within Queensland and to and from other states.

The Environmental Services Branch of the Conservation and Environmental Services Group of the Queensland Environmental Protection Agency are accountable for enforcement of and compliance to the legislation under the Environment Protection Act. The Department of Environment and Resource Management (DERM) collect waste generation, recycling and disposal data from local governments.

A new Waste Management Strategy for Queensland, *'Let's Not Waste Our Future – Queensland Waste Strategy'* underwent public consultation in 2007/08.

There are 4 waste classification types within Queensland: domestic waste, commercial and industrial (C&I), construction and demolition(C&D), and regulated waste.

Data Systems

The reporting of waste movement within Queensland is required for 'trackable wastes' as defined in the *Environmental Protection (Waste Management) Regulation 2000*. This tracking system is used by waste producers, transporters and receivers of 'trackable wastes'. These wastes are generally classified as regulated wastes.

DERM capture waste generation, recycling and disposal by local governments as well as industry data through voluntary surveys. This data is produced in *'The state of waste and recycling in Queensland'* reports which are available electronically. All data collected from local governments is supported by legislation.

Table 2-2 provides a summary of waste data systems in Queensland.

Table 2-2 Summary of Waste Data Systems in Queensland

Waste Data	Waste and Recycling Data	Waste and Recycling Data	Trackable Wastes
Collectors	Local Government	Waste Industry / Local Government	DERM
Receivers	DERM	DERM	DERM
Mechanism	Legislation	Voluntary	Legislation
Availability	Aggregated in State of Waste and Recycling Report	Aggregated in State of Waste and Recycling Report	confidential
Purpose	Data Provision for State of Waste and Recycling Report	Data Provision for State of Waste and Recycling Report	Assessment of Industry Compliance

2.1.6 South Australia

Legislation

Legislation in South Australia is administered under *The Environment Protection Act 1993* and the recent *Zero Waste SA Act 2004*. The *Zero Waste Act* established Zero Waste SA, with the function of reforming waste management in the State and producing a state wide strategy, with coordination with the EPA. This Act also established the Waste to Resources Fund, which is partly funded by the waste levy.

The *Environment Protection Act* has a number supporting regulations including:

- *Environment Protection (Beverage Container) Regulations 2008.*
- *Environment Protection (Fees and Levy) Regulations 1994.*
- *Environment Protection (General) Regulations 1994.*
- *Environment Protection (Used Packaging Materials) Policy 2007.*
- *Environment Protection (Waste Management) Policy 1994.*

There are 3 main classes of waste: municipal solid waste (MSW), C&D waste and C&I waste. Like NSW, there are a number of sub classifications under these classes.

Data Systems

South Australia has two major data systems:

- A system based upon the conditions and licenses for transporters and waste facilities.
- A fully manual (paper based) waste tracking database.

Zero Waste SA is currently setting up a system to look at reuse, recovery and waste reduction. The system was initially used to capture municipal solid waste (MSW) and illegal dumping data. A recent update now allows for the collection of data from composting facilities. This system runs through a monthly email system where collected data is aggregated and provided to the stakeholders as a monthly report. Data within the C&I and C&D areas are likely to be collected in the near future.

Table 2-3 provides a summary of waste data systems in South Australia.

Table 2-3 Summary of Waste Data Systems in South Australia

Waste Data	License Data	Landfill, Composters, Illegal Dumping	General MSW
Collectors	EPA	Zero Waste	South Australian Local Government Grants Commission
Receivers	EPA	Zero Waste	South Australian Local Government Grants Commission
Mechanism	Legislation	Voluntary	Required under grant application
Availability	confidential	Confidential. High level public summaries	confidential
Purpose	Compliance with licence conditions and other environmental outcomes	Assessing waste issues in the community, management of SA Strategic Plan waste objectives. Incentives to target re-use and reduction in waste.	Distribution of untied Commonwealth financial assistance grants to local governing authorities in SA

2.1.7 Tasmania

Legislation

Primary legislation in Tasmania is the *Environmental Management and Pollution Control Act 1994.* Amendments to this Act were made in 2007, *Environmental Management and Pollution Control Amendment (Environment Protection Authority) Act 2007*, establishing the Environment Protection Authority. One of the Authority's roles is to regulate waste in Tasmania.

The main subordinate regulation in Tasmania is the *Environment Management and Pollution Control (Waste Management Regulations (2000).*

The Department of Environment, Parks, Heritage and the Arts supports the EPA in waste and resource recovery and recently produced the *Tasmanian Waste and Resource recovery management strategy (2009).*

Wastes are classified broadly into municipal, commercial and industrial and construction and demolition. Hazardous waste is referred to a controlled waste.

Data Systems

The Tasmanian state and local governments have agreed to jointly pursue improved systems for waste and recycling data reporting. Since 2006, municipal landfill operators have been required to report on waste in accordance with the Tasmanian Solid Waste Classification System. The Department of Environment, Parks, Heritage and the Arts have issued Environmental Protection Notices on all landfills in Tasmania requiring them to provide annual reports on waste disposal at their sites. Tasmania are about to introduce a controlled waste tracking system.

All major landfills are running software based measurement (at weighbridges) and quantities are easy to collect. Smaller landfills that don't operate weighbridges use volumetric surveys to calculate waste quantities (<5% of total waste). Veolia operates all MRF's in the state and recyclables quantities are easy to access. Data recording is mixed (from detailed records to none).

2.1.8 Victoria

Legislation

Legislation in Victoria is administered under *The Environment Protection Act 1970*. The Environment Protection Authority Victoria (EPAV) is responsible for administering the Act. The Act allows the EPAV to develop industrial waste management policies.

The *Environment Protection (Industrial Waste Resource) Regulations 2009* came into effect on 1 July 2009. The Regulations re-establish requirements for the transport of prescribed industrial waste, including a tracking system and a permit system for vehicles transporting prescribed industrial waste under a streamlined set of guidance documents.

Sustainability Victoria (SV) has a strategic role in waste management in Victoria under the Act. Under Victoria's *Towards Zero Waste Strategy* targets are set for materials and products in each waste sector focussed on avoidance and resource recovery to 2014. Sustainability Victoria is responsible for the Solid Industrial Waste Management Plan (SIWMP) for Victoria. The Act assisted in the formation of Regional Waste Management Groups within Victoria of which there are 12, as well as the Metropolitan Waste management Group.

Data Systems

There are two major data systems operated by EPA Victoria:

- WasteCert system for tracking movements of prescribed industrial waste.
- Landfill Levy system.

The WasteCert system tracks waste from the producer, via licensed transporter, to the waste treater or waste disposal facility. The Landfill levy system allows for the tracking of MSW, Prescribed Industrial Waste (PIW) and C&I waste, which is reported quarterly.

Sustainability Victoria undertakes two annual surveys: the annual survey of Victorian recycling industries and the Victorian Local Government Annual Survey. Both are voluntary surveys which feed data into the *Towards Zero Waste Strategy*.

Table 2-4 provides a summary of waste data systems in Victoria.

Table 2-4 Summary of Waste Data Systems in Victoria

Waste Data	Waste Cert	Landfill Levy	Victorian Local Government Annual Survey	Victorian Recycling Industries Annual Survey
Collectors	EPA	EPA	info provided by local governments	Victorian Reporssessors provide info about material received by source and categories where possible
Receivers	EPA	EPA	SV collects the data provided by all 79 Victorian councils	SV collects data
Mechanism	Legislation	Licences	Voluntary – 100% response rate in 7 of 8 years	Voluntary about a 70% response rate but all major players included such as Visy which represents about 90% of all material collected.
Availability	confidential at the detailed level and public at aggregate level	confidential at the detailed level and public at aggregate level	Public at aggregate level	Public at State level only – no individual organisation is identifiable
Purpose	assessment of industry compliance, policy development and policy review	data allows verification of levy payments and is also used for public reporting at the aggregate level	To support councils measuring performance against the State governments TZW strategy targets; Measure efficiency of different bin systems; Provide advice to programs to improve council performance in terms of waste reduction ;	To allow State government to measure its progress against the TZW targets for each sector; Provide advice to programs to improve recovery rates from each of the sectors ;

2.1.9 Western Australia

Legislation

Primary legislation in Western Australia is administered under *The Waste Avoidance and Resource Recovery Act 2007*. The Act is supported by the *Waste Avoidance and Resource Recovery Regulations 2008*. Other legislation includes the *Environment Protection Act 1986*, which is administered by the Environmental Protection Authority (EPA) includes:

- *Environmental Protection (Controlled Waste) Regulations 2001.*
- *Environmental Protection (Rural Landfill) Regulations 2002.*
- *Environment Protection (NEPM-UPM) Regulations 2007.*

The 2007 Act establishes the Waste Authority. The Waste Authority's work includes developing a long term Waste Strategy and increasing waste recovery. The EPA roles include licensing of waste facilities and developing of policies to protect the environment. The Act also legislates the state landfill levy system. Recycling data is collected the *Environment Protection (NEPM-UPM) Regulations 2007*.

There are 3 waste classes in Western Australia: municipal solid waste, commercial and industrial waste and construction and demolition waste.

Data Systems

Western Australia has an electronic waste tracking system that provides the Department of Environment and Conservation with information on the movement of controlled wastes. Like other states, the system is not totally electronic (90%) and does rely on a small number of paper manual entries. This system and its information have open access, although it is password protected. The system is also used for tracking wastes across state boundaries, which due to the size of Western Australia is relatively rare. A comprehensive audit of the system is conducted to assist in administering the system.

The Western Australia Waste Authority currently captures the following data:

- Landfill levy data from metropolitan waste facilities (including municipal solid waste, commercial and industrial, and construction and demolition). This data is requested with a breakdown of material type.
- An annual local government's survey of waste and recycling services. This data also includes littering reports, and operating costs (where available).

- A reprocessing and recycling activity survey for commercial and industrial and construction and demolition waste. Data on municipal solid waste provided by local government.

2.2 National Waste Data Initiatives

2.2.1 Background

Although waste management is primarily the responsibility of the states and local governments, the Commonwealth Government works with the state and territory governments to provide appropriate national waste management policy frameworks and guidance. It also collaborates with the jurisdictions to develop necessary data to support these policy frameworks and guidance.

There are also areas of national policy where the Commonwealth has specific waste policy responsibilities such as in hazardous waste and greenhouse gas reporting.

This section of the report aims to outline previous national data collection and reporting initiatives under national waste legislation or policy.

Through reviewing a number of background reports, an assessment was made as to why these previous efforts have failed at a national level. A complete list of these background reports are provided in the reference list (Section 8).

2.3 Commonwealth Data Initiatives

2.3.1 Australian Bureau of Statistics Reporting

The Australian Bureau of Statistics (ABS) is Australia's official national statistical agency. It provides statistics on a wide range of topics including the economy, social and environmental matters. ABS statistics cover government, business and the population. The role of the Australian Bureau of Statistics (ABS) is to assist and encourage informed decision-making, research and discussion within governments and the community by leading a high quality, objective and responsive national statistical service.

The ABS conducts a number of waste-related surveys. These surveys have involved a number of different approaches. However, the ABS approach mainly deals with methods that measure the supply and demand of waste services within the various sectors of the economy. The surveys have consisted of collecting data from:

- Businesses and government agencies within the waste industry, i.e. organisations supplying waste-management services.
- Businesses as waste producers and users of waste services, i.e. how much businesses spend on waste services.
- Governments as waste producers and users of waste services, i.e. how much governments spend on waste.

- Households as waste producers, i.e. users of waste-management services and the activities undertaken within households to minimise the need for waste services (e.g. recycling and reuse).

Waste Management Service Surveys

The ABS has conducted two waste management services surveys in 1996-97 and 2002-03. These periodic surveys provide details of the performance and structure of organisations providing waste management services operating in Australia. The main focus of these surveys was to understand:

- The nature of waste management activities.
- The composition of income generated.
- Expenses incurred and the nature and volume of waste quantities.

Volumetric data on waste going to landfill were also collected for a limited number of broad categories for some states and territories. The scope of the waste management services surveys included all employing private and public sector businesses that generated income predominantly from waste management services. Waste management services include the collection, transport and/or disposal of refuse (except through sewerage systems). The scope included the waste management activities of both government and private businesses, but excluded information on recyclables. Currently there are no plans to repeat this survey.

Household Waste Surveys

The ABS household survey program collects limited information on the environmental behaviours and practices of households and individuals in Australia. Each year in March, the supplementary topic to the Labour Force Survey contains one of a set of rotating environmental topics, of which waste management is one. The waste topic has been included in the surveys conducted in 1996, 2000, 2003 and 2006.

The waste management topic focuses on the waste management activities undertaken by households, rather than volumes of physical waste produced. It provides information on the percentage of households that are recycling waste, the type of waste recycled, methods of recycling, and reasons for not recycling. Estimates are available at both Australian and state/territory levels. The next survey will be conducted in 2009.

In addition, the 2008-09 ABS Multi Purpose Household Survey will collect information on behaviours and attitudes of households towards the environment, including availability and frequency of waste collection and disposal, and satisfaction with services.

2.3.2 Waste and Recycling in Australia Report

The lack of a truly national picture on resource recovery and waste management led the Commonwealth to commission Hyder Consulting produced a report titled *Waste and Recycling in Australia*. The first report was produced in 2006 (covering the period 2002-03) and an update of this report was completed in 2008 (covering the period 2006-07). This second report is being refreshed to include additional data for the same reporting period. Together these reports represent the most up-to-date and comprehensive picture of waste and recycling activity in Australia and provide trend information over a four year period. The reports were also the first attempt at international benchmarking of resource recovery and waste management locally.

The reports by Hyder Consulting addressed four areas of waste management, one of which included data on waste disposal and recycling in Australia. Available waste management data was accessed by Hyder Consulting through desktop research, industry knowledge and consultation with state agencies. Data was sourced through publically available reports except where state agencies were able to provide unpublished data that was more up-to-date.

2.4 National Government Data Initiatives

2.4.1 The Department of Environment, Water, Heritage and the Arts

DEWHA develops and implements national policy, programs and legislation to protect and conserve Australia's natural environment and cultural heritage.

National Strategy on Ecologically Sustainable Development 1992

The National Strategy on Ecologically Sustainable Development (the Strategy) was endorsed by the Council of Australian Governments in 1992. The Strategy aimed to:

> *'Improve the efficiency with which resources are used and reduce the impact on the environment of waste disposal, and to improve the management of hazardous wastes, avoid their generation and address clean-up issues.'*

The National Waste Minimisation and Recycling Strategy formed part of the Strategy and committed to a national target of 50 per cent reduction by the year 2000. In addition, a number of material-specific recycling targets were also adopted.

Major objectives include:

'To improve the efficiency of resource use and reduce the impact on the environment of waste disposal'.

Governments will:

- seek to develop improved means for providing support for local councils for increased recycling activity including kerbside recycling collections, and planning and operation of landfill disposal sites
- work towards introduction of pricing and charging structures which adequately reflect the full economic and environmental costs of waste disposal, while assisting the funding of rehabilitation and maintenance of facilities for waste disposal
- work to ensure the costs associated with changing waste management practices does not fall disproportionately on industry and local authorities
- encourage greater levels of involvement by industry in recycling activities and recognise the contribution already being made by industry in this area
- have regard to the principles and recommendations in the National Waste Minimisation and Recycling Strategy and the Industry Commission's report on recycling
- provide further support for the development of whole-life-cycle methodologies and a methodology for full social cost pricing of landfill and waste disposal facilities, taking into account social equity considerations in charges for waste disposal
- develop methodologies for the evaluation and assessment of the costs and benefits of various options for waste minimisation
- develop indicative targets for waste reduction
- at the Commonwealth level, continue work on development of a national pollutant inventory

'To avoid the generation of hazardous wastes, improve management of those wastes which are generated and improve mechanisms for their clean up'.

Governments will:

- assess recommendations on the range of technologies available for the destruction of intractable wastes and decide on the preferred options, and appropriate regulatory and legislative mechanisms for the control of intractable wastes
- cooperatively work towards early finalisation and adoption of a national approach to regulation of intractable wastes and a memorandum of understanding for their management
- undertake a siting study to identify a short list of suitable sites for a repository of low-level radioactive wastes

- have regard to the guidelines for the Assessment and Management of Contaminated Sites
- through ANZECC, give further consideration to the issue of liability for clean-up of contaminated sites, including the issue of generating a public register of contaminated sites

Since the establishment of this Strategy, targets have struggled to be met and have been ineffective based on their primary objectives.

Product Stewardship for Oil Program 2001

The Product Stewardship for Oil Programme was introduced in 2001 by the Australian Federal Government to provide incentives to increase used oil recycling. The arrangements comprise a levy-based system. The Program, administered by DEWHA, aims to encourage the environmentally sustainable management and re-refining of used oil and its re-use. These arrangements provide incentives to increase used oil recycling in the Australia Community.

DrumMuster

DrumMuster is a national program developed by National Farmers Federation (NFF), CropLife Australia, Animal Health Alliance (Australia) Ltd , VMDA and the Australian Local Government Association (ALGA). The program has been set up for the collection and recycling of cleaned eligible non returnable chemical containers. Participating plastic drum manufacturers pay a 4 cent per litre levy which is recoverable from the sale of the product. Since the program's inception, 13,536,356 containers have been collected across Australia which represents 18,216 tonnes of recyclable materials.

2.4.2 The Environment Protection and Heritage Council

The Environment Protection and Heritage Council (EPHC) were formed to ensure the protection of the environment and heritage of Australia and New Zealand. The amalgamation of the National Environment Protection Council (NEPC), the environment protection components of the Australian and New Zealand Environment and Conservation Council (ANZECC), and Heritage Ministers' Meetings created the EPHC. Members of the EPHC include Ministers from participating jurisdictions (i.e. Commonwealth, State & Territory Governments, the New Zealand Government, and the Papua New Guinea Government).

National Environmental Protection Measures

The National Environment Protection Council (NEPC) has two primary functions:

- To make National Environment Protection Measures (NEPMs).
- To assess and report on the implementation and effectiveness of NEPMs in participating jurisdictions.

- **National Pollutant Inventory NEPM**

The National Pollutant Inventory (NPI) NEPM provides the framework for the establishment of the NPI. The NPI is an internet database designed to provide publicly available information on the types and amounts of certain substances being emitted to air, land, and water from threshold facilities.

- **Movement of Controlled Waste NEPM**

The Movement of Controlled Waste NEPM ensures that controlled wastes that are moved between States & Territories are properly identified, transported, and handled in ways that are consistent with environmentally sound practices in line with state legislation.

This NEPM provides a national framework which includes the following management systems:

- Tracking systems which provide information to assist agencies and emergency services, and ensure that controlled wastes are directed to and reach appropriate licensed facilities.
- Notification systems which provide participating States and Territories with access to information, to assess the appropriateness of proposed movements of controlled wastes in terms of transportation and a facility selection process.
- Licensing and regulation of generators, transporters and facilities so that tracking and notification functions are compatible with participating State and Territory requirements.

National Packaging Covenant and Used Packaging Materials NEPM

The Used Packaging Materials NEPM has a goal to reduce environmental degradation arising from the disposal of used packaging and conserve virgin materials through the encouragement of re-use and recycling of used packaging materials by supporting and complementing the voluntary strategies in the National Packaging Covenant (EPHC 2009).The Covenant aims to ensure that all involved in the packaging chain support in reducing packaging waste.

The NEPM provides participants in the Covenant confidence that they will not be unfairly disadvantaged in the market place from their support.

The Covenant undertook significant review in 2004 and was revised in response to that review. The Covenant incorporates requirements to achieve substantially improved performance by participants, and expires in 2010.

In July 2005, the NEPC varied the NEPM to extend it to 2010. The variation will ensure consistency between the NEPM and Covenant and provide for the continuation of an effective co-regulatory arrangement for the life of the Covenant.

2.5 Industry Waste Data Systems

2.5.1 Background

The waste management industry comprises of organisations involved in the collection, sorting, recycling and disposal of waste (Productivity Commission 2006). The waste industry sector can also include industry associations that have been established to represent the professional or commercial interests of particular members in the waste industry.

This section of the report aims to outline previous and current work by industry in collecting and reporting waste data at a national level.

2.5.2 Paper / Cardboard

Since 1989, Industry Edge has collected paper and cardboard packaging data on a financial year basis. Amcor and Visy are the two major reprocesses and manufacturers of paper and cardboard packaging in Australia.

Paper and cardboard packaging makes up the greatest proportion of all packaging and is difficult to categorise due to the large number of product grades.

The amount of packaging on exported goods is estimated to be 5% of total packaging consumption in each year. A similar or higher figure would also apply to imported packaging on goods.

Paper and cardboard packaging recycling includes both locally recycled material and material exported for recycling. Locally recycled paper and cardboard packaging is based on the actual usage of recovered material as reported by Amcor and Visy.

Exports of recovered paper and cardboard packaging are again provided by Amcor and Visy, and verified by data, provided by the Australian Bureau of Statistics (ABS).

2.5.3 Glass

Glass packaging data is collected and reported on a financial year basis. There are only two manufacturers of glass packaging in Australia: Amcor and Owens-Illinois. Visy accounts for the majority of glass packaging prepared for recycling in Australia.

Glass packaging that is not reprocessed, is not included in the dataset and is estimated to be in the order of 200,000 tonnes. The glass packaging consumption is based on local glass container production and imports of both filled and empty glass packaging.

Production and imports of empty glass packaging are based on data provided by Amcor and Owens-Illinois. Imported filled glass packaging is based on estimates derived from ABS data. Exports of products packaged in glass, other than wine, were not accounted for and are therefore included in local consumption.

Recycling data is based on the actual usage of recovered material as reported by Amcor and Owens-Illinois. Visy also provides independently verified recycling volumes. Visy, with recyclers provide data on sales to confirmed secondary users.

2.5.4 Plastics

Plastics packaging consumption and recycling data is collected via survey by the Plastics and Chemicals Industries Association (PACIA) undertaken annually by Hyder Consulting. The recycling survey includes the mechanical recycled portion of plastics, which is considered the significant portion.

Local consumption data is obtained from plastics recyclers. ABS data provides volumes of importation of plastic resin and scrap plastic. Consumption does not include plastic packaging on both imported and exported goods, or empty rigid packaging imported for local filling (seen to be negligible).

Some plastic films destined for local packaging applications (e.g. pallet wrap) are manufactured locally, and will be captured in consumption data. However, significant quantities of plastic films (for local packaging operations) are likely to be exported, and are not included in consumption data for plastics packaging.

2.5.5 Steel Cans

Steel can data collection is limited to steel cans with a capacity of less than 20 litres and include paints, aerosols, beverage, food and lids. Consumption data is based on locally produced tin plated steel sheeting and filled packaging and doesn't include data for packaging imports or exports. It is assumed all cans manufactured in Australia, stay in Australia and may therefore inflate local consumption.

Weight based data is also utilised from the Retail World's Australasian Grocery Guides (Retail World) to obtain the number of cans imported per product. All recycling quantities include only steel packaging recovered by materials recovery

facilities and estimated recovery for councils with greater than 8,000 households within their municipality.

2.5.6 Aluminium Cans

Aluminium packaging consumption is based on local beverage can manufacture and imported filled cans but excludes beverage for export. The main manufacturing sources of data include Amcor and Visy. AC Neilson provides data on packaging of imported beverages using sales figures estimates. Packaging on exported goods is provided by the ABS and is verified using data provided by Amcor and Visy.

Recycling data includes both local and export cans. Local data is provided by known re-melters in Australia, while export figures are based on ABS data and verified against the data provided by re-melters. Export data does not include aluminium that is exported as general aluminium scrap.

2.5.7 E-Waste

Like a lot a waste streams, it's difficult to accurately define what the e-waste category includes. Broadly it includes consumer and business electronic and electrical equipment which includes computers, televisions, mobile phones, DVD players, stereos, photocopiers, and fax machines, as well as associated accessories. For this report we have concentrated on the three main components: computers, televisions and mobile phones.

Computers & Accessories

There have been a number of organisations and groups undertake surveys on the consumption, recycling and landfilling of computers and their accessories. The major survey of the type was undertaken in 2005 by IPSOS, the Household Electrical & Electronic Waste Survey. Like other e-waste, data is limited on the typical computer lifecycle due to the stockpiling of computers within the community. This is seen as more crucial with computers due to the sensitive nature of data stored and not recovered from ageing and unsupported models. For example data from the US in 1999 found that 8% are landfilled, 21% recycled and over 71% are in storage awaiting disposal. Currently (2007/08) approximately 10% of computer and computer products are recycled in Australia.

In Australia the level of recycling has improved with the introduction of reuse schemes as more suppliers take up product stewardship responsibilities. Currently, only a small percentage is recycled in Australia, through recovery of components and recovery of materials (such as metals). Television and computer waste is estimated to comprise less than 0.4% of landfill volumes currently in Australia.

Televisions

There is currently little or no recycling of televisions in Australia (<1% (2007/08)). Any recycling involves collection, dismantling, and salvaging of components. There is stockpiling of televisions broadly within the community as older sets are seen to have

some residual value rather than as a waste product, noting that at least a half of televisions disposed of are repaired and used again. According to IPSOS (2005), far more households are currently acquiring televisions than are disposing of them. This indicates that the potential amount of television waste is growing. This is only likely to increase with less product reliability and the phases of technologies ever changing (i.e. phasing out of analogue). The television industry is currently negotiating a product stewardship agreement with the EPHC Ministers.

Mobile Phones

The Australian Mobile Telecommunications Association (AMTA) (MobileMuster) has a recycling program operating under the name MobileMuster. The program involves mobile phone retailers and aims to collect and recycle unwanted phones and batteries. The data collected and reported has been assured by KPMG and found to meet all materiality criteria. Like other e-waste, phones are seen to have some residual value other than as a waste product.

Data collected includes: annual collection rate of discarded mobiles, annual collection rate of net imports, diversion from landfill, storage rate of mobile phones at home or work, disposal to landfill rate, awareness rate of mobile phone recycling, and industry participation rate from phone manufacturers.

2.5.8 Tyres

Tyres are a significant waste stream in Australia, mainly due to the numbers of units, the spatial density of the country, changing state rules around land filling, environmental hazard, and the lack of viable long term recycling industry.

Most states have either banned tyres from landfill, have set targets to reduce or stop land filling within target dates. This has led to major stockpiling of tyres which has resulted in state prosecution with unauthorised dumps. There also can be serious environmental costs from the stockpiling of tyres due to fire risk and the associated toxic plumes of smoke and associated runoff from fire fighting activities.

Recycling of tyres includes: mechanical recycling (shredding) in new product manufacture including other external markets (i.e. paving), retreading of truck tyres, and as a fuel for cement kilns.

2.5.9 Batteries

Batteries have been identified as a waste stream in several Australian jurisdictions that should be prioritised. Data surrounding battery waste and recycling in the Australian market is largely incomplete or unreliable, with the most reliable being automotive batteries. Data for automotive batteries is comprehensive for both production and recycling. A lack of battery recycling surveys and programs in Australia is largely due to inconsistent waste definitions in regulation, funding and

viability of recyclable materials. Data captured will face similar challenges to e-wastes in community stockpiling of end of life stock.

Batteries can have environmental issues around their disposal (mercury, cadmium and lead may leach into ground and water sources at landfill sites, or release toxic fumes if incinerated) and currently don't have a significant recyclable market.

ABRI in future has planned to undertake a detailed research project on the Australian battery market and stewardship options to begin to generate awareness of the importance of battery recycling.

2.5.10 Disposable Nappies

Nappies are about 3% by weight of all domestic wastes landfilled in urban areas. Over the past 10 years, manufacturers have reduced the bulk of nappies by over half, substantially reducing their landfill impact.

There have been recycling plants set up for the disposable nappy market however there have been technology and cost related issues which has impacted on their viability. Data on nappies disposal to landfill is mainly restricted to MSW surveys.

2.5.11 Organics

Organics data is captured by the Annual National Processors Survey conducted by Compost Australia in conjunction with the relevant government agencies in each state. The survey provides aggregates processing quantity and product market data, in a consistent form across jurisdictions and is a good example of a nationally consistent database. This then enables for consistent, efficient and effective programs to be introduced at a national level. Noting, that there are still inconsistencies in the way that state agencies publish resource recovery data for organics.

The resulting survey data, aggregated by state and on a national basis, is made freely available through this website.

2.5.12 Hazardous Waste

Hazardous wastes are collected by jurisdictions under two main banners: one being the Movement of Controlled Waste NEPM (refer to Section 2.2.3) and the other at a State & Territory Agency/Authority level, based tracking of hazardous/controlled waste. The levels of hazardous waste are indirectly measured by its movement and where licence requires that this data be provided to the regulator; however there are still significant gaps in hazardous waste generation in Australia.

The NEPM provides a basis for ensuring that controlled wastes which are to be moved between States and Territories are properly identified, transported, and otherwise handled in ways which are consistent with environmentally sound practices

for the management of these wastes. This data includes: movement of controlled waste into each jurisdiction, indicating jurisdiction of origin; waste code and quantity of waste; level of discrepancies (e.g. non-arrival of a consignment) as a percentage of total authorised controlled waste movements; and benefits arising from the implementation of the NEPM. This data is publically available in an aggregated form.

Tracking of controlled/hazardous waste within jurisdictions is not commonly made public and is utilised within states for waste minimisation, industry partnership and licence conformance programs. The data integrity and assurance is typically strong, especially where systems are predominately electronic.

2.6 Mapping of Key Waste Datasets in Australia

Feedback from key summary documentation and stakeholder engagement has defined the following as key waste datasets within Australia. Table 2-5 provides details of the databases and two factors important to data, its availability and level of assurance. In assessing the level of assurance, Net Balance has made no measure of the range of assurance made within levels. The accuracy of assurance level is based limited stakeholder and investigative engagement and should be seen as indicative only.

Table 2-5 Mapping of Key Australian Waste Databases

Dataset	Owner	Availability	Level of Assurance (nil, Internal, External, unclear)
Commonwealth			
National Greenhouse and Energy Reporting System	Dept. Of Climate Change	To be established	External
National Pollutant Inventory	Dept. Of Environment, Water, Heritage and the Arts	Public - Via web interrogation	External
Waste Management Services	Australian Bureau of Statistics	Public Reports	Internal
Import and export data	Australian Customs Service	Some data publicly available from ABS; some data available on fee for service from ACS or Dept. Foreign Affairs and Trade	Unclear
National			
NEPM Annual Report (controlled waste) Jurisdictional Reports on Implementation and Effectiveness of NEPMs	Environment Protection and Heritage Council	Public Annual reports	External
Consumption and Recycling Data	National Packaging Covenant Council	Public – available from NPCC website	External
Industry			
National Plastics Recycling Survey	Plastics and Chemicals Industry Association [Confidential data	Public – available from PACIA website	Internal (Hyder)

Dataset	Owner	Availability	Level of Assurance (nil, Internal, External, unclear)
	retained by Hyder]		
Annual National Processors Survey (Organics)	Waste Management Association of Australia	Public – available from WMAA website	Internal
Mobile Muster	Australian Mobile Telecommunications Association	Website summary	Unclear
National Landfills Survey	Waste Management Association of Australia	Public – overview of results available on WMAA website; detailed results available to WMAA members	Internal
National Steel Can Recycling Survey	Australian Food and Grocery Council and National Packaging Covenant Council [Confidential data retained by Hyder]	Public - website	Internal (Hyder)
Victoria			
Waste Cert System	Environment Protection Authority Victoria	Internal Use	Internal
Landfill Levy	Environment Protection Authority Victoria	Internal Use	External
Recycling Survey	Sustainability Victoria	Public reports	Internal
Annual Local Government Survey	Sustainability Victoria	Public reports	Internal
Sustainability Victoria waste model (waste quantities tracking system)	Sustainability Victoria	Internal Use	Internal
New South Wales			
Controlled Waste System	Dept. Of Environment, Climate Change & Water	Internal Use	External
Landfill Levy System	Dept. Of Environment, Climate Change & Water	Internal Use	External
NSW Resource Recovery	Dept. Of Environment,	Public reports	Internal

Dataset	Owner	Availability	Level of Assurance (nil, Internal, External, unclear)
Industries Survey	Climate Change & Water		
Queensland			
Trackable Wastes System	Queensland Environment Protection Agency	Internal Use	Internal
Waste generation, recycling and disposal survey	Dept. Environment & Resource Management	Public reports	Internal
Local government administration reports include waste data	Queensland EPA	Internal use (data incorporated into public report titled 'State of Waste in Queensland')	Internal
South Australia			
Waste Tracking System	Environment Protection Authority South Australia	Internal Use	Internal
MSW & Compost (ZEUS)	ZEROWASTE	Quarterly Report	Internal
Recycling Activity Survey	Zero Waste SA (confidential reprocessor data retained by Hyder)	Public report	Internal (Hyder)
Western Australia			
Waste tracking – controlled wastes system	Dept. Environment & Conservation	Internal Use	Internal
LG Annual Survey	Dept. Environment & Conservation	Public Summary report	Internal
Landfill Levy System	Dept. Of Environment & Conservation	Internal Use	External
Reprocessing & recycling survey	Dept. Environment & Conservation	Public reports	Internal
Australian Capital Territory			
Landfill data system	TAMS NoWaste	Internal Use	Internal
Resource Recovery Survey	TAMS NoWaste	Internal Use	Unclear
Northern Territory			

Dataset	Owner	Availability	Level of Assurance (nil, Internal, External, unclear)
Annual waste data fee	Dept. Of Natural Resources, Environment, The Arts and Sport	Internal Use	Internal
Tasmania			
Annual Waste disposal for municipal landfills	Depart. of the Environment, Heritage and the Arts	Internal Use	Internal

2.7 Assessment of Waste Data Systems in Australia

The following section uses various assessments, verification techniques and principles to enable a critique of the Data System and the quality of the data it contains. It should be noted that a significant amount of work has been undertaken to improve the quality of data, and this initial assessment should be considered in this context.

2.7.1 Assessment of State and Territory Waste Data Systems

State and territory data reporting systems were rated by Net Balance using an internally developed rating system. The data management rating system that was used is shown in Table 2-6. An explanation of the rating system is described under the table.

It is noted that the assessment provided is based on the reviewed data and feedback from stakeholders. The accuracy of the data should therefore be considered as indicative rather than comprehensive.

Table 2-6: Net Balance Data Management Ratings

Data Management	Data Collection		
	Measured	Derived	Estimated
Robust	M1	D1	E1
Satisfactory	M2	D2	E2
Questionable	M3	D3	E3

- **MEASURED** = Data directly provided by a service provider, contractor or directly obtained from a monitoring device. For example, electricity invoices, contractor receipts, emissions monitoring equipment, incident reports, consultants reports, etc.
- **DERIVED =** Data obtained from calculations, mass balances, use of physical/chemical properties, use of coefficients and emission factors etc. (e.g. the conversion of cubic meters of waste into tonnes).
- **ESTIMATED =** Usually where there is no other available method for obtaining the data. Such data could be pro-rated on previous results, use of precedents or historical data, or even a calculated guess.
- **ROBUST =** Evidence of a sound, mature and rigid reporting system, where room for error is negligible. Examples would include use of spreadsheets, databases and on-line reporting.
- **SATISIFACTORY =** Some potential exists for error or loss of data. Examples would include manual, but structured keeping of records, files and results.
- **QUESTIONABLE =** No logical or structured approach to data or record keeping. High potential for error and/or loss of data. Data may appear to differ from those initially reported.

Table 2-7 provides a rating for each state based waste data system.

Table 2-7: State and Territory Data Management Rating – Jurisdiction Wastes

State	MSW	C&I	C&D
Australian Capital Territory	M1	D2	D2
New South Wales	M1	D2	D2
Northern Territory	E2	-	-
Queensland	D2	E2	E2
South Australia	M2	E2	E2
Tasmania	D2	D3	D3
Victoria	M2	M2	D2
Western Australia	M2	D2	D2

Municipal Solid Waste (MSW)

In summary, MSW data collected across most states is measured using data directly provided by a service provider (e.g. local governments, landfill operators). MSW is

strongly linked with annual reporting, however data capture rates can be varied due to their spatial nature, and this is particularly evident in larger States.

Commercial and Industrial Waste (C&I)

The C&I data was strong in some areas, particularly data relating to controlled / hazardous wastes. Significant data gaps did exist in states, which is amplified due to confidentiality requirements. The majority of the data captured has been derived or estimated from survey data.

Construction and Demolition (C&D)

The majority of the captured C&D data has been derived or estimated from survey data. This data is not comprehensive and is likely to be indicative rather than accurate in its measure.

2.7.2 Summary of Reporting and Quality of Australian Waste Data

Net Balance has used common principles of reporting quality for data systems to provide an overview of waste data in a national context. This has been measured against common data management scores to enable a clear understanding of the overall waste within Australia.

Six principles have been selected for the summary. These consist of the four applied to the National Greenhouse and Energy Reporting Guidelines and two additional principles from the Global Reporting Initiatives (GRI). We have used the intent of these principles, for the purpose of project definitions rather than the full published definitions. The selected principles include:

- Transparency - Data documented and verifiable
- Comparability – Data is produced by same methodologies and can be compared across jurisdictions
- Accuracy – Uncertainty in data values must be minimised
- Completeness – All sources within state boundaries identified and accounted for
- Clarity – Information is understandable and accessible
- Timeliness – Is reporting occurring on a regular schedule to enable informed decisions to be made from it

The data management scores include:

- Robust - Evidence of a sound, mature and rigid reporting system, where room for error is negligible. Examples would include use of spreadsheets, databases and on-line reporting (e.g. banking - accounts).

- Satisfactory - Some potential exists for error or loss of data. Examples would include manual, but structured keeping of records, files and results (e.g. household taxation).
- Questionable - No logical or structured approach to data or record keeping. High potential for error &/or loss of data. Data may appear to differ from those initially reported (e.g. open crowd estimation).

Table 2-8 provides a summary of the Australian waste data, divided into the three most common categories: Municipal Solid Waste, Commercial and Industrial, and Construction and Demolition. This is based on stakeholder engagement and published work on waste databases. The table represents a preliminary indicative overview and is not based on a detailed assurance assessment.

Table 2-8: Summary of Reporting and Quality of Australian Waste Data

Principles	Municipal Solid Waste	Commercial and Industrial	Construction and Demolition
Transparency	Satisfactory	Questionable	Questionable
Comparability	Satisfactory	Questionable	Questionable
Accuracy	Satisfactory	Questionable	Questionable
Completeness	Questionable	Questionable	Questionable
Clarity	Satisfactory	Questionable	Questionable
Timeliness	Robust	Questionable	Questionable

2.7.3 Other Waste Data Systems

The following waste types, shown in 2-9 (a to d) have been investigated at material level and are considered to be the key waste streams in Australia. These datasets are based on documentation drawn from the National Packaging Covenant and the Waste and Recycling in Australia report. The following section provides an initial overview of data quality using reporting principles measured against common data management scores. The following subsections then outline the overall data quality and other related issues.

Common principles of reporting quality for data systems have been utilised to provide an overview of other waste data in an Australian context. These have been measured against common data management scores to enable a clear understanding of these systems in Australia.

Similar to the previous section, six principles have been selected for the summary. These consist of the four applied to the National Greenhouse and Energy Reporting Guidelines and two additional principles from the Global Reporting Initiatives (GRI). We have used the intent of these principles, for the purpose of project definitions rather than the full published definitions. The selected principles include Table 2-9(a,

b, c & d) provides an overall summary of 'other' Australian waste data including: Paper / Cardboard, Glass, Plastics, Steel cans, and Aluminium Cans, E-waste, tyres, batteries, disposable nappies, organic and hazardous waste. These tables have been formulated based on an evaluative process which featured stakeholder engagement, researching other information published on waste databases and independent analysis by Net Balance.

We note that this section represents a broad indicative overview; the information contained is not based on a detailed assurance assessment. The accuracy of this summary should viewed in this context.

Table 2-9(a): Summary of Reporting and Quality of other Australian Waste Data

Principles	Paper / Cardboard	Glass	Plastics
Transparency	Robust	Satisfactory	Questionable
Comparability	Robust	Robust	Robust
Accuracy	Robust	Robust	Robust
Completeness	Questionable	Questionable	Satisfactory
Clarity	Robust	Questionable	Robust
Timeliness	Satisfactory	Questionable	Satisfactory

Table 2-9(b): Summary of Reporting and Quality of other Australian Waste Data

Principles	Steel Cans	Aluminium Cans	E-waste
Transparency	Questionable	Questionable	Satisfactory
Comparability	Robust	Robust	Robust
Accuracy	Satisfactory	Satisfactory	Satisfactory
Completeness	Satisfactory	Robust	Robust
Clarity	Satisfactory	Satisfactory	Robust
Timeliness	Satisfactory	Satisfactory	Satisfactory

Table 2-9(c): Summary of Reporting and Quality of other Australian Waste Data

Principles	Tyres	Batteries	Disposable Nappies
Transparency	Satisfactory	Questionable	Satisfactory
Comparability	Satisfactory	Questionable	Satisfactory
Accuracy	Satisfactory	Questionable	Satisfactory
Completeness	Questionable	Questionable	Questionable
Clarity	Satisfactory	Questionable	Satisfactory
Timeliness	Satisfactory	Questionable	Satisfactory

Table 2-9(d): Summary of Reporting and Quality of other Australian Waste Data

Principles	Organics	Hazardous Waste tracking System	Hazardous Waste Generation
Transparency	Satisfactory	Robust	Questionable
Comparability	Satisfactory	Satisfactory	Satisfactory
Accuracy	Robust	Robust	Questionable
Completeness	Questionable	Satisfactory	Questionable
Clarity	Robust	Questionable	Questionable
Timeliness	Satisfactory	Robust	Satisfactory

3. Issues with Waste Data Systems in Australia

3.1 Previous attempts at a Federal Level Waste Data System

3.1.1 Australian Waste Database

An Australian Waste Database (AWD) was established in 1990 by the Cooperative Research Centre for Waste Management and Pollution Control (CRCWMPC) at the request of Environment Australia (now DEWHA).

The aim of the AWD was to establish a database in response to the need to provide a monitoring mechanism for Commonwealth and State waste minimisation policies. It was intended to be used by state and federal environmental and waste management authorities, and other interested parties to track progress against waste minimisation targets. All information was to be voluntarily provided by the respective state Environmental Protection Agencies. The AWD provides an overview of the waste management scenario in various regions of Australia. The intention of the AWD was to provide:

- A National Solid Waste and Hazardous Waste Classification System;
- Guidance Manual for Solid Waste Composition Studies;
- Data on waste generation and disposal in Australia for both Municipal Solid Waste and Hazardous Waste.

In 2003, the CRCWMPC was dissolved and the CSIRO was invited by DEWHA in 2004 to revitalise the AWD. CSIRO's intended to use the AWD to form part of an industrial ecology database. This industrial ecology database would allow resource users and waste generators to advertise their resource needs and surplus.

The main issue with the current AWD is that incorrect assumptions were made about the extent and availability of data to populate the database. Some organisations were also uncomfortable with the system's goal of creating an industrial ecology database that would be used as a repository for resource users and waste generators to advertise their resource needs and surplus. In general there was resistance from the stakeholders in the use of this database.

3.2 Key Issues – Literature Search

A number of documents and reports have been reviewed by Net Balance, including recent work undertaken by the WMAA in relation to the AWD (see Appendix B for a list of these documents). These documents identified a number of issues, explaining the current difficulties in collecting, aggregating and reporting national waste data in

Australia. These difficulties have been summarised into 6 key themes which are consistent with those identified from stakeholder engagement (Section 3.3):

- Issue #1 – Lack of support for National Waste Reporting;
- Issue #2 – Inconsistent Waste Classification and Terminology;
- Issue #3 – Problematic Data Collection;
- Issue #4 – Limited understanding of waste's life cycle impacts;
- Issue #5 – Problems with the alignment of National Waste Data Reporting;
- Issue #6 – What fundamental data sets does Australia need to collect to better inform waste management policies, practices, investment, business operations and to assess and manage risk?

3.2.1 Issue #1 – Lack of Support for National Waste Reporting

National level reporting (and the key national waste reporting tool, the AWD) has previously not been fully supported by the states. The main reason for the lack of support is that waste management legislation, strategies, policies and programs have been driven at a state level. States independently developed their own data and reporting requirements tailored to their unique state issues, such as conditions, distances, population and infrastructure.

In addition to this some stakeholders that were required to report did not want to submit data to multiple agencies. Waste management companies and local government's who operate waste collection, landfill or resource recovery services also do not want commercially confidential data made publically available to their competitors. This was especially the case under the AWD, as some jurisdictions were unwilling to release confidential data to the CSIRO.

While there is an existing EPHC Waste Working Group, it was also noted that there are few ongoing networks that facilitate discussion concerning waste management between agencies within a state, between states and between States and the federal government.

3.2.2 Issue #2 – Inconsistent Waste Classification and Terminology

As presented in Section 2.1 (State and Territory Waste Data Systems), there are inconsistencies among the state in terms of:

- Policies, regulation and legislation;
- Waste strategies (including targets) and guidelines;
- Waste categorisation (at a waste category level and waste stream level); and
- Standard methods for collecting data (state specific requirements for waste tracking).

Inconsistent waste classifications and terminologies have been a major contributor (or non-contributor) data gaps and data bias. This has made it difficult to aggregate data and report at a national level.

3.2.3 Issue #3 – Problematic Data Collection

Waste that is generated can be directed to a range of destinations including disposal and redirection back into the economy (reuse, recycling, and recovery). Currently resource recovery and waste data is collected and reported by a range of stakeholders including:

- Landfill operators;
- Material re-processors (recyclers);
- Local Governments;
- Industry Associations;
- Environmental Protection Agencies;
- Commonwealth Government
- Consultants.

Each of these stakeholders has their own data collection and reporting requirements and methods, using different waste terminology and classifications. These stakeholders also cover different regions and industries.

The following sections summarises the waste data reporting issues met by various stakeholders that have been identified in the reports.

Landfill Operators

Currently only certain landfill facilities are required to report their waste quantities under their relevant state legislation. Reliance on voluntary reporting data makes it difficult to rely on the accuracy of the data. This data has also not been verified by an independent third party.

Australia's large land mass and dispersed population, has resulted in difficulties in the collection of data for many rural and regional landfill facilities. This is especially evident at unstaffed landfills, without weighbridges. These landfills can only commission data collection surveys on the number of loads entering the landfill providing information on volume only (data in cubic metres). However, the factors that are used to convert volume measurements to weight are fairly arbitrary and do not account for different types of waste. In addition, these stakeholders can rarely justify the additional costs required to collect, aggregate and report data. Importantly there is little attention to the hazardous nature of wastes entering such landfills.

Most landfills are not required to determine the source and composition of waste due to the way that waste is generated, collected and disposed. Many jurisdictions have conducted landfill waste audits to determine the source and composition of landfill waste. These audits have generally been conducted on only a sample period and do not account for the considerable variations in waste type and amount that occurs in practice over time. Some of these surveys have also been undertaken on a visual basis which introduces further inaccuracies.

Typically, jurisdictions do not closely monitor aggregated landfill capacity. Landfill operators are generally only required to report annual waste tonnages to the regulator. The understanding of landfill capacity is essential for the jurisdiction.

The collection and collation of data on the capacities of landfills is important to improve landfill planning.

Other important datasets from landfill operations include:

- Environmental Factors (landfill gas concentrations, leachate, run off, odour/other air emissions);
- Greenhouse Gas Emissions (transport emissions, GHG capture, carbon storage, anaerobic windrow operations);
- Landfill Capacity (population, waste to landfill and recycling, landfill capacity data, waste to inert landfills)
- Sustainability data (recycling / diversion rates, composting, future landfill capacity).

Material reprocessors (recyclers)

A number of states currently review and report on the level of recycling that occurs within their jurisdiction. Methods of data collection generally involve reprocessor questionnaires and interviews. Generally, these forms of data collection have resulted in a low response rate. Most states report on the amount of recyclables actually reprocessed, however some figures may be overstated if reprocessors report on the amount actually collected. There is also a tendency for collected amounts to be overstated as some recyclables are stored and a proportion may also be disposed to landfill due to contamination. In addition, there could be some double counting within these reviews as recyclables materials are transferred between reprocessors.

Local Governments

Local Governments are responsible for the management of MSW (household waste). Many rural and regional Local Governments currently find it difficult to report on the amount of MSW collected as many landfill facilities are unstaffed. Rural and regional

Local Governments can rarely justify the costs associated with the collection, aggregation and reporting of data.

Industry Associations

Some industry associations also collect some data on the recovery of their products. For example, the WMAA releases reports on the following:

- Landfill survey;
- Organics Recycling in Australia; and
- Construction and Demolition (C&D) Survey.

The Plastics and Chemical Industry Association (PACIA) also report annually on the level of recycling and reprocessing of plastics in Australia.

The Newsprint Producer and Publisher Group also report on the percentage of newsprint that is recycled.

Environmental Departments and Protection Agencies

Each state and territory environment department and/or protection agency collects and reports data differently. Consequently there are gaps in the coverage of regions, waste streams and materials.

Commonwealth Government

Current data systems in place do not support international obligations under the Basel Convention.

Consultants

A range of consultancy firms also undertake data collection activities, but they also provide various methodology development. An example of this is the Blue Book prepared by Wright Corporate Strategies and various publications by Hyder consulting.

3.2.4 Issue #4 – Limited understanding of waste's life cycle impacts

A number of reports and stakeholder submissions have outlined that the current price of landfilling is too low, and does not reflect the life cycle impacts of disposing of waste to landfill. It has been identified that there is currently a lack of data covering all the externalities resulting from landfill disposal. The variable nature of the data for products and materials makes it difficult to prioritise actions and develop strategies to support waste lifecycle impacts.

3.2.5 Issue #5 – Problems with the alignment of National Waste Data Reporting

The new waste composition data, which underpins landfill emission calculations under NGERS, is largely inconsistent with the composition waste data used in most states. The NGERS data includes: typical state waste stream analysis, conversion factors, percentages of organics in waste streams, and for higher methods direct measurement of emissions.

The NPI NEPM variation now includes data for transfer of wastes to their final destination which is additional to required current estimations of emissions to air, land and water.

3.2.6 Issue # 6 - What fundamental data sets does Australia need to collect to better inform waste management policies, practices, investment, business operations and to assess and manage risk?

Australia does not currently have sufficient data quality to support informed business decision making across all resource recovery sectors. Accurate information is required to inform decision processes for the future of the waste industry. This could include examples such as; setting priority areas for Extended Producer Responsibility and Product Stewardship schemes, targeting particular waste streams for further policy action - such as commercial and industrial waste or waste types such as organics, and identifying infrastructure investment opportunities and measuring progress made in resource efficiency.

Costs of National Waste Reporting

The estimated cost of waste data activities are currently estimated to be in the order of $9 million. Cost data presented in the Australian Waste Database Feasibility Study (WMAA 2009) for a voluntary scheme including waste flow (quantities of products, materials or waste sources received, and quantities and granular categorisation of materials), recycled (Product or output specifications), infrastructure (site specifications, management practices equipment and monitoring) and transport logistics (start locations, destinations, dates, cargo type, capacity) set a sliding scale cost which provides a lower cost option compared with the current activity after a period of four years.

It was identified through discussions with stakeholders that the costs associated with data capture, storage and processing is very difficult to estimate. Some data is already captured as part of normal business structure, resulting in no additional costs whereas some data would require the use of external consultancies, resulting in various levels of costs. Most regulators and associations had some form of data storage on multisource databases and some were linked via electronic reporting. These variations in data storage also made estimation of costs difficult.

3.3 State and Territory Data System Issues

There are significant differences in the way in which various States and Territories collect and store waste and resource recovery data. These differences are largely due to spatial nature, associated population and supported levy systems in the various States and Territories.

The major issues in relation to the NWDS come from the fact that state databases have understandably been designed around state legislation, which are only broadly consistent across the country. Also, the States and Territories away from the populated eastern seaboard typically don't have the resources to comprehensively capture their waste management and associated data.

There are still issues around confidentiality with the data. Limited, spatial dependent surveys and inconsistent methodologies of collecting data have resulted in additional difficulties in moving to a national process. When required under legislation, licensing data bases are generally robust and have good data reliability.

In most states, waste management is primarily undertaken by the environmental regulator with some assistance from the waste authorities.

The major issues with the waste data systems across the country include:

- The various technologies used for tracking data and data support systems (no tracking/ paper/ electronic).
- The current systems were established to support regulation, which for older legislation is geared more around accountability of volumes rather than from a cradle to grave approach, which is more consistent in later legislation.
- Waste data from rural and remote areas are limited; this is important where cost-effective systems are required for support.
- Large investments have historically been made into the creation of data systems to support the relevant state regulatory requirements which differ across jurisdictions.
- There are inconsistencies in how interstate and intrastate transfer of recyclables is recorded and accounted.
- There is inconsistency in the classification of wastes between states (i.e. classification of soil within states results in C&D waste ranging from 5-50% across states).

The collection of all national data could potentially provide further information to assist in the continual improvement on the waste from the source and overall industry that it is drawn from. This could be achieved from utilising data to support community/stakeholder change in habits, providing resource and support to an effective and efficient industry. In terms of resource recovery and waste data

collected in Australia, opportunities for supported change have been somewhat reduced due to the quality of data provided, such as:

- Incomplete datasets.
- No breakup of total tonnage.
- Confidentiality with operators.
- Limited spatial data.
- Poor historical data (making trend analysis difficult).

This has led to is a lower confidence in policy response as the data supporting it has been questionable. A key requirement in the support of a national system is the confidence of stakeholders in the product that is being put forward. Better data provides better means for decision making.

The following sections present issues with the current data systems for the various States and Territories. These were developed through representative stakeholder engagement. This should not be considered the official stance of each jurisdiction on current data system issues, but representative of some of the major issues identified through the stakeholder engagement process.

3.3.1 Current Data System Issues – Australian Capital Territory (ACT)

The majority of the data system issues in ACT relate to data accuracy, especially within the resource recovery survey, where some data was estimated. In addition, green waste recovery has been estimated in load volumes (cubic metres) instead of weight (tonnes). The voluntary resource recovery survey also has associated time constraints and no formal auditing system for uncontracted operators. The ACT waste data codes do not directly relate to those currently in the Australian Waste Database, meaning that further manipulation of data is required.

3.3.2 Current Data System Issues – New South Wales (NSW)

The waste tracking system achieves approximately 90% electronic recovery, the rest (10-20 per month) are provided manually, which could lead to interpretation of data provided. As it is a web based system, it can face various performance issues (for example: speed, servers being out of order). The online waste and levy system is supported by a rigid compliance system that includes auditing and verification of data received requirements. There is some internal inflexibility in making changes to a regulatory system due to the current systems in place.

3.3.3 Current Data System Issues – Northern Territory (NT)

The current annual report is provided on CD and hard copy under verification of the facility Managing Director or equivalent. The main issue is due to the transient and

spatial nature of waste within the state, and hence the dataset cannot be considered comprehensive.

3.3.4 Current Data System Issues – Queensland (QLD)

The main issue for QLD is the lack of a comprehensive data capture system. Current legislation only requires local government to collect data and industry data is of a voluntary basis. It is estimated that only 14% of total waste data is collected.

The waste tracking system also does not include analysis of the waste tracking records from industry. Current agreements only commit waste tracking by transporters with poor accountability from generators and receiving facilities.

There are also issues with linkages between the waste tracking database and the licensing system.

3.3.5 Current Data System Issues – South Australia (SA)

The main issue for SA is the current manual paper based system, which apart from the large maintenance costs, limits the state in setting key performance indicators (KPIs) for waste. There are also issues with the interpretation of the system (i.e. there is no restrictions on options, unlike an electronic system).

The ZeroWaste System has been successful by utilising an email system which provides a product back to the providers for their input. It was found through feedback from stakeholders that they preferred the security of an email system over a login system. The email system does however have greater time commitments over a strictly online system.

3.3.6 Current Data System Issues – Tasmania (TAS)

The current waste data system in TAS is labour intensive and requires the manual input/transfer of data which can result in human error. One of the local reporting councils have developed a reporting tool which is based on a basic excel spreadsheet.

Consistency in waste classification is a significant issue with all councils recording different waste categories. Also, different organisations need varying data formats, for example the EPA requires data in a different format for council operation. For most councils, waste is a minor service and there are no legislative requirement to record waste data (unless they own a landfill) and therefore many councils do not record any waste data.

3.3.7 Current Data System Issues – Victoria (VIC)

The EPA Victoria WasteCert system's major issue is the use of both electronic (40%) and paper (60%) systems to track waste. The paper system and associated

interpretation of hand written details can lead to uncertainty when this is tracked back into the electronic system. The Landfill Levy system also has limitations in verifying the figures provided. However, the WasteCert system provides good verification for tracking Prescribed Industrial Waste.

The limitations of the Sustainability Victoria surveys are their voluntary basis, which consequently result in a large amount of resource necessary to follow up on data, data type consistency, regional data capture and limited responses (70% response rate).

3.3.8 Current Data System Issues – Western Australian (WA)

The electronic waste tracking system used in WA currently works well and has a high accuracy in data terms. There are limitations in the data as some rural and remote facilities are unmanned which could potentially lead to unreliable or no recorded data.

Data captured by the Waste Authority is limited by the definition and estimation of load type and tonnage, the term 'mixed waste' is commonly used. Load mixing may also influence disposal estimates and the use and no-use of weighbridges if available to weigh loads. A recent audit identified clear limitations in the data supplied, it also found that even within local governments data is collected in inconsistent ways.

3.4 What issues must be managed to deliver a successful NWDS?

At the NWDS Workshop held in Melbourne on the 18th August 2009, posed the question, 'What issues must be managed to deliver this future (NWDS)?' The key items identified include:

Reporting

- How should we define the governance arrangements
- How should we deal with differences between states and between the states and the Commonwealth?
- How could we define a long term design/framework for the system?
- What triggers and thresholds could to be implemented for each, sector/ enterprise?
- How should it promote usefulness and value?
- What could be the standards?

Ownership / management of the system and ongoing development

- Who should own and maintain the system?
- What should be the Commonwealth role versus state/ territory, do they have the capacity?
- Who should be responsible for project management – coordination, reporting over time?
- How should enforcement / verification be undertaken?
- How can we deal with differences between state(s) and Commonwealth in reporting?
- What should be the layers of responsibility?
- What could be the transition milestones?

Resourcing / funding / technology

- Long term design/ framework for system have should be defined.
- What could be the long term goals / objectives / design?
- How should the distribution of costs/burden be undertaken?
- What should the data capture protocol be?
- What is the capacity to undertake the task? (Regional & Metropolitan capacity / flexibility / adaptability)
- How could conflicts between embedded systems get resolved?
- What are the ongoing costs for federal and states?
- How could we get timely access to centrally stored data.
- How should we get a secure agreement to provide / mandated Data collection.
- Who could provide required development, support, and transition?
- What technology (IT and software products) could be used?
- How should data accuracy/ collection be undertaken?
- How should ongoing development be supported?
- Not all data is timely (this may vary depending on type).

- The legislated versus reported definitions requirements (inconsistency in different legislation) should be worked through.

Include both regional and metro data

- It should have the flexibility and the adaptability?

Engagement / training

- Who should undertake training/ education?
- Engagement should be tailored for sectors (Government & Industry sectors).
- Early engagement could be a challenge.
- What should the Commonwealth Government's role capability be versus State/ Territory Government?
- How could conflicting and competing interests /perceptions be dealt with?
- It should promote usefulness and value.
- Early engagement and communications strategy should be based on vision, benefits, investment and education – and will require input by stakeholders.
- How should the interest of stakeholders be maintained, i.e. government and industry?
- What education/ consultation should be required?

Legislative change/enforcement

- Legislated versus reported definitions requirements (inconsistency in different legislation) should be worked through.
- What should the policy integration and intent be (purpose: what, why, when, how)?
- Standards should be required.
- What should the Commonwealth role capability be versus state/ territory?
- How should we move forward the difference between states and commonwealth?
- Legislative changes should be required.
- Layers of responsibility should be understood and agreed.

Confidentiality

- Confidentiality (Maintaining logistics, getting access to data, trust – social capital).
- Inertia – confidentiality, apples and oranges, transfer and exchange, how could this be managed?
- How could you control conflicting and competing interests – perceptions?
- How should we manage the issue of maintaining trust (i.e. confidentiality with NSW legislation)

Gap analysis / prioritisation

- What are the data gaps? (e.g. landfill capacity)
- How could it promote usefulness and value?
- Prioritise what data and then select early success.
- What should be the elements and priorities?
- Pick a champion industry (i.e. Paper, organics, recycling)

3.5 Issues Summary

The overall summary of waste data systems in Australia indicates that considerable effort is presently invested in uncoordinated and ad hoc ways to gather resource recovery and waste data. It also indicates that further significant work is required to gather accurate, consistent and comprehensive data. However, there is also an opportunity to lead and establish a direction for the future, especially on the back on successful national systems such as NPI and NGERS.

There is little overall support for the previous AWD with stakeholders. The capture of resource recovery and waste data is in various levels of quality and consistency. The majority of the various waste data systems currently used throughout the nation do not adequately meet the key quality principles of reporting data systems (i.e. Transparency, Comparability, Accuracy, Completeness, Clarity and Timeliness) and have reduced value in relation to decision making from the data captured.

In terms of opportunities to deliver a successful NWDS, there are some fundamental issues that need to be overcome, including;

- **Reporting–** Clear arrangements need to be made that support or transition the current state requirements;
- **Ownership / management** - Support and management is required of any transition process. This includes the support of ongoing development, and the assigning levels of ownership, responsibility and accountability.
- **Financial** – Financial support to the various stakeholders for the system may be necessary to assist in data capture requirements, and the streamlining of reporting requirements for stakeholders.
- **Technology** – A supported system that aligns with current national systems (NPI and NGERS) and provides tools for easy interrogation of the data and access to data.
- **Engagement and training** – Engagement, communication and training is required to support the system vision, benefits, investment and education.
- **Legislative change** - Legislative support is required for the acquisition of data and support for current state systems.
- **Confidentiality** – The system needs to be sufficiently robust such that it can gather data in a way that is sensitive in a competitive market.
- **Prioritisation** – The system should evolve from initial prioritised datasets.

4. National and International Reporting Requirements

4.1 National

4.1.1 National Greenhouse and Energy Reporting System (NGERS)

NGERS establishes a 'single national framework for corporations to report greenhouse gas emissions and energy consumption and production from July 1 2008'. The objectives of NGERS are to:

- Underpin the introduction of the CPRS in 2011.
- Inform Government policy formulation.
- Meet Australia's international reporting obligations.
- Assist Government programs and activities.
- Avoid duplication of similar reporting requirements in States and Territories.

4.1.2 National Pollutant Inventory (NPI)

The NPI is a public online database that displays information about air, land and water emissions of 93 substances and the transfer of substances in waste from industrial facilities; and emissions of diffuse sources. The objectives of the NPI are to:

- Help industry and government with environmental planning and management.
- Give the community up to date information about substance emissions and transfers from industrial facilities.
- Promote waste minimisation, cleaner production, and energy and resource efficiency.
- The NPI has six different threshold categories with each of the 93 NPI substances listed in one or more of these categories. These include:
- Category 1 – based on substance usage.
- Category 1a – based on substance usage.
- Category 1b – based on substance usage.
- Category 2a – based on fuel combusted.
- Category 2b – based on fuel combusted.
- Category 3 – based on substance usage.

- If a facility trips a threshold during a reporting year for a substance on the reporting list, all the emissions of that substance from the facility must be reported. In addition, transfers of the substance (if Category 1, 1b or 3) to a mandatory transfer destination must be reported.

4.2 International

4.2.1 The Basel Convention

The Basel Convention on the Control of Trans-boundary Movements of Hazardous Waste and their Disposal (1989) is a global treaty. It was developed to restrict the dumping of hazardous waste by developed countries in developing countries.

Under the Basel Convention, Australia is required to take appropriate measures to ensure that the generation of hazardous and other wastes (including household wastes) are reduced to a minimum and take into account:

- Social, technological and economic aspects.
- Adequate disposal facilities exist for the environmentally sound management of wastes.
- Waste managers prevent pollution from waste or at least minimise any associated for human health and the environmental impacts.

4.2.2 The Stockholm Convention

The *Stockholm Convention on Persistent Organic Pollutants (2001*) aims to protect human health and the environment from persistent organic pollutants (POPs). Twelve chemicals fall under the Stockholm Convention, with 9 new once being added in the near future. Australia is implementing its responsibilities under Stockholm Convention through a national strategy that includes the development of national waste management plans for schedules wastes including: Organochlorine Pesticides (OCPs), Polychlorinated Biphenyls (PCBs) and Hexachlorobenzene (HCB).

4.2.3 The Rotterdam Convention

The Rotterdam Convention on the Prior Informed Consent Procurement for Certain Hazardous Chemicals and Pesticides in International Trade (1998) purpose is to share the global responsibility and cooperation in the international trade of certain hazardous chemicals. The convention covers 27 pesticides and five industrial chemicals.

Each year, Australia is required to report on chemicals that have been banned or severely restricted substances, if this is a result of human health and environmental concerns. Australia is required to respond to each chemical included on the Prior Informed Consent List ('PIC List') with a decision of whether chemicals are prohibited

or able to be imported. If Australia produces or exports chemicals that it has banned or restricted, they must inform the importing country. If Australia produces or exports any chemicals included on the PIC List, they must ensure that the importing country has consented to its import.

The Rotterdam Convention is complementary to the Stockholm Convention in that it deals with similar chemicals

4.2.4 2002 United Nations World Summit on Sustainable Development

The 2002 United Nations World Summit on Sustainable Development agreed a framework of programs to accelerate a shift towards sustainable consumption and production. This framework will be reviewed in 2010 and may help drive the development of a NWDS.

4.2.5 IPCC Guidelines for National Greenhouse Gas Inventories

The IPCC Guidelines for National Greenhouse Gas Inventories (IPCC 2006) provide methodologies for estimating national inventories of anthropogenic emissions by sources and removals by sinks of greenhouse gases. The 2006 IPCC Guidelines were prepared in response to an invitation by the parties to the United National Framework Convention on Climate Change (UNFCCC). They may assist parties in fulfilling their commitments under the UNFCCC on reporting on inventories of anthropogenic emissions by sources and removals by sinks of greenhouse gases not controlled by the Montreal Protocol, as agreed by the Parties. The 2006 IPCC Guidelines are in five volumes, with volume 5 covering waste.

Data collection procedures are necessary for finding and processing existing data (i.e. data that are compiled and stored for other statistical uses than the inventory), as well as for generating new data by surveys or measurement campaigns. Other activities include maintaining data flows, improving estimates, generating estimates for new categories and/or replacing existing data sources when those currently used are no longer available. The methodological principles of data collection that underpin good practice are the following:

- Focus on the collection of data needed to improve estimates of key categories which are the largest, have the greatest potential to change, or have the greatest uncertainty.
- Choose data collection procedures that iteratively improve the quality of the inventory in line with the data quality objectives.
- Put in place data collection activities (resource prioritisation, planning, implementation, documentation etc.) that lead to continuous improvement of the data sets used in the inventory.
- Collect data/information at a level of detail appropriate to the method used.

- Review data collection activities and methodological needs on a regular basis, to guide progressive, and efficient, inventory improvement.
- Introduce agreements with data suppliers to support consistent and continuing information flows.

It is intended both for countries establishing a data collection strategy for the first time and for countries with established data collection procedures. It covers:

- Developing a data collection strategy to meet data quality objectives regarding timeliness, and also consistency, completeness, comparability, accuracy, and transparency,
- Data acquisition activities including generating new source data, dealing with restricted data and confidentiality, and using expert judgement,
- Turning the raw data into a form that is useful for the inventory.

Data collection guidance applicable to emission factors, activity and uncertainty data collection is defined as factual information (e.g. measurements or statistics) used as a basis for reasoning, discussion, or calculation. Data collection is the activity of acquiring and compiling information from different sources.

The 2006 IPCC Guidelines outlines that it is good practice to engage data suppliers in the process of inventory compilation and improvement by involving them in activities such as:

- Offering an initial estimate for the category, pointing out the potentially high uncertainties and inviting potential data suppliers to collaborate in improving estimates.
- Scientific or statistical workshops on the inventory inputs and outputs.
- Specific contracts or agreements for regular data supply.
- Regular/annual informal updates on the methods that use their data.
- Establishment of terms of reference or memoranda of understanding for government and/or trade organisations providing data to clarify what is needed for the inventory, how it is derived and provided to the inventory compiler and when.

The Guidelines also indicate that, where appropriate, it may be useful to explore existing or new legal arrangements as means of guaranteeing the delivery of data to the inventory. Restricted data and confidentiality of Data providers might restrict access to information because it is confidential, unpublished, or not yet finalised. Typically, this is a mechanism to prevent inappropriate use of the data, unauthorised commercial exploitation, or sensitivity to possible imperfections in the data. Sometimes, however, the organisation simply does not have the resources required

to compile and check the data. The IPCC advises that, where possible, to cooperate with data providers to find solutions to overcome their concerns by:

- Explaining the intended use of the data.
- Agreeing, in writing, to the level at which it will be made public.
- Identifying the increased accuracy that can be gained through its use in inventories.
- Offering cooperation to derive mutually acceptable data sets.
- And/or giving credit/acknowledgement in the inventory to the data provided.

Furthermore, the IPCC Guidelines specify that the protection of confidentiality is one of the fundamental principles of a national statistical agency (NSA). NSAs are committed to safeguarding information that plainly reveals the operations, belongings, attitudes or any other characteristics of individual respondents. If respondents are not convinced that the information they provide to the NSA is absolutely confidential, the quality of the information collected may suffer. Detailed individual data must therefore be treated and aggregated so as to draw out the information that is important to the user, without disclosing individual data. This is more likely to be an issue for business statistics, especially where a few companies dominate the sector, than for other data.

Sometimes, depending on the size and structure of the original sample, raw data can be aggregated in a way that protects confidentiality and yet produces useful information for emission inventory purposes. If, however, there is a need to preserve confidentiality, the NSA, or the body that originally collected the data, are normally the only ones that can carry out this additional treatment of the raw data. Some countries have special arrangements to mask data (i.e., make data anonymous with respect to companies or facilities) to allow researchers access. Inventory compilers may investigate the possibility of making such arrangements. However, as this reprocessing will be required regularly (annually if possible), a better solution would probably be for NSAs to incorporate this into their own work programmes. While this will require an initial investment in data processing, it will probably be quicker and less expensive in the long run.

Expert judgement on methodological choice and choice of input data to use is ultimately the basis of all inventory development and sector specialists can be of particular use to fill gaps in the available data, to select data from a range of possible values or make judgements about uncertainty ranges.

Experts with suitable backgrounds can be found in government, industrial trade associations, technical institutes, industry and universities. The goal of expert judgement may be choosing the proper methodology; the parameter value from ranges provided; the most appropriate activity data to use; the most appropriate

way to apply a methodology; or determining the appropriate mix of technologies in use. Interpretation is especially needed for data sets that are small, highly skewed or incomplete. In all cases the aim is to be as representative as possible in order to reduce possible bias and increase accuracy.

Experience has demonstrated that using a good practice approach is a pragmatic means of building inventories that are consistent, comparable, complete, accurate and transparent – and maintaining them in a manner that improves inventory quality over time.

Indicators of inventory quality are:

- Transparency: There is sufficient and clear documentation such that individuals or groups other than the inventory compilers can understand how the inventory was compiled and can assure themselves
- Completeness: Estimates are reported for all relevant categories of sources
- Consistency: Estimates for different inventory years, gases and categories are made in such a way that differences in the results between years and categories reflect real differences in data. Inventory annual trends, as far as possible, should be calculated using the same method and data sources in all years and should aim to reflect the real annual fluctuations and not be subject to changes resulting from methodological differences
- Comparability: The inventory is reported in a way that allows it to be compared with state and national inventories for other countries.
- Accuracy: The data inventory contains neither over- nor under-estimates so far as can be judged. This means making all endeavours to remove bias from the data estimates. Uncertainty assessment is an important component of good practice. The uncertainty analysis characterises the range and likelihood of possible values for the data inventory as a whole as well as for its components. Awareness of the uncertainty of parameters and results provides inventory compilers with insight when evaluating suitable data for the inventory during the data collection and compilation phases. Uncertainty assessment also helps identify the categories that contribute most to the overall uncertainty, which helps the inventory compiler prioritise future inventory improvements.

4.3 State Requirements for a NWDS – Stakeholder Feedback

The following requirements for a NWDS were provided by key stakeholders within each state jurisdiction. This is not an exhaustive list of the requirements of the official stance of the various jurisdictions, but some key criteria that was identified during the workshop.

4.3.1 Requirements for a NWDS - ACT

ACT stakeholders identified that a key for a NWDS is consistency, for accurate comparison/benchmarking between states/territories to assist in national approaches being applied at the state level.

They also questioned the data threshold which needs to be examined, especially in terms of smaller, rural and remote entities. They also identified that mandatory reporting requirements should not add unnecessarily to the burden of business and the multiple reporting systems should be merged and streamlined.

4.3.2 Requirements for a NWDS - NSW

NSW stakeholders have identified that the NWDS should build on existing data systems collection or fund an appropriate new national system. The system should identify links between State and National systems, and not duplicate or undermine existing data collection. The requirements for the national system should clearly define state regulatory systems and see that these are met away from an overall national approach.

4.3.3 Requirements for a NWDS - NT

NT stakeholders indicated that the NWDS would need to examine how to factor in the distance between, and size of remote communities, especially in relation to transport issues during particular times of the year (for example, the wet season). Remote communities are likely to have older waste and lack services for collection of chemicals and drums. Stakeholders also indicated that there is need to assist local government in addressing these issues.

4.3.4 Requirements for a NWDS - QLD

Qld stakeholders identified that consistency of approach is required nationally and across all waste streams to ensure consistent and traceable data. This includes standardised definitions, classifications and methodologies to calculate volumes of waste. Stakeholders also suggested that the system should include the inter-state movement of wastes; they suggested a national registration database, similar to the national trucking database, for all waste transporters (not just hazardous waste).

They also identified that the NWDS should cover large waste streams generated at large facilities that may not be reported as commercial and industrial waste. (such as ash generated by coal-fired power stations, mineral processing wastes generated by refineries and smelters, wastes generated by food processing mills (for example: sugar mills, flour mills etc)). Another suggestion was the provision of a methodology to reconcile generation with recovery. i.e. Source streams are by classification (MSW, C&I, C&D) while resource recovery is provided in material type.

4.3.5 Requirements for a NWDS - SA

The stakeholders from SA indicated that there is a need for nationally consistent electronic waste data collection which provides a uniform approach in waste stream classifications. They also indicated that a fully integrated electronic waste tracking system is required, and that it should incorporate knowledge of waste management for indigenous communities. The logistics of any roll-out would need to be carefully planned and agreed. They emphasised that the database should be a one stop shop, supported by federal legislation; with a database that provides aggregated reports that are easily extracted for understanding national trends.

4.3.6 Requirements for a NWDS - TAS

Stakeholders from Tasmania indicated that the waste classification system in their state largely follows the original Australian Waste Database coding system. Waste reporters raised concerns of the number of different types of reports they would be required to provide to the various State and Federal Agencies and expressed that there should be a capacity to streamline reporting requirements. Stakeholders noted that the requirements include controlled (hazardous) wastes.

It was also mentioned that a national system is the most critical waste management tool moving forward. Stakeholders also suggested that the NSDS could help improve the effectiveness of current waste programs. It would also provide assistance in undertaking business case analysis on potential services such as introduction of a kerbside organics collection. The stakeholders also suggested that the database must be suitability structured so that council databases could be uploaded in to the national database with limited manipulation.

4.3.7 Requirements for a NWDS - VIC

Victorian stakeholders indicated that the major requirement for a NWDS is data and information. Data and information is required to assess how state waste data would be integrated and if there is value from nationally consistent data collection processes. The NWDS should provide a clear link to National Waste Policy objectives, and seek to achieve efficiencies in data gathering.

4.3.8 Requirements for a NWDS - WA

The WA stakeholders indicated their support for a national framework for data collection and reporting due to the isolation of Western Australia and small number of interstate movements. However the stakeholders also indicated that the value and cost of a national system needs to be clear and measurable. Like the Northern Territory and South Australia, the remoteness of areas of the state means that waste management is costly, with key judgements needed in weighing up issues around health and environmental costs. They suggested that the utilisation of data from these areas needs to be thoroughly thought through, and that there needs to be consistency in the data, clear methodologies prepared for data acquisition and more audits undertaken of transfer facilities.

5. Why a National Waste Data System?

5.1 Current Status

The current status of waste data systems in Australia includes a number of data systems that meet their state needs, associations (industry and local/regional government) with data to support members, and some industry data usually utilising consultants and broad census data. There is little to no consistency in the methodology of the systems or classification of the waste streams. Data is rarely verified by a third party, and generally does not meet common principles for data quality.

There is currently no comprehensive way to aggregate resource recovery and waste data on a national scale. A national system would enable a means to confidently inform national strategic directions, inform policy and/or support broad sustainability principles especially in resource recovery. A NWDS could streamline reporting and data gathering and reporting initiatives an, save money, reduce red tape and assist in delivering a seamless economy.

Nationally, waste data is currently collected in ways that is inconsistent with methods supporting the NGERS and NPI databases. On an international scale, the current data systems in place do not support international obligations under the Basel Convention.

As expected the way that stakeholders currently collect data has significant financial inefficiencies due to the time and resource businesses need to collect and report resource recovery and waste data. Multiple reporting to different organisations/authorities using different methods and classifications is also a large burden on businesses. Overall the current state of resource recovery and waste data in Australia lacks the robustness that is required to confidently make valued decisions at a national level.

A NWDS approach can provide a way forward in provision of accurate, consistent, transparent and timely data to support industry, develop strong policy, and overall track Australia's national performance in areas such as resource recovery. Based on previous failures of the AWD, there are important steps in design, requirements, roll out and support required to make it successful.

5.2 Opportunities

A national system provides the following opportunities:

- Provide required data for international reporting.
- Improve access to waste data.
- Support regulatory reform and associated reporting burden on business.

- Support a consistent, comprehensive data capture process.
- Provide accurate and reliable data to inform decisions, strategies and business.
- Support consistent methods, classification and terminology for waste data.
- Provide a clear purpose for why we should collect this data.
- Support state and federal legalisation.
- Support the Australian Waste Policy.

There have been recent examples of national data systems (NPI & NGERS) that have successfully been designed to streamline reporting arrangements, reduce red tape and aid regulatory reform, some of which acquire waste data.

5.3 How does this assist Stakeholders?

Waste is not only a function of use of a product; it also provides opportunities for recovery, re-use and energy minimisation. Within this broad lifecycle the majority of Australians can be impacted by the results of the way we define, use, store and collect resource recovery and waste data. A successful NWDS can improve our way of life by supporting sustainable industries.

5.3.1 Community

Our community relies on data to provide evidence for education and behavioural change programs. Data provides evidence that supports policy development and that policy makers are making informed decisions to support sustainability initiatives.

5.3.2 Investors

To support an industry requires investment, whether it's new technologies, or broad industry support. Investment is a risk based decision supported by evidence (data). The greater confidence in the data, the more informed and successful investments will be.

5.3.3 Waste Industry and Associations

By streamlining the reporting processes, the burden to industry is reduced. An accurate comprehensive dataset also allows for confident decision making and the capacity for industry growth. Associations reduce their resources spent on industry surveys and assist them in broader strategic initiatives that aim to continuously improve the industry sector.

5.3.4 Local Government

The NWDS would reduce the reporting burden for local government and enable the data captured to be used for local initiatives and better resource management of community rates that are invested in waste collection and associated activities.

5.3.5 State Regulators and Agencies

An NWDS will allow for more effective use of resource recovery and waste data in the context of measuring policy objectives confidently, while reducing the resources required to manage current waste data systems into the future. It also allows for broader benchmarking on systems especially those concerned with the movement of waste around the country.

5.3.6 Federal Government

The NWDS would allow for the support of the National Waste Policy and other federal data systems. It will allow Australia to meet our international reporting requirements (e.g. under Basel and to the OECD) and to establish appropriate domestic management strategies for waste articles which contain certain controlled chemicals (e.g. those listed under the Stockholm Convention such as brominated flame retardants). It will also support national sustainability initiatives, like resource recovery, re-use and future renewable energy sources.

6. National Waste Data System (NWDS) Considerations

This section provides:

- An overview of the functional and non-functional requirements that may be considered for the development of the NWDS that effectively supports the Policy Framework.
- Some initial considerations of possible features of the NWDS specifically in relation to the policy framework document with a focus on the seven themes and clarification points from the consultation process. These considerations should be further explored during further consultation with key government and industry stakeholders. Aligning the design process to the policy framework, and indeed the seven key themes allows for a systematic process for developing the requirement of an effective NWDS that supporting the management information needs of the National Waste Policy Framework while being a complimentary system in relation to other national and international reporting requirements.

6.1 Defining Requirements of the NWDS

6.1.1 Functional Requirements

Functional requirements capture the intended behaviour of a system. These behaviours may be expressed as services, tasks or functions the system is required to perform. Functional requirement questions would include, but are not limited to:

Objectives

- What are the intended outcomes of the NWDS?
- Who will be the users of the NWDS?
- Who will be the audience of the NWDS?
- What will be the user's requirements of the NWDS?
- How will the NWDS help achieve the goals of the National Waste Policy?

Inputs

- What type of information should the NWDS collect and store?
- Who should enter the data into the NWDS?

- Is data entry automatic or manual?
- Should there be reporting requirements for particular stakeholders?

Outputs

- What KPI's should be tracked?
- How will KPI's be tracked?
- What reports will the NWDS generate?

6.1.2 Non-functional requirements

Non-functional requirements are sometimes known as constraints or quality requirements. Non-functional requirements can be further classified according to whether they are performance requirements, maintainability requirements, safety requirements, reliability requirements, or one of many other types of requirements. Initial non-functional requirement questions and potential considerations are included below.

Requirements

- What are the timeframes/ reporting periods?
- How will the NWDS be accessed?
- What are the auditing requirements?
- How will the system ensure it is effective and efficient for users?
- How often will the NWDS be maintained?
- How often can the data be modified in the NWDS?
- Will data need signoff from a particular party?

Interdependencies

- What other voluntary or mandatory reporting frameworks could be reliant on NWDS outputs?
- What other voluntary or mandatory reporting frameworks could be inputs to the NWDS?
- What standardised input/output considerations need to be made to avoid possible duplication of effort across any interrelated reporting frameworks or systems?

6.2 Workshop – Summary of System Principles

The exercises undertaken during the NWDS workshop enabled key stakeholders to identify and agree on a common set of possible system principles. These principles capture the essence from which NWDS framework requirements could be drawn. The summaries of System Principles are outlined below:

1. Build to evolve. Begin simple, identify material(s) to initially model the system.
2. Shift focus more to tracking “materials” rather than “sources”.
3. One datum, one point of entry, one system
4. Capture lifecycle implications.
5. Where possible treat waste as a potential resource with economic value or system input.
6. Ensure the system is accessible and usable.
7. Seek integration with existing systems (e.g. NGERS, NPI)
8. Standardise definitions and classifications
9. Clearly articulate system purpose: For community, for federal, state and local government, and for industry.
10. Voluntary participation has been an issue in previous initiatives. Seek to mandate/legislate, and/or provide incentive to participate.
11. Look internationally. Seek world-wide best practice, what worked, what were the issues?
12. Reduce red tape, streamline processes.
13. Ensure clear custodianship. Who owns what?

6.3 What should the NWDS include?

On the basis of these system principles and previous work undertaken in the AWD Feasibility Study (WMAA 2009), the broad requirements for the system include:

- Clearly outline ownership and provide roles and responsibilities.
- Providing high quality data through meeting common data quality principles.
- Including standardised definitions, methodologies and classifications.
- The accessibility and flexibility for reporting and is multi-functional in its ability to investigate database, while having the security mechanism for protection of sensitive and confidential data.

- Supporting data entry for all users and providers of resource recovery and waste data in a way that streamlines current processes.
- Building on current state and territory waste data systems and requirements, with the ability to aggregate flows of data.
- Alignment with national and international reporting requirements including the capability to share common data (NGERS & NPI).

6.4 What might a NWDS do?

The experience of drafting the first National State of Waste Report suggests that national data would be valuable in the following areas:

- Total waste generation [including details on all streams (including hazardous waste), location, articles, materials and methodology).
- Total recovery and recycling (including details on streams, location, articles, materials, contamination levels and contaminants and methodology).
- Total waste to landfill (and netted of landfill recycling), (including details on streams including hazardous waste, location, articles, materials and methodology).
- Details on what can be recycled, where articles and materials can be recycled and who can recycle it.
- Data on landfill performance (including greenhouse emissions, landfill gas capture, odour, dust, leachate, liner performance, groundwater monitoring, etc).
- Data on recycling facilities performance (including recovery rates, secondary reuse and residuals sent to landfill).
- Data on waste avoidance activities and their measures.
- Landfill capacity data (years of capacity remaining), (including landfill type, size, population served and location).
- Resource recovery capacity (including facility type, size, population served and location – covers AWTs)
- Data on final destinations/disposition of materials recovered/recycled.
- Data on waste to energy (including composition of feedstock, disposition, energy generated etc.).
- Hazardous waste data (generation, disposition, composition, recycling / treatment, end use, and movement).

- Material data (cradle to grave information for use in specific product stewardship initiatives)
- Litter data, including marine debris.
- Flexible categories/aggregations (e.g. make sure that it is possible to have data on food waste and green waste within the organics category).

6.5 Requirements from National Waste Policy Framework

To effectively support strategies and actions, the NWDS needs to provide for the data management requirements to support each theme. The following theme subsections summarise the NWDS requirements that would support these (more detail can be found in Appendix C).

6.5.1 Taking Responsibility

The NWDS could assist in:

- Managing compliance requirements.
- Informing the product stewardship/extended producer responsibility framework.
- Providing public reports.
- Providing third party assurance of data.
- Flagging, protecting and managing confidential data.
- Synchronising with other databases.
- Support data entry and administration.

6.5.2 Improving the market

The NWDS could:

- Differentiate between waste, resource, co-product and by-product and facilitate a shift from 'waste' to 'resources'
- Provide standards for reporting.
- Collect waste throughput for waste to energy data.
- Have the capability to handle integrated data.
- Provide data from Stockpilers, Reprocessors (buyers) and Industry waste generators (suppliers).
- Manage an inventory of waste resources.
- Provide best practice guidance for waste data collection.

- Provide an audit trail for captured data.
- Protect confidentiality while providing an open and transparent data stream.
- Improve the timeliness of making data available – towards real time where applicable.

6.5.3 Pursuing Sustainability

The NWDS could:

- Contain a tool that is able to quantify the environmental gains of reuse/recycling/recovery e.g. GHG emission, energy, water saved (DECC Benefits of Recycling Calculator).
- Contain guidelines and standards on the organic waste input (separation and contaminant levels include hazardous materials) and organic end products such as soil conditioners and compost.
- Contain guidelines and standards for processable waste for waste to energy plants and methane to energy.
- Provide whole of life reporting to help identify material sustainability issues and therefore focus efforts in environmental objectives across regions and jurisdictions.

6.5.4 Facilitating Investments

The NWDS could:

- Manage data and reporting requirements for materials flow modelling.
- Manage data and reporting requirements for processing and distribution activities.
- Register of future government projects that require input materials that can be recovered from waste streams.

6.5.5 Reducing Hazards

The NWDS could:

- Maintain an inventory of stockpiles of hazardous waste.
- Administer the data requirements for the movement of hazardous waste around Australia.
- Provide a detailed audit trail and verification process for hazardous waste data enhancing quality assurance for data reported under the international Conventions.

6.5.6 Reporting on Performance

The NWDS could:

- Provide consistent reports nationally for use in State of the Environment reporting, as appropriate reports in implementation of the National Waste Policy or input to future State of Waste Reports,
- Report progress against targets set under the National Waste Policy
- Provide an automated reporting mechanism to meet annual international reporting requirements under the Basel and Stockholm Conventions and to OECD reporting mechanisms, and contribute to future performance reviews of the international conventions.
- Facilitate the development of consistent definitions, terms and standards, waste stream and waste type classifications.
- Provide facilities and businesses with models for effectively managing waste and resource recovery information.
- Support various reporting periods (calendar vs. financial year, monthly vs. quarterly).
- reinforce the evolution of classifications of the main waste streams - MSW, C&I and C&D waste categories, which will include liquid, gaseous and solid waste streams.
- Support interdependencies – the shared data points that align the NWDS with NGERS and NPI as well as other reporting obligations.
- Support the future development of waste targets.

6.5.7 Tailoring solutions

The NWDS could:

- Facilitate the innovation and tailoring process by providing best practice and benchmarking information.
- Facilitate ease of data collection.
- Help identify opportunities to grow local economies through investment opportunities.
- Support data collection through the use of incentives where applicable.

6.6 National Waste Data System Requirements

6.6.1 Functional Requirements – Based on Workshop and Stakeholder Feedback

Functional requirements capture the intended behaviour of a system. These behaviours may be expressed as services, tasks or functions the system is required to perform.

Objectives

What will the NWDS be required to do?

The NWDS could be required to comprehensively collect nationally consistent waste and resource data that will efficiently and effectively support decisions on the sustainable management of waste in Australia. In doing so, it will also be required to support the National Waste Policy Framework (refer section 6.5 - Requirements from National Waste Policy Framework).

Who will be the users of the NWDS?

- Community
- Investors
- Waste Businesses & Associations
- Auditors
- Local Government
- State Regulators & Sustainability Agencies
- Federal Government
- International bodies (Basel Convention, Stockholm Convention, OECD etc)

Section 5.3 provides more detail on the how a NWDS would assist stakeholders.

Who will be the audience of the NWDS?

The comprehensive list of users is likely to be consistent with the audience for the NWDS. Additional audience may come from other industry groups and include a broader community audience.

What will be the user's requirements of the NWDS?

The key user requirements include:

- Clearly outline roles and responsibilities.
- Inclusion of standardised definitions, methodologies and classifications.

- Has accessibility and flexibility for reporting and is multi-functional in its ability to investigate database, while having the security mechanism for protection of sensitive and confidential data.
- Supports data entry for all users.
- The ability to aggregate flows of data.
- Alignment with national and international reporting requirements including the capability to share common data (NGERS & NPI).

How could the NWDS help achieve the aims of the National Waste Policy?

The aims of the National Waste Policy will be to avoid the generation of waste, to reduce the amount of waste (including hazardous waste) for disposal, to manage waste as a resource and to ensure that waste disposal is done in a safe, scientific and environmentally sound manner. The NWDS achieves this through the capture of nationally consistent waste data that underpins the certainty needed to effectively meet these aims. Section 6.5 provides more detail on the specific NWDS Requirements to support the National Waste Policy Framework.

Inputs

What type of information could the NWDS collect and store?

Overall the NWDS could capture consistent verifiable waste data collected by accepted methodologies. With all data, further information from the source provides context (metadata) and a way of making the data transparent and verifiable from third parties. This includes information such as:

- A code for the data collection activity.
- Contact details for data provider, date, time.
- Who undertook the data collection activity.
- What methodology was used for the data collection.
- Amount of waste in agreed consistent units.
- Materials and source information.
- Articles and source information.
- Any further comments and assumptions in data collection (metadata).
- Which categories should the data be housed in.
- Do they need any special flags (i.e. Confidentiality).
- Is the data material, aggregated.

Who should enter the data into the NWDS?

This should be established during the detailed design of the system.

It may include a number of proposed users depending on each data element to be captured. The detailed design will consider the following principles and needs:

- Data entry for all users and providers of resource recovery and waste data will be based on a streamlined process.
- The focus will be on capturing the data one time at the least cost and/or effort collection point.
- Contextual and additional valuable categorisation data will be captured at that one time data input activity to meet the outputs needs of that data element.

Is data entry automatic or manual?

This should be established during the detailed design of the system. Automation should be considered wherever practically possible without forsaking significant data quality needs. Data entry mechanisms will be established during the mapping out and streamlining of the business and data entry and input processes.

Should there be a reporting requirement for particular stakeholder?

This should be established during the detailed design of the system. Reporting and data entry requirements for particular stakeholders must be considered in order to satisfy system requirements for contextual, valuable and consistently recorded data. It has been recognised that additional reporting requirements by particular stakeholders will be critical to providing valuable information to downstream consumers of reporting outputs. It is therefore important to manage those stakeholders with regard to the provision of quality data.

Outputs

What KPI's should be tracked?

The KPI's for the system will be established with finalisation of the National Waste Policy. As the system will build from current state and national systems, these systems will also likely support an agreed and consistent set of KPI's. The system will also include a range of KPI's required by the range of stakeholders for local, regional, state, national and international level performance reporting.

How will KPI's be tracked?

This should be established during the detailed design of the system. Most KPI's will likely be tracked via the extraction of reports generated by the NWDS. A number of core KPI's for individual stakeholders and users may also be provided via the user interface of the system. Where relevant, KPI's may also be tracked against performance targets.

What reports will the NWDS generate?

While this will be established in the detailed design of the system, the reports will need to support performance targets and provide sufficient user detail in a way that is sensitive to some data sources. In some cases, user specific reporting may need to be available to provide support to those stakeholders playing a critical role in ensuring quality data inputs. Reporting will also allow for some flexible filtering as well as some customisation.

The types of reports to be considered are:

- Generic summary level reports at the state and national level including data at a sufficiently high level so that confidential data is non attributable to specific data providers.
- A range of stakeholder and audience specific summary reports that meet the majority of needs for those users.
- A suite of detailed level reports designed for each of the major groups of users that will be driven by security and confidentiality rules.
- Transactional reports that are consistently aligned to other reports and allow for ease of auditing of data.

6.6.2 Non-functional requirements

Non-functional requirements are sometimes known as constraints or quality requirements. Non-functional requirements can be further classified according to whether they are performance requirements, maintainability requirements, safety requirements, reliability requirements, or one of many other types of requirements.

Requirements

What are the timeframes/ reporting periods?

This should be established during the detailed design of the system.

Data entry should be available at a date/time level (real time) as well as at discrete reporting intervals (e.g. monthly – end of month) for certain types of data that has not been captured at the date/time level. Reporting should be made available for any date range and periodic reporting at least at a monthly level.

How will the NWDS be accessed?

This should be established during the detailed design of the system.

Previous experience in data collection for NGERS and NPI (as well as potential efficiencies and synergies) suggests that web based access to data input and reporting will be an ideal channel for accessing the NWDS.

What are the auditing requirements?

While this would be established further in the detailed design, it would be expected to audited to an international standard (ISO) and also have third party verification.

How will the system ensure it is effective and efficient for users?

The system will be effective and efficient if it is designed and developed in line with the system principles as well as the future direction requirements for each of the major components (themes) of the policy framework.

A standardised system for collection of waste data is an effective and efficient way of providing data to the system, compared to the current variance in data quality and consistency. The provision of data from the system requires accessibility and flexibility for reporting and needs to be multi-functional in its ability to investigate database, while having the security mechanism for protection of sensitive and confidential data.

How often will the NWDS be maintained?

This should be established during the detailed design of the system.

Given the importance and critical role the NWDS will play in delivering the national waste policy, ongoing support and a regular program of maintenance will be required.

How often can the data be modified in the NWDS?

To be established in the detailed design of the system. Considerations will need to be made with regards to:

- Maintaining an audit trail of data entry and changes
- The needs for a process of 'closing out' reporting periods or an alternatively relevant process for changing historical data
- The different roles of users in terms of security and authorisation levels and their ability to modify data.

Will data need signoff from a particular party?

The data will require both an internal quality management system and third party verification. This will mean that data will likely be flagged as to its rigor (i.e. questionable, preliminary, final -verifiable). This will be established in the detailed design of the system.

Interdependencies

What other voluntary or mandatory reporting frameworks could be reliant on NWDS outputs?

Other voluntary and mandatory reporting that could be reliant on the NWDS outputs include, international reporting through the Basel convention and national reporting through the NPI and NGERS frameworks. State, regional and local government reporting required for regulation at those levels and other industry based frameworks. Section 2.4, provides a comprehensive list of key waste datasets which will have associated frameworks supporting these.

What other voluntary or mandatory reporting frameworks could be inputs to the NWDS?

In streamlining the way that data is collected in Australia, all current frameworks will need to be considered in building a successful NWDS.

What standardised input/output considerations need to be made to avoid possible duplication of effort across any interrelated reporting frameworks or systems?

The considerations relate to how waste is reported at the different levels of government. Nationally consistency will take time due to current legislative requirements of the state and territory governments. However, the use of material data can provide flexibility into how users aggregate waste for their reporting purposes, especially in the short term.

The NWDS will address input/output considerations through the development of agreed standardised terms (e.g. categories, materials, sources etc) as well as the development of data input processes and guidelines that seek to eliminate the need for duplicate effort by ensuring that all contextual data that is valuable to downstream information consumers of information is captured at its source at a sufficiently granular level. Refer the Inputs section under Functionality Requirements above for further information.

To assist with this process, it is recommended that reference should be made to the experience and insights gained through the Australian Government Initiative driven by the Department of Treasury for Standard Business Reporting (refer

http://www.sbr.gov.au). Engaging with the SBR team at the early design stages will add significant value and assist in streamlining the standardisation process.

7. Way Forward – What could a NWDS look like?

7.1 Workshop Feedback

The NWDS Workshop facilitated by Net Balance and held during August 2009 gained feedback on three important questions in moving a national system forward:

1. What could the NWDS look like in the future?
2. What issues must be managed to deliver this future?
3. What does the road map to the new system look like?

7.1.1 What could the NWDS look like in the future?

The main areas for the workshop are summarised as follows:

- **Simple (especially in the beginning)**

The NWDS, in the future, could start from simple beginnings, and then build to a complex comprehensive system. The system could likely start with low hanging fruit, most likely on a material level to test the system and minimise stakeholder burden. It could begin to build the data flows required for all stakeholders from source to regulator. It would likely be consistent with other federal systems such as the NPI, and could use the backbone of the existing Australian Waste Database. It could progressively be refined and improved, increasing the effectiveness of the system, making it easy to access and transparent.

- **There is consistency, integration, streamlining & standardisation**

The NWDS, in the future, would provide certainty, consistency, and support for the Waste Industry through the integration and standardisation of waste reporting. This will streamline current systems and provide confidence for users of the data supplied.

The NWDS would be supported by accreditation of survey work and data systems (data collectors) and would enable consistent classifications to be utilised for other national reporting requirements (NGERS, NPI). It would also integrate with other environmental reporting, e.g. liquid waste, energy, landfill gas, water, etc.

There would be standards for terminology, nomenclature and methodologies and strong relationships with industry associations to gather a comprehensive dataset.

- **Purpose**

A future NWDS would have a clear purpose and measureable key performance indicators. It would support objectives for data, be flexible to industry changes and build on experience of similar systems internationally.

The NWDS would enable benchmarking, inform policy and support social, economic and environmental values

- **Provides clarity**

The system will provide clarity and value to the private sector enabling strategic directions to be set and confidence in investment. This clarity will also provide for a great framework for stakeholder engagement and education especially on waste hazard, waste minimisation, and sustainability issues.

- **Supports policy**

The future system will support sustainability policy development within waste policy development. It will provide confidence through evidence based policy and will meet our and future legislative requirements.

- **Preferably materials based (able to investigate product lifecycle)**

The future NWDS is preferably materials and product based with the capacity to aggregate data into categories where required. It has the ability to look at full product lifecycle and supports product stewardship.

7.1.2 What does the roadmap to the new system look like?

The main areas for the workshop are summarised as follows:

Clear Purpose / long term vision

The NWDS should have a clear purpose that defines a long term vision of the system. An important step is to engage stakeholders in this vision. The purpose should provide certainty and define boundaries of the system. The purpose will enable objectives and milestones to be formed to support the direction and usefulness of the NWDS.

Prioritisation / Gap Analysis (low hanging fruit - packaging, e-waste, organics)

The NWDS should have two initial steps to assist in its successful development: a gap analysis to understand the current waste data 'system' and its complexities, and a start point for a NWDS, which was suggested to be material based system such as packaging, e-waste or organics. These steps will enable a prioritisation of data and confidence in the way forward with the system.

It will also support an impediments list which outline different perceptions of benefits and disadvantages of resource recovery and waste data in Australia.

Consultation / Engagement / Agreement

To build a successful NWDS all stakeholders need to be engaged, consulted and form an overall agreement of the purpose, structure and requirements on the system. It is likely that this engagement will need to discuss support mechanisms such as regulation and legislation. This stage will also look at custodianship and rules of engagement, including areas such as accessibility and system transparency. This will establish transition agreements, memorandum of understanding (MOUs), and define responsibilities.

A Regulation Impact Statement would probably be required to support the new NWDS.

Standardisation (methods / classifications), boundaries and requirements

Work should be prioritised to set the baseline requirements to enable waste data to be provided in a form which is comprehensive, comparable and traceable. To get to this stage we require clear and uniformly agreed definitions, terminologies, classifications and data capture methodologies.

Trial / Pilot

The new NWDS could start small through a pilot system on a selected material item. This will allow for the small scale system to become entrenched, gain support from industry and set the building blocks for a successful full scale NWDS. The data selected for the trial is preferably comprehensive, verifiable and easily accessible.

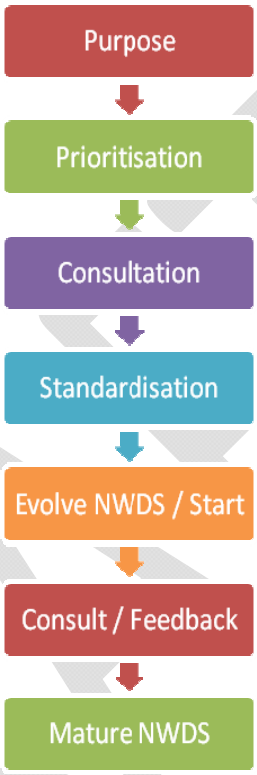
Consultation / Feedback

Throughout the future roadmap there is open consultation and feedback to optimise the system to meet the requirements of the users and overall purpose. It will set milestones for review and adapt to meet any changing landscapes in the future. It will be open to its impediments and work to rectify these in time.

Full scale build

When the system has evolved and stakeholders have been able to provide feedback to enhance its performance towards its overall purpose, the NWDS would be ready for a complete build and rollout. This roll out would look at specific IT solutions and set timelines and milestones for implementation and future review.

7.2 Road Map Forward - Next Steps



7.2.1 Purpose

There was a general consensus from stakeholders that the NWDS would need to be supported by a clear and measureable purpose. This purpose would provide a backbone for the system and enable a framework to be outlined to support the purpose and the overall system.

Work undertaken by WMAA on the feasibility study for an AWD; put forward a primary purpose, 'to efficiently and effectively inform decisions relating to the sustainable management of waste throughout Australia (local to international)'. The question of purpose was also discussed at the August 2009 workshop, with areas such as waste data being a subset of sustainable consumption and supporting the community in overall sustainability. The Draft National Waste Policy Framework had an overall aim to 'avoid the generation of waste, to reduce the amount of waste (including hazardous waste) for disposal, to manage waste as a resource and to

ensure that waste disposal is done in a safe, scientific and environmentally sound manner'. This supported vision, principles and theme statements.

The final purpose of the NWDS, must be supported by stakeholders and engagement in relation to the purpose should be undertaken.

7.2.2 Prioritisation

One of the reasons why previous attempts at an AWD were not successful was the fact that a path forward through priority areas was not fully supported. In building a successful system, a key is to require a clear understanding of complexities of the task involved. Areas which need particular work include a detailed gap analysis, and prioritising the steps of building a data system (i.e. which data should be captured first).

This stage of the road map will set the support required and acknowledge the task ahead (easy wins, speed humps).

7.2.3 Consultation

With such wide and diverse industry in Australia it's important in building a successful system that stakeholders continue to be engaged throughout the whole process, and have buy in to the overall purpose, structure and requirements of the NWDS. It is important that lead organisations and associations such as Waste Management Association of Australia, Australian Council of Recyclers, Australian Landfill Owners Association and Australian Local Government Association play significant parts in this consultation. Stakeholders need to understand the higher level custodianship, requirements, accessibility and most important how this is going to make their work more effective and efficient.

There is strong support from stakeholders that the NWDS system should be supported by legislation, especially in areas of streamlining current state legislation and providing the system with supporting requirements (i.e. focus of mandatory reporting being the best way of supporting a successful system).

7.2.4 Standardisation

It is clear from the review of current waste data systems that comparison and benchmarking, especially across state borders is very difficult. Nearly all data struggles to meet common reporting principles, as a result the data has a lessoned value in instructing strong policy.

The waste data system requires a common standardisation to support a comprehensive, comparable and traceable dataset. This will include areas such as uniformly agreed definitions, terminologies, classifications and data capture methodologies.

7.2.5 Evolve NWDS – Start

The NWDS should evolve and not attempt to address all items at once. An evolving system would provide success, confidence, support and a framework to build a larger more comprehensive system. Presently, some datasets and industry are not at the stage to provide data of the quality required to meet expected objectives, feedback from stakeholders suggest an evolving system that begins with bringing together data of high confidence (comprehensive, verifiable and easily accessible).

7.2.6 Consult /Feedback

An evolving system would require support from all stakeholders, feedback for successes and areas for improvement are required for continuous improvement of a building system. Work on initial data gaps will need to continue and the standardisation process is likely to evolve within a changing landscape into the future. It is expected that milestones within the evolving system will require consultation and feedback to establish whether they have met expectations and key indicators set.

7.2.7 Mature NWDS

A fully developed NWDS could evolve over a number of years into a mature system. The mature system would hold a comprehensive waste dataset that is of a robust nature and can be confidently used to inform policy and investment into sustainable waste practices. A mature system would still require consultation and feedback as part as continuous improvement. It will also be required to set key milestones for change adaptation and future review.

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Appendix A – List of Stakeholders Engaged

State / Territory / Federal / National	Name
Australian Capital Territory	Department of the Environment, Climate Change, Energy and Water
Australian Capital Territory	NOWaste
Federal	Department of Climate Change
Federal	Department of Environment, Water, Heritage and the Arts
National	Australian Landfill Owners Association
National	Australian Local Government Association
National	Waste Management Association of Australia
New South Wales	Department of Environment and Climate Change
New South Wales	Local Government and Shires Association of NSW
New South Wales	South East Resource Recovery Regional Organisation of Councils (SERRROC)
Northern Territory	Department of Natural Resources, Environment, the Arts and Sport
Northern Territory	Local Government Association of Northern Territory
Organisation	Equilibrium OMG
Organisation	Hyder Consulting
Queensland	Department of Environment and Resource Management
Queensland	Local Government Association of Queensland
South Australia	EPA SA
South Australia	Local Government of South Australia
South Australia	SRWRA
South Australia	Zerowaste SA
Tasmania	Department of Primary Industries, Parks, Water and Environment
Tasmania	Dulverton Waste Management
Tasmania	Local Government Association of Tasmania
Victoria	EPA Victoria
Victoria	Municipal Association of Victoria
Victoria	Sustainability Victoria
Western Australia	Department of Environment and Conservation
Western Australia	West Australian Local Government Association

Appendix B – Key issues details relating to the development of a NWDS

A number of documents and reports were reviewed by Net Balance, including recent work undertaken by the WMAA in relation to the AWD. These documents presented a number of issues, and explain the current difficulties in collecting, aggregating and reporting national waste data in Australia. These difficulties have been summarised into 6 key issues which are consistent with those identified from stakeholder engagement (Section 3.3):

- Issue #1 – Lack of support for National Waste Reporting
- Issue #2 – Inconsistent Waste Classification and Terminology
- Issue #3 – Problematic Data Collection
- Issue #4 – Limited understanding of waste's life cycle impacts
- Issue #5 – Problems with the alignment of National Waste Data Reporting
- Issue #6 – What fundamental data sets does Australia need to collect to better inform waste management policies, practices, investment, business operations and to assess and manage risk?

Source	Issues and Concerns
Issue #1 – Lack of support for National Waste Reporting	
AWD Workshop	The old Australian Waste Database (AWD) failed because it did not have sufficient state and territory support - despite it having Ministerial level support through ANZECC (ANZECC directed that the database be populated with data). While some value still continues to be drawn from the categories used in the database shell, for various reasons it did not meet State Government collective needs and was therefore not fully or substantially populated.
WMAA p3	Any value to be derived from a database is inextricably linked to the value of the data it contains. The developers of the previous national databases seem to have addressed the storage, collation and retrieval of data, but made incorrect assumptions about the extent and availability

Source	Issues and Concerns
	of data to populate the database. This procedural oversight has been the most significant downfall of both previous attempts at a national repository for Australian Waste Management and Resource Recovery (WM&RR) data.
WMAA p8	According to some sources, there is currently no ongoing, structured network for regular or periodic communication between agencies within a state, between the states, or between the states and the federal government, concerning waste management and resource recovery. Other stakeholders indicated they have access to or are involved in the forum provided by the Environment Protection and Heritage Council (EPHC) for the discussion of waste management and resource recovery related issues. Apart from the EPHC, groups or committees are established on a project-by-project or regional basis. Unfortunately the high turnover in public sector positions and the industry at large, the contentious issues that need addressing and the lack of continuous funding mean that strategic groups are rarely sustained. Open communication and ongoing coordination are a fundamental requirement for establishing a nationally consistent waste data bank.
WMAA P15	Concerns exist about how relevant a national perspective of waste data is for anything other than general interest and adhering to international reporting obligations. Stakeholders want to submit the minimum data required, and do not want to submit the same data to multiple agencies. State and territory jurisdictions are predominately responsible for waste legislation, regulation and policy development. Significant diversity (of conditions, distances, population and infrastructure) exists, not only between the states, but between neighbouring local and regional councils. For many of the small but numerous local and regional councils, for whom the cost of implementing extra monitoring will be significant, it is not clear how data analysis, programs or policy applicable elsewhere can necessarily be of benefit to them.
WMAA p15	Companies and councils who run waste disposal or resource recovery facilities do not want commercially confidential data made available to their competitors. Organisations would need to have the utmost confidence in the technical and physical security of the AWD. It is also imperative that those analysing the data be restricted from releasing information that could be disaggregated to a level whereby a particular business or facility's data can be identified.
WMAA p15	With the benefits of centralised and/or coordinated national data collection not immediately foreseeable, stakeholders are concerned about the availability of funding and where it will be coming from. Large companies who operate facilities for profit can generally afford to gather the data they require when they require it, and already have significant investment in their systems. Remote facilities can rarely justify even the existing costs of any required reporting, let alone any further reporting.

Source	Issues and Concerns
Senate Inquiry	Initiatives to provide nationally consistent data and reporting have faced a series of obstacles in the past for reasons including the different regulatory and methodological approaches operating in each state. The Australian Waste Database (AWD) is one such initiative which was put on hold in 2005 because some jurisdictions were unwilling to release their data to the Commonwealth Scientific and Industrial Research Organisation (CSIRO).Originally designed to provide information to allow national reporting and facilitate the matching of waste generators and processes with potential opportunities for use of waste streams, the AWD provided three primary benefits identified by Professor Stewart Burn, Stream Leader, CSIRO: The database has benefits for policymakers in that it provides the information needed to make valid policy decisions. It provides information to local manufacturers in that they can identify synergistic relationships for waste reutilisation - where you have a waste generator, it can be reutilised in a local area - and it also provides major benefits to the community in that landfill and other waste disposal processes should be minimised.
Senate Inquiry	National waste policy should be informed and underpinned by national waste data derived from a national waste data system. Such a system, which could draw on the AWD model and lessons emanating from it, could provide not only standardisation in terms of definitions and classifications but also include methodologies to calculate volumes of waste generation. In addition, such a database could be used as an eco-efficiency tool. Professor Stewart Burn, Stream Leader CSIRO noted of the AWD in this regard: The Australian Waste Database is a project that is on hold at the moment. It was originally designed to provide information to allow national reporting and to provide information to allow eco-industrial applications, which means linking up waste suppliers and waste users at a postcode level.
Issue # 2 – Inconsistent Waste Classifications and Terminology	
AWD Workshop	Some of the issues raised were: ▪ The need for guidance on waste categorisation for the development of landfill license conditions; ▪ Standard methodologies for generating data; ▪ Data should have the purpose of allowing jurisdictions to target particular problems;
WMAA	The lack of a common language used in the WM&RR industry also decreases the usefulness of shared information. It is difficult to formulate and

Source	Issues and Concerns
p 14	evaluate outcomes of projects, policy, and law and business transactions across jurisdictions, regardless of their size, similarity, and/or proximity, without a common language.
WMAA P15	Councils and facilities are often asked to provide similar data to different organisations or agencies in different formats. The people who are responsible for providing the data are ill-informed as to the purpose of the data, how it fits in to any big picture, or why the data they provided to one requestor can't be used by the other. In addition, there is little, if any, transparency as to what data will be required until it is actually asked for.
Productivity Commission p36	Finding 2.1 - Australian waste data are collected from a range of sources. Differences in definitions and collection methodologies between data sets, and inherent difficulties in collecting data on waste, mean that the data have substantial gaps and biases.
Productivity Commission p42	Finding 2.2 - Comparisons between Australia's waste management outcomes — in terms of waste generation, recycling and disposal — and those of other countries should be made with caution. Differences in the way waste is classified, data are collected, and the economic, environmental and social circumstances of different countries, limit the usefulness of international comparisons.
	There were examples and anecdotes at many sessions of the problems experienced because of differing guidelines, definitions and standards across Australia. This also extended to differing data collection and accounting. There was general agreement that a harmonised approach would deliver cost savings, assist better decision making and facilitate on-ground infrastructure, systems and improvements. Issues raised included: ▪ Inconsistent data across jurisdictions makes comparison and analysis difficult ▪ Conflicting and uncoordinated definitions of wastes and activities exist across jurisdictions that mitigates against using waste as a resource, sets up differential requirements for hazardous waste and increases the risk of non-compliance. ▪ Harmonisation and coordination would reduce costs ▪ Harmonisation and coordination would remove some obstructions to increased investment and recycling

Source	Issues and Concerns
	Resource recovery Discussions around the practical issues associated with increased resource recovery raised a wide range of examples highlighting that while some materials may be targeted for resource recovery, actually achieving that outcome can be difficult. Over-arching matters that were raised include: ▪ Inconsistent data makes assessment of national performance and comparisons between jurisdictions difficult ▪ Differing standards and classifications for recovery of materials and use of recovered materials impede growth of markets and infrastructure ▪ Rural and regional areas face higher costs, need tailored collection models ▪ Local Government paying for resource recovery without commensurate contributions from industry / producers
Transpacific Industries Submission to the National Waste Policy	Across all states and territories the definitions and terminology in relation to waste are widely inconsistent; what one state defines as a waste type may be completely different in another state or territory. This applies to hazardous, contaminated (regulated), inert, construction and demolition and putrescibles waste. Similarly inconsistent are the policies, regulations and legislation. This relates to individual waste codes, classification of landfill and rules of landfill disposal, the requirements and daily practice of paperwork handling of waste across the jurisdiction boundaries. In particular, the following are the common barriers to most cost effective and environmentally beneficial waste management practices: ▪ Inconsistent waste classifications between state ▪ Incomplete waste coding between States ▪ State specific requirements for waste tracking ▪ Non-uniform requirements for consignment authorisation applications (allowing movements of waste across State boundaries (between States and Territories). ▪ Poor management and administration of consignment authorisation applications by State authorities ▪ Increased business and environmental risks arising from the inconsistency and incompatibility between States consignment authorisations.
Issue #3 – Problematic data collection	

Source	Issues and Concerns
WMAA p 14	Waste can be directed to a diverse range of destinations for either disposal or redirection back into the economy. Only a subset of disposal facilities is currently required by law to report quantities and basic compositional data. Reliance on voluntarily provided data makes it difficult to determine absolute trends as opposed to differential participation rates over time.
WMAA p14	It is currently not feasible to obtain accurate, granular compositional data on loads of waste coming into a facility. Using periodic audit data to extrapolate compositional information from high level volumes over longer periods of time is not always representative or accurate.
WMAA p14	Despite the approaching deadline for reporting carbon emissions from waste, many facilities, particularly smaller, rural facilities that are not manned, have no way of determining the volume/weight or even high level composition of waste being received at the facility.
WMAA p14	Whilst Australia is a large land mass, its population, and hence infrastructure, is small and unevenly distributed across the country. The infrastructure, policies and reporting obligations that may be suitable for mid-high density areas is often impractical for the numerous small, isolated councils and facilities.
WMAA p14	The standard waste nomenclature that was devised by the CRCWMPC and various state EPA representatives isn't practical for a diverse range of waste/resource recovery audits. Nor is it compatible with the newly created categories for the Carbon Pollution Reduction Scheme (CPRS) reporting. Its granularity needs to be useful for actual waste classification tasks as well as for informing decisions about policy, infrastructure and programs. Insofar as the current categories have proved inadequate, they have been amended to cater for the objectives of individual projects. As such, results from projects are not comparable or able to be aggregated, and are of little use beyond the scope of the project for which they were collected. Even using the same nomenclature can result in vastly different results depending on how the categories are interpreted and conversion factors are applied. There is no standard reference or guide to safety procedures and best practice audit or survey conduct from which councils and regions can base their procedures.
Productivity	These differences caution against drawing strong conclusions from comparisons between different regions or jurisdictions based on broad

Source	Issues and Concerns
Commission p4	measures of waste volumes or tonnages. Different institutional and regulatory frameworks can also mean that data are collected in different and inconsistent ways.
Productivity Commission p4	The adequacy of the current data is an important element of this inquiry. Good policy outcomes will depend on focusing on the key problems we face in waste generation and disposal, and then being able to measure how substantial they are. Relevant and comparable data are essential for this purpose.
Productivity commission, p15	Though it has improved in recent years, the quality of Australian waste management data has traditionally been quite poor. Each state and territory collects and reports data differently and there are gaps in the coverage of regions, waste streams and materials. Despite these data limitations, it is reasonable to conclude that: ▪ Total waste generation per person in Australia has been increasing over time. ▪ In recent years, recycling rates have increased at a faster rate than disposal to landfill. Despite this growth, more solid waste is disposed to landfill (54 per cent) than is recycled (46 per cent). However, this varies markedly between materials. ▪ The export of recyclable material has increased in recent years, mostly driven by increased demand from Asia. ▪ Caution must be used when comparing Australian waste generation, landfill and recycling rates with those of other countries. There are significant problems with the quality of some data, and the data are not always comparable between countries. Measured differences between Australian municipal waste generation per person and those of other countries may be due to: ▪ differences in the ways that member countries have classified municipal waste in their responses to OECD surveys; ▪ differences in the composition of waste — the generally larger housing allotments in Australian towns and cities may mean that more green waste is generated in Australia than many European countries; and ▪ Socioeconomic differences including differences in per person income levels, population densities and available waste management technologies in the home (such as in-sink garbage disposals).
Productivity Commission	Australian waste data are collected and reported by a variety of organisations including: landfill operators, material reprocessors (recyclers), local governments, environment protection agencies (EPAs) and their affiliates, and industry associations. Each has its own data collection and

Source	Issues and Concerns
p15	reporting requirements, and may use different waste classifications, and different regional and industry coverage.
Productivity Commission, p16	Some state and territory environmental protection and/or waste management authorities draw upon these data to report on the quantity and composition of material recycled, and/or waste generated and disposed to landfill (DEC 2004e; EcoRecycle Victoria 2005d; EPA Queensland 2006b). While the quality and coverage of data have improved over time, there are still some gaps and inconsistencies, including: ▪ Differences between jurisdictions in the classification of waste, the definition of recycling and data collection methods; ▪ Low (though improving) response rates from reprocessor surveys; and ▪ Difficulties in collecting data on waste generation, disposal and recycling in rural and regional areas.
Productivity Commission, p20	The large percentage of uncategorised (other) waste reported for the C&I sector is the result of significant gaps in the data. C&I waste data are particularly difficult to accurately collect and report due to: ▪ Differences in the way that waste data are disaggregated between jurisdictions; ▪ The inability of data collection exercises (including audits) to categorise all of the waste in each stream; and ▪ Commercial sensitivity issues.
Productivity Commission, p20	International evidence suggests that economic growth contributes to growth in waste generation per person (Christiansen and Fischer 1999; de Tilly 2004; OECD 2001b). Australia's economic prosperity over the past 10 to 15 years has undoubtedly contributed to the growing generation of waste. However, the exact size and nature of this relationship in Australia is uncertain due to the lack of adequate time-series data on waste generation.
Productivity Commission, p22	Problems with Australian recycling data - There are many reasons why caution should be used when interpreting Australian recycling data. Some recycling data report the amount of material collected for recycling, while others report the amount that was actually reprocessed. If a jurisdiction or country reports the amounts collected for recycling rather than the amount actually reprocessed, effective recycling activity will be overstated. Data for New South Wales, Victoria, Western Australia, South Australia and the ACT appear to report amounts reprocessed, while Queensland data report amounts collected (although this is likely to change in forthcoming surveys). Some of the material collected may be stockpiled for use in future years and some may be disposed to landfill due to contamination. Using state and territory data to create national recycling estimates may result in some overlaps in reprocessing data between jurisdictions. Most jurisdictions' data sets report the materials

Source	Issues and Concerns
	exported/imported in each period, and unless these amounts are explicitly taken into account to avoid double counting (and it is likely that they have not), recycling estimates may be slightly over reported. Many jurisdictions' reprocessor surveys also suffer from low response rates, which may underreport recycling activity in Australia. For example, Queensland recycling surveys had a 54 per cent response rate in 2002-03, and in New South Wales the response rate was 63 per cent (though responding businesses made up 90 per cent of the industry).
Productivity Commission, p28	Some industry bodies collect their own data on the recovery of their products. For example, the Plastics and Chemicals Industries Association collects data on plastics consumption and recycling (box 2.3), and the Newsprint Producer and Publisher Group reports on the percentage of newsprint that is recycled.
Productivity Commission, p 26	An alternative destination for waste is thermal treatment (including incineration, pyrolysis and gasification) either with or without energy recovery. There are limited data available on the use of thermal treatment in Australia. Anecdotal evidence suggests that (excluding on-site facilities) little energy recovery is undertaken in Australia, other than in cement kilns, where some waste, such as oil and tyres, are used as supplementary fuels.
Productivity commission, p31	Problems with Australian landfill data - There are a number of difficulties in the collection and reporting of landfill data, and in using these data to identify trends over time. It is often difficult to determine the source and composition of waste due to the way that waste is generated and disposed. Waste is transported to landfills using a variety of methods and from a diverse range of sources. Landfill operators are not in the position to determine, except in a broad sense, where waste comes from, nor the composition of the waste streams. Many jurisdictions have used targeted landfill audits to get an indication of the source and composition of waste disposed to landfills. Targeted landfill audits involve surveying the people who deliver waste to the landfills about the source and composition of their waste delivery, and then visually inspecting this waste after it has been unloaded. However, audits are not without their problems. Their results may be affected by the characteristics of the landfills targeted and the time(s) of year in which they are conducted. Also, differences in methodology may make the results difficult to compare between audits. Similarly, different waste classification systems are used in different jurisdictions. This makes it difficult to compare landfill data between jurisdictions (chapter 12). Traditionally, landfill data for regional and rural areas have either not been available, or where they are available, their accuracy has been in question. However, this situation appears to have improved in recent years. Increasing scale has made more non-metropolitan landfills subject to licensing and data collection requirements, and increased the use of weighbridges, which improve the accuracy of data.

Source	Issues and Concerns
Productivity Commission, p34	Although little data are available on illegal disposal, there is sufficient evidence to suggest that it is a significant problem. The costs imposed on local governments from the cleanup of litter and illegal dump sites (chapter 4), and the enforcement of littering and illegal dumping laws (chapter 8) can be considerable. Some data are available from studies conducted on the nature and causes of littering behaviour, and the prevalence of litter in the community.
Productivity Commission, p34	Illegal dumping Incidences of illegal dumping are only officially recorded when the appropriate authorities receive complaints from the public, it is investigated, and the appropriate remedies are sought. For example, the Western Sydney Regional Illegal Dumping Squad (covering the Baulkham Hills, Bankstown, Fairfield, Hawkesbury, Holroyd and Penrith councils) heard 779 complaints, and conducted 782 investigations in 2002-03 (DEC 2004e). There were 236 penalty infringement notices and 50 clean-up notices issued in that year to the values of $152 492, and $16 000 respectively. Data on investigations and infringement notices are not necessarily reliable indicators of the incidence of illegal dumping. The number of investigations and infringement notices reported in any given year will be correlated with the strength of illegal dumping regulations, and the resources dedicated to their enforcement.
Productivity Commission, p34	Litter - Data on the incidence of litter, its composition, and littering behavioural trends are collected by several industry groups and non-government organisations. A recent national study for Keep Australia Beautiful by McGregor Tan Research (2006b) found the most significant items in the Australian litter stream (by number) were: cigarette butts (49 per cent), plastics (21 per cent) and paper products (17 per cent) (figure 2.9). In contrast, volumetric estimates (in cubic metres) suggest that paper and plastic products are the most significant litter items, and cigarette butts the least significant. The study also found that litter is most likely to be found alongside highways, at car parks and at industrial sites. These results are broadly consistent with a similar study conducted six months previously (McGregor Tan Research 2006a).
Qualitative Analysis of submissions	Of particular concern to a number of submitters is government policy resulting in target-setting for increased landfill diversion and recycling rates. Industry, councils and industry groups in particular regularly present the view that current data collection practices are insufficient to support policy directions of this nature both on a local and national scale and are similarly insufficient to measure their efficiency. Although it is generally accepted that waste to landfill is a lost resource opportunity, it appears that submitters are not convinced that the current directions taken to avoid this are supported by evidence. A frequent opinion is presented which suggests arbitrary target-setting just shifts the problem from a state to a local level with little guidance given to assisting implementation.

Source	Issues and Concerns
Qualitative Analysis of submissions	Many submissions present the view that a nationally consistent approach to data collection is necessary for these reasons. The reasons for collection of specific data need to be clearly defined and linked to key performance indicators such that data collected will be useable by all levels of government, providing a basis for policy decisions and a way of measuring the success of these decisions. Further, it is considered that without information of this nature, it is unrealistic to base or compare waste management practices in Australia with those overseas.
Qualitative Analysis of submissions	It is also noted that although a national approach is required to ensure consistent data collection, it can be difficult to obtain this information at a local/regional level. However, the differences at this level would be of key importance as it is widely accepted that a "one-size fits all" approach to waste management will not provide the best outcomes for individual regions, particularly where rural areas are concerned. Differences between regions are largely viewed as being a result of disparity in costs and availability of certain treatment techniques. For example, insistence on mandatory recycling targets for outer suburban and rural areas which may lack nearby facilities, could well result in unreasonably high costs in these areas, due to increased transport distances, for marginal benefit.
ABS submission to the Senate Inquiry (2008)	Quantifying waste data, and trends in waste production, requires compiling information from throughout the economy, from the originating sources of the waste, to the organisations and government agencies that manage the waste once it leaves the point of production, and potentially to the end users of the waste or associated by-products. The flow of waste involves individuals, industry, not-for-profit organisations and all levels of government. Currently waste data sources are many and varied, as is the quality and frequency of availability of the data. The 2006 Productivity Commission Report stated that "Each state and territory collects and reports data differently and there are gaps in the coverage of regions, waste streams and materials".
Issue #4 – Limited understanding of waste's life cycle impacts	
Senate Inquiry	Improving waste data 4.31 Understanding and quantifying the impact of waste streams and their economic, social and environmental costs is central to effective national waste policy development. In this regard the Department of the Environment, Water, Heritage and the Arts (Environment Department) submitted: ...it is important that governments have access to sufficient data to support policy making for emerging government priorities, including the contribution that wastes and recycling make to national greenhouse accounts. However, there is currently a lack of national data on many waste issues that would otherwise underpin the sustainable management of Australia's waste streams.

Source	Issues and Concerns
	The Environment Department noted: Understanding the extent of the problem, or determining whether there is, in fact, a problem with particular waste streams in Australia requires good information. However, while there is some good sectoral information and some jurisdictions have better information than others, at a national level Australia lacks reliable, comprehensive, contemporary waste information. The department noted the consequences of inadequate data: In the absence of a full understanding of life cycle impacts, strategies may be selected which may move us away from more sustainable outcomes.
Qualitative Analysis of submissions	Predominantly, submitters would be happy to see increased landfill gate prices if these increases were supported by quality data showing that the increased costs internalised all externalities relating to landfill disposal and passed these costs onto users. There is widespread opinion that resource recovery is largely impeded by the cost disparity between landfill and resource recovery although there is a lack of data to prove if this cost difference is real or essentially based on sentiment. It is expected that 'real' pricing of landfill would help rectify the failure of the market to allow reuse and recycling businesses to compete with this disposal method. More importantly, it is widely expected that it will at least provide sound evidence on which to base waste management decisions. Support exists for increasing costs on the basis of quality data to provide an appropriate transparent price signal to users.
Qualitative Analysis of submissions	Creating a market in this manner would remove significant impediments to the expansion of sectors of the resource recovery industry, being high start-up costs and limited demand for products resulting in uncertain economic feasibility. A number of submitters also believe it is important for the government to provide funding, for instance using revenue obtained from the landfill levy, for resource recovery operations. However, it can be extrapolated from other submitters that this in and of itself would be inappropriate without considering whether the benefits of doing this outweigh the costs. This again highlights the need for adequate data collection and subsequent full cost-benefit analysis to assist sensible and defensible decision-making.
Qualitative Analysis of submissions	Adequate and appropriate data would additionally allow for more precise analysis of costs and benefits relating to different waste management measures. It is considered that there is significant support for the incorporation of all economic, social and environmental costs and benefits in the analysis of waste issues. This would allow for meaningful comparisons to be made between different waste management options and lead to sound and defensible decision-making taking into account all relevant factors. The qualitative analysis of submissions from both inquiries indicates that policies based on transparent analysis of this nature would be supported by the majority of submitters and by extension, the wider

Source	Issues and Concerns
	community they represent.
	The basis for most of the environmental collections within the ABS revolve around developing an approach that allows data to be collected or compiled for both immediate needs, such as policy requirements, as well as for longer term and possible future needs, such as long term analysis and associated impacts. Consequently, the survey standards and methodologies employed need to be statistically sound and repeatable, especially if the survey results are to be used to assess and monitor change. A major element of this involves using the methodologies and frameworks described within the System of Environmental and Economic Accounting (SEEA), 2003 (2). Put simply, SEEA is a framework that describes how a set of accounts (typically physical rather than financial) can be compiled that will allow analysis of the interactions within and between the economy and the environment. SEEA describes all solid, liquid and gaseous wastes as 'residuals'. Residuals are defined as the incidental and undesirable outputs from production and consumption processes within the economy. Consequently, within SEEA, the residuals can be measured by looking at their flow, ie. the flow of residuals from the source, such as the manufacturing process to their ultimate sink: land, air or water. Thus, to measure waste, it is possible to develop a set of physical supply and use tables. For residuals (or waste), the physical supply tables would look at the substances by origin, and the use tables would look at the destination of the waste flows. While SEEA is presented as a methodology for integrating environmental accounts, the ability to apply it to any country is dependant on having good data. Since most of the interactions between the environment and the economy have a physical basis, the underlying need is for a good set of physical accounts. Once the physical data have been compiled, the next stage would be to complement the physical accounts with economic data, thus adding an economic context to the physical measures. Waste is a part of the SEEA framework and understanding the waste, environment and economy interactions requires a solid understanding of the waste flows. Understanding and measuring waste flows is a large and ongoing task. Waste, by its very nature, is an undesirable by-product of production, and as production increases so does the amount of waste. While the overall production process is usually well measured and recorded, the indirect outcomes, such as waste, are typically poorly reported, thus making data collection difficult.
Issue #5 - Problems with comparing and reporting Australian waste data at an international level	
Productivity Commission	International evidence suggests that economic growth contributes to growth in waste generation per person (Christiansen and Fischer 1999; de Tilly 2004; OECD 2001b). Australia's economic prosperity over the past 10 to 15 years has undoubtedly contributed to the growing generation of

Source	Issues and Concerns
, p20	waste. However, the exact size and nature of this relationship in Australia is uncertain due to the lack of adequate time-series data on waste generation.
Productivity commission, p36	Waste generation in Australia and other countries- Many commentators and inquiry participants have argued that Australians generate large amounts of waste by international standards. The terms of reference for this inquiry include the statement that 'Australians generate solid waste at a high rate compared with most other OECD countries'. OECD data report that 690 kilograms of municipal waste per person was generated in Australia in 2003 (OECD 2005b). This places Australia fifth in the OECD rankings of municipal waste generation (out of all 30 countries in the OECD), exceeded only by Ireland, the United States, Iceland and Norway (figure 2.10). Part of the reason for Australia's high apparent rate of waste generation can be explained by the OECD secretariat's practice of generating its own estimates of Australia's total municipal waste generation since the late 1990s (OECD 2005b). The OECD's estimate of municipal waste generation was 13.8 million tonnes in 2003. This is significantly higher than estimates made by Hyder Consulting (DEH, sub. 103, att. A) (8.9 million tonnes estimated for 2002-03) and WCS Market Intelligence (2001) (8.4 million tonnes estimated for 2001). The reasons for these differences may include the OECD's broader definition of municipal waste, the extrapolation by the OECD of data from earlier years, and the inclusion of (a potentially significant amount of) C&I waste in estimates for Australian municipal waste generation (OECD 2005b).
Productivity Commission , p 37-38	Waste generation data are not strictly comparable between countries Collection, classification and reporting issues make waste data difficult to compare between countries. Waste source and type classifications used in each country's data collections are often inconsistent and do not necessarily match those used by the OECD. This is especially true in the case of municipal waste data. The OECD (2005b, p. 68) defined municipal waste as: … Waste collected and treated by or on the order of municipalities. It includes waste originating from households, commercial activities, and office buildings, institutions such as schools and government buildings, and small businesses that dispose of waste at the same facilities used for municipally-collected waste …. Household waste … includes garbage, bulky waste, and separately-collected waste. However, some countries' municipal waste data varies significantly from this definition. For example, New Zealand municipal waste generation figures only include 'household waste land filled … and packaging waste recycled' (OECD 2005b, p. 68). Municipal waste generation estimates for different countries may be under- or over-reported depending upon how local data definitions compare to those of the OECD and the availability

Source	Issues and Concerns
	of data. These, and other, data collection and comparability issues have been identified by the OECD and the European Commission in its publications. According to the OECD (2005c, p. 8): … in many countries, systematic collection of environmental data has a short history; sources are typically spread across a range of agencies and levels of government, and information is often collected for other purposes. Furthermore, a recent review of the European Commission's Packaging and Packaging Waste directive found that member states had not harmonised their data collection methodologies (Perchards 2004). This meant that data were not necessarily comparable between members. These weaknesses make it difficult to make definitive comparisons of waste generation and management data between countries, and as such these data should be used with caution.
Productivity Commission, p 38	The OECD's estimate of Australia's municipal waste generation per person may also reflect the greater significance of food and garden waste in the Australian municipal waste stream. The proportion of food and garden waste in Australia's municipal waste stream was 50 per cent in 2002, compared to, for example, 24 per cent for both Ireland and the United States (figure 2.11). Data from New South Wales, Victoria and South Australia suggest that garden waste made up half of food and garden waste in 2002-03 (DEH, sub. 103, att. A). There are many other reasons why the weight and composition of waste generated in each country may differ. These include: ▪ Differences in per person income levels and consumption; ▪ Differences in population density and the size of household yards; ▪ The adoption of alternative waste disposal systems, such as household composting and in-sink garbage disposal units; and ▪ The prevalence of public parks, sporting grounds and other open spaces.
Productivity Commission 40-41	The Australian recycling rate compares favourably with that of other countries The Australian recycling rate (35 per cent) is above the OECD average for 2003 (27 per cent) (OECD 2005b).3 However, it is much lower than the countries with the highest recycling rates, Austria and Belgium (61 and 60 per cent respectively) and another seven countries including the Netherlands and Germany (both 56 per cent). However, comparisons need to be made with caution. It appears that many EU countries only report the total amount of waste collected for recycling, rather than the amount that was actually reprocessed (Eurostat 2005). Thus, in some of these countries, recycling estimates may be overstated. This is consistent with claims by the PCA (sub. 67, p. 30) that there 'may be a difference of 30 per cent between what is collected and what is recovered' in many European countries.

Source	Issues and Concerns
	There are also problems with the way waste treatment methods are classified in other countries. Japan and some European countries use thermal treatment to deal with a high proportion of their waste. This type of treatment will typically have energy recovery, and therefore it may be classified as recycling rather than disposal (OECD 2005c). It is not clear that the distinction between incineration and recycling is consistently made in waste data published by the OECD. The rate of recycling in different countries may be driven by a number of different factors including: community support for recycling and/or aversion to landfills, waste policies and the availability of land on which to locate landfills (OECD 2002). OECD data suggest that decreasing landfill-disposal rates, and increasing recycling rates, are trends occurring in many countries (de Tilly 2004).
Productivity Commission p41-42	Waste disposal in Australia and other countries Many inquiry participants argued that Australia's rate of disposal to landfill is too high when compared to other countries, and that it should be reduced. According to OECD estimates, approximately 65 per cent of Australia's waste was sent to landfill in 2003 (figure 2.12). This is not very different from the average across OECD countries (53 per cent) 5, and significantly below rates in countries such as Mexico, Turkey and Poland (all 97 per cent), and New Zealand (85 per cent). This estimate is broadly consistent with those from other data sources. Hyder Consulting (DEH, sub. 103, att. A) Estimated that the rate of disposal to landfill in Australia was 70 percent in 2002-03, and WCS Market Intelligence (2001) estimated it was 77 per cent in 2001. Caution should be used when comparing landfill-disposal rates between countries. In addition to potential problems with the data's accuracy and consistency (discussed earlier), a range of economic, environmental and social factors also need to be considered. These include the financial and regulatory incentives for waste treatment methods other than the disposal of waste to landfill, the availability of suitable land, and the availability and cost of other waste-management technologies.
	Both the UN and the OECD support and promote material flow accounting. Country level Material Flow Accounts (MFAccs) are often used as indicators of environmental pressure and in the assessment of resource productivity. While the ABS can appreciate international agency approval of, and support for, such high level indicators, Australian data analysts and the ABS are generally not strong supporters of highly aggregated economy-wide MFAccs being used as environmental impact indicators. Unfortunately, the material flow approach often over simplifies the situation and the real impact on the environment. This occurs for a number of reasons, and is principally due to the need to use a common unit of measurement. For example, adding a tonne of nuclear waste to a tonne of lawn clippings, to get two tonnes of waste is not sensible. The dramatically different impacts these two wastes have on the environment means that the costs of managing these two wastes are also very different. For example, nuclear waste would not be dumped in backyards, nor would a

Source	Issues and Concerns
	waste dump be specifically built for lawn clippings. Lower level substance or sector specific MFAccs are far more valuable tools in helping to understand impacts and direct policy. The ABS believes that to maximise the understanding of the flow and impacts of waste, both in the economy and environment, any future waste data analysis needs to be disaggregated so that the individual waste streams or waste types can be measured, monitored and analysed. Whilst the ABS is not a supporter of highly aggregated economy-wide MFAccs, there would be value in understanding the flow of certain materials throughout the economy. Understanding the flow of specific materials would assist those undertaking resource efficiency and product lifecycle analyses. The ABS trade data would be a starting point for trying to develop flows of specific materials i.e. what is coming into the country. However, once the goods are in the country no attempt is made to monitor their final consumptive destination.
Issue #5 - Problems with the alignment of National Waste Data Reporting against other federal reporting requirements	
A National Waste Policy: managing waste to 2020 consultation paper summary of selected submissions	The new waste composition data, which will underpin calculations of landfall emission under the CPRS, is inconsistent with the waste composition data used by most states (and is also inconsistent with the waste data in the Consultation Paper).
Alliance for a Clean	It also appears that the NPI system is not capturing such basic data as atmospheric dioxin emissions from incinerators and the transfer of dioxin contaminated ash.

Source	Issues and Concerns
Environment submission	
Issue # 6 –What fundamental data sets does Australia need to collect to better inform waste management policies, practices, investment, business operations and to assess and manage risk?	
ACOR and Boomerang Alliance Joint Response to the NWP Consultation Paper	▪ An ASIC code for recycling and reprocessing companies; ▪ An accurate database tracking disposal of waste by material and source; ▪ Detailed tracking of priority wastes including volumes of material imported (controlled by customs); ▪ Standard data sets for each priority waste to assess the environmental impacts in the waste stream and environmental and economic benefits of recovery; ▪ Detailed information about which materials contaminate the waste stream and the cost to deal with this in recycling (e.g. glass contaminates paper in kerbside recycling, while source separated collection and technology can address this contamination it comes at a cost, which based on the polluter pays principle, should be borne by glass producers. Similarly the cost to disassemble computers and cars should be borne by the manufacturer not the recycler. Australia does not yet have sufficient data quality to support informed business decisions across all resource recovery sectors. Accurate information is needed to support an informed decision process for the future of the industry, for example, in setting priority areas for Extended Producer Responsibility and Product Stewardship schemes, identifying infrastructure investment opportunities and measuring progress made in resource efficiency. We also need to measure our levels of waste generation and disposal against other countries so that best practice performance can be identified and achieved (while noting that international strategies may not be directly applicable in the Australian context). States and territories should report on the basis of a common methodology for data collection, which should include: ▪ Volumes and types of waste disposed of to landfill or other disposal technologies (including the removal of 'Other' as a reporting category) ▪ Volumes and types of resource recovery ▪ Data reported in tonnes, as opposed to percentages, as increasing recovery percentages can hide increasing disposal volumes if combined

Source	Issues and Concerns
	with increases in the rates of waste generation ▪ Disaggregation of 'mixed' material recovery, for example identification of the composition of mixed bales of plastics being exported for 'recycling'. The volumes of materials recovered and disposed of are only part of the resource efficiency equation. As improvements are made in developing resource efficiency metrics, so too should data collection improve to keep track. Additional information required includes: ▪ volumes of virgin and recycled materials used in manufacture ▪ measurements of recycled content and embodied energy (similar to the energy and water ratings) for given product and also at a state/territory and national level ▪ time series comparison
Alliance for a Clean Environment submission	Data on landfill leachate is also a dataset that required development. As a minimum, all landfill leachate should be measured and recorded into a database, so as to indentify waste and chemical residues that have the potential to impact health and the environment. This database needs to inform assessment processes at the upstream end where the original approvals and risk assessments are undertaken and so as to inform these processes of emerging issues such as the identification of chemical residues that have not adequately accounted for their environmental fate. For example, the high levels of residues of pesticides and industrial contaminants that have been recently documented in WA's Swan River Trust investigation into river quality and nutrient/pollution levels. Again the levels of waste residues/pesticides/chemical residues being identified in Australian human breast milk and blood is serious cause for concern and urgently requires action so as to reduce these residues entering the environment and ultimately our bodies particularly our most vulnerable, our kids and their future.
City of Marion submission to the NWP	The methodologies for collecting data, particularly waste audits, are currently different from state to state and even from one auditor to another. Adopting a national methodology for waste audits and other forms of data collection would enable information to be shared and compared with some degree of accuracy which in turn would enable more strategic planning to occur for national policies and strategies.
	NGERs and IPCC methodologies used to estimate landfill gas generation are established on accepted first order decay (FOD) methodology. While the principles of FOD methods are based on sound science, their limitation is the data input into them. Data requirements for these models include: waste composition; degradable carbon content, methane correction factor and decay constants (half life). All input components have

Source	Issues and Concerns
	significant impact on the final calculation and required more rigorous assessment. LMS's own data suggests variation between captured and NGER modelled generation is between 50% and 200% in 2008. Waste composition is essential data to establish all aspects of any forthcoming waste strategy. While methodologies to estimate it are well established through waste audits, such audits are not widely applied across jurisdictions, and require ongoing update to reflect changing circumstances. More accurate degradable carbon and decay constants can be established in the laboratory, but must be established with extreme rigour and take into account variations in climate and landfill management. In the longer term there must be a preference toward actual measured results.
Australian Industry Group NWP submission	Conversion factors. The factors used to convert between volume and weight for waste are not only fairly arbitrary, but also differ completely from state to state. As a result, businesses that operate in more than one state, or who are owned by national companies, are less able to keep track of their waste, negotiate effectively with waste managers or produce reliable and comparable data.
Logan City Council Submission	A uniform formula for conversion of waste volumes to tonnes should NOT be encouraged and incentives provided instead to encourage all waste facilities to use some form of weighbridges. It is noted that weighbridge systems/load cells are now relatively inexpensive and there are also relatively affordable mobile units that are now commonly available in the market.

Appendix C – National Waste Policy Framework & NWDS Requirements Summary

Seven high level themes have been identified, together with a number of key directions for change. It is intended that the directions will be used to guide development of specific strategies and actions.

To effectively support these strategies and actions, the NWDS needs to provide for the data management requirements to support each theme. The following table contains the background information on each theme, the suggested directions for change as well as the NWDS considerations with respect to the theme.

Themes and directions	NWDS Considerations	
1 Taking Responsibility Product stewardship/extended producer responsibility and lifecycle and supply chain management and initiatives to drive environmental and economic benefits		
Background Product stewardship/extended producer responsibility and lifecycle and supply chain management and initiatives to drive environmental and economic benefits Today's municipal and commercial waste streams include increasing volumes of complex high value manufactured products, materials and packaging. These wastes can contain high value materials or other	**Directions for change** Facilitate business and the community to take responsibility for end-of-life management of materials, products and packaging through a national product stewardship/extended producer responsibility framework. This framework would: ▪ cover an initial set of nominated sectors, materials or products with capacity to extend	Will the NWDS be required to: ▪ Administer the advance charge ▪ Manage the compliance requirements ▪ Administer or align with the product stewardship/extended producer responsibility framework ▪ Allow for set up of opt-in products/sectors ▪ Provide public reporting

Themes and directions	NWDS Considerations	
resources that can be re-used, and heavy metals and other hazardous material. They can also be made of substances that do not readily decompose or degrade into inert compounds. The trend, both internationally and in Australia, is for these goods and materials to be subject to recycling and re-use schemes organised on a voluntary, co-regulatory or mandatory basis. Such schemes may either be based on a product stewardship approach with all parties participating or on the concept of extended producer responsibility where the producer/supplier takes responsibility for the product at end-of-life. Manufacturers and suppliers are increasingly initiating product stewardship style schemes, and community expectation that recovery arrangements are in place and consumers willingness to pay are also increasing. The approach to date within Australia has been to take a tailored approach to considering individual products, materials, or type of packaging. Often a variety of schemes have been adopted by different states and territories and at the local government level. The absence of a comprehensive, national approach has created market difficulties and does not address concerns that those players who do not participate in the scheme will enjoy lower operating costs and	when agreed criteria are met ▪ provide underpinning national legislation that will address the free rider issue ▪ enable the application of an advance charge to cover recycling and disposal ▪ allow businesses/sectors to implement recovery schemes best suited to their needs ▪ allow businesses to manage compliance ▪ allow business and governments to identify products or sectors to be nominated or request opt-in for existing schemes. ▪ include public reporting and an independent review ▪ provide transitionary measures for industry, business and the community, if necessary. The application of an advanced charge would provide a supply chain signal that would encourage product re-engineering to avoid waste, waste reduction, the use of less hazardous substances and design for re-use.	Audit Trail – What level of audit trail is required for the independent review process? Users – Producers, Industry Associations, Governments Confidentiality – Will producers have option of flagging confidential data or will all competitors be unable to access each other's data? Data entry – Will producers enter data or will it be administered by DEWHA? Interdependencies – What synergies exist with other programs like the Product Stewardship/Extended Producer Responsibility framework and the NPC? (eg. can NPC use NWDS outputs or vice versa)

Themes and directions	NWDS Considerations	
receive a competitive advantage (free riders). It has also led to policies which are unresponsive to business and community needs and placed additional regulatory and operational burdens on business. In addition jurisdictional schemes have emerged which do not necessarily align with the principles of the Mutual Recognition Act (Commonwealth) 1992. **Product Stewardship – (from points of clarification)** Introducing national stewardship arrangements for priority products, particularly for electronic waste such as computers and televisions as well as for end-of-life tyres, batteries, mercury containing lamps and whitegoods has been strongly supported through the public consultation process. In considering the development of a national product stewardship / extended producer responsibility framework, not every material and product available in the marketplace will be covered. The proposed framework would be sufficiently flexible to encompass a range of product stewardship approaches (voluntary, co-regulatory and regulatory) and cover an initial set of nominated sectors, materials or products with capacity to extend over time if agreed criteria are met. It would provide an accreditation mechanism to allow existing schemes to opt in. Existing work by the Environment Protection		

Themes and directions	NWDS Considerations	
and Heritage Council on the design elements of a national product stewardship approach for computers, televisions and end-of-life tyres will continue. The national product stewardship/extended producer responsibility framework will provide the underpinning competitive neutrality safety net and minimum performance governance arrangements for these schemes.		
2 Improving the market Addressing market and institutional impediments and inconsistencies in regulation and classification of waste, co-products and by-products to enable innovation, technology, infrastructure investment and business models for managing waste as a resource		
Background What constitutes a waste, hazardous waste, scheduled waste and prescribed waste varies across jurisdictions and is usually enshrined in legislation (primary Act or Regulation). The nature of the classification invokes a range of requirements for handling, transporting and disposing of waste. At a national level this increases complexity and cost and can have unintended consequences such as movement of materials to areas with lower requirements. Management of waste as a resource that can be used for other purposes requires a different and uniform classification system. If a waste is subsequently used for another purpose then it requires a classification	**Directions for change** The management of waste as a resource that can be used for other purposes requires a national classification system. Where a waste is subsequently used for another purpose then it requires a classification that reflects its role as a co-product or by-product to which typical manufacturing standards apply. Similarly facilities that re-use waste for energy as an input to other goods and services should be required to comply with typical standards for emission to the atmosphere rather than being classified as waste incinerators. Facilitating re-processing or re-use of waste	NWDS Definitions: ▪ that differentiate between waste, resource, co-product and by-product. NWDS Standards ▪ for by products (e.g. compost) ▪ waste throughput for waste to energy (WTE) facilities to minimise emissions to the atmosphere. ▪ For the acceptable storage and stockpiling of resources prior to use. NWDS Guidelines

Themes and directions	NWDS Considerations	
that reflects its role as a co-product or by-product to which typical manufacturing standards apply. Similarly, facilities that re-use waste for energy (e.g. tyres, wood, and paper) as an input to production of other goods and services should be required to comply with typical emission and environmental benchmarks rather than being classified as waste incinerators. Facilitating re-processing or re-use of waste materials requires that other existing impediments arising from their consideration as waste be addressed. This includes the need for consistent guidelines or standards for safe and acceptable storage/stockpiling of these resources prior to use. In the commercial and industrial and construction and demolition sectors (which produce more than 2.5 times more waste than the municipal sector), there is considerable scope for increased use of many of these waste materials providing assurances relating to quality and quantity of supply and quality of the end product can be met. The existing impediments arise from the lack of consolidation of these waste streams close to re-processing and re-use facilities where type and quality can be controlled. A mix of market and regulatory signals in these sectors could encourage commercially useful quantities of material for secondary markets.	materials will also require that other existing impediments arising from their consideration as waste be addressed. This includes the need for consistent guidelines or standards for safe and acceptable storage/stockpiling of these resources prior to use. For major urban centres and larger regional areas, development of integrated waste management, processing and resource re-use complexes (including landfill) could be facilitated by developing national performance guidelines. These complexes would need to have best practice requirements for infrastructure and technology, specifications, and guidelines and standards applying to construction, location, waste stream separation, processing, materials input and output, monitoring, methane capture and energy generation. Application of industrial waste management approaches, such as supply chain mapping that help match waste generators with facilities that could reprocess or re-use that waste, could also add value to the local economy in some areas. Development of agreed guidelines, standards and specifications (such as best practice for infrastructure components,	▪ for integrated waste management Who will users be? ▪ Stockpilers ▪ Reprocessors (buyers) ▪ Industry waste generators (suppliers) What will NWDS do? ▪ Manage inventory of waste resources? ▪ Administer market? ▪ Knowledgebase administration for advice on fit for purpose technologies and best practice guidance. ▪ ▪ Audit trail – Where will audit trail data be required? ▪ ▪ Confidentiality – Should any data be confidential? A market will need open and transparent data to work efficiently. ▪ ▪ Timeliness – How important is making data available in real time? Will it allow for more proactive decision-making by market

Themes and directions	NWDS Considerations	
Waste streams that provide opportunities for improved collection and re-use are organic waste (in particular food waste), tyres and packaging (glass, paper, wood and cardboard), concrete and wood. For example, materials such as glass, concrete and tyres can be effectively re-used in roads, with the potential to use the majority of this material locally. However, such use is precluded in the majority of jurisdictions due to the absence of engineering specifications for this use, government contract specifications preventing consideration of recycled materials and the lack of knowledge in the industry to take advantage of such opportunities. A set of national technical specifications, allowing for recycled material in contract provisions, and product testing information would facilitate this particular market. More generally there is a need for agreed specifications, best practice, guidelines, standards or regulation to reduce contamination of recovered resources and to provide assurance that end products are of a consistent, recognised standard to facilitate market certainty and development. A critical number of core, appropriately located, infrastructure also needs to be available to handle commercial waste and provide the capability for re-direction to other productive uses. The development of core	quality/contamination of waste stream inputs and quality of end products) can also facilitate better use of components of the waste stream (including co-products and by-products), and assist in enhancing markets for processed products. Understanding and making decisions on investment and accessing or creating business opportunities could be facilitated by the establishment of a clearing house capability. A clearing house or brokerage capability could provide, among other things, access to: baseline assessments on technologies (domestic and international); expert advice on fit-for-purpose technologies; contacts with successful operations; possible sources or uses for materials; best practice guidance; and specifications. This could greatly assist local governments, councils, re-processing and recycling businesses and down stream markets.	participants? Interdependencies – What synergies can be gained by leveraging existing marketplaces, auction houses etc.

Themes and directions	NWDS Considerations	
infrastructure and technology is being facilitated in some jurisdictions through incentives such as grants provided from waste levies. **Market Arrangements (From points of clarification)** Current market arrangements are focused on 'end-of-pipe' signals for waste disposal, typically a mix of waste levies applied by a state or territory, a landfill gate fee applied by the operator for commercial waste (weight or volume based) and rates paid by the community to the local council for disposal and recycling of domestic waste. In some areas landfill bans apply for specific products. End-of-pipe solutions can be an effective driver for resource recovery and contribute to waste minimisation. However, there are currently no clear market signals to influence creation or management of waste with respect to product design, the hazardous content of materials and components, efficacy of manufacturing processes, packaging, and transport or end-of-life disposal. An effective National Waste Policy will need to encourage market signals along the supply chain and requires the creation and disposal of waste to be encompassed both in business decisions and in the purchasing decisions of consumers. Access to appropriate technologies, infrastructure and business services for all sectors for		

Themes and directions	NWDS Considerations	
the handling, re-processing, re-use of waste and disposal of residual elements to landfill is also critical.		
3 Pursuing sustainability Avoiding waste and using waste generated as a resource to achieve better environmental, social and economic outcomes		
Background A new direction for managing Australia's waste needs to be considered in the context of strategic government policies on sustainability, innovation and climate change. Avoiding the generation of waste and enhancing the recovery and recycling of Australia's waste streams can improve the efficient use of materials, save energy and water and make an important contribution to reduce greenhouse gas emissions. Better management and re-use of the organics in Australia's waste streams would offer significant opportunity to deliver sustainability and innovation benefits. Greenhouse emissions from the waste sector are dominated by methane emissions from landfill. Methane is produced from the large volumes of organic waste (including cardboard, paper, wood, green waste, sewerage sludge, as well as food waste and other putrescible waste and bio-solids). In 2006-07, approximately 10.5 million tonnes of organic waste per annum (or 50 per cent of total waste	**Directions for change** Better design of products, processes and services to avoid and minimise waste including the use of hazardous substances, consider whole of life impacts to promote energy, water and material efficiency and facilitate disassembly and recycling have the potential to deliver environmental, social and economic gains for Australia. The community and business need to have a better understanding of the links between waste and other environmental issues and the data and tools to facilitate action. An agreed effective national approach to organics to harness opportunities for business. This could include a transition to alternative uses for each major type of organic waste, in particular for non putrescibles. This approach could set out the conditions under which the different types are allowed to landfill; the need for facilities to handle the different types of	▪ NWDS should contain a tool that quantifies the environmental gains of reuse/recycling/recovery e.g. GHG emission, energy, water saved (DECC Benefits of Recycling Calculator) ▪ NWDS should contain guidelines and standards on the organic waste input (separation and contaminant levels include hazardous materials) and organic end products such as soil conditioners and compost ▪ NWDS should contain guidelines and standards for processable waste for waste to energy plants and methane to energy. ▪ ▪ Interdependencies – How do sustainability objectives support or be supported by Improving Marketplace theme ▪ ▪ ▪ ▪ Reporting – How can NWDS provide whole of life

Themes and directions	NWDS Considerations	
disposed) was landfilled. Based on available data, over 64 per cent of municipal waste, 78 per cent of commercial and industrial waste, and 11 per cent of construction and demolition waste to landfill is organic waste. In 2007 methane emissions from solid waste disposal in landfill were 11.1 million tonnes of carbon dioxide equivalent. Estimated emissions from solid waste disposal decreased by 3.8 Mt (25.5 per cent) during the period 1990–2007 reflecting changing patterns of disposal, particularly higher rates of recycling, and from an increase in methane recovery. Net emissions from solid waste are estimated to have increased by 0.2 Mt (2.0 per cent) in 2007 compared with 2006. There are a wide variety of approaches in place across jurisdictions to manage organic material. They range from bans on certain organics to landfill, to gate fees being applied on either a weight or volume basis at landfills in close proximity to each other, to licence requirements on operators to flare methane. The application of the Carbon Pollution Reduction Scheme to landfill is expected to drive further change in the management of organics. Improved management of organic waste can better capture both its embodied energy and nutrient values to provide broader benefits. The production of fertilizers,	organics for a range of re-use purposes; the provision of agreed best practice, guidelines and standards for both organic waste input (separation and contaminant levels including hazardous materials) and organic end products such as soil conditioners and compost; and for waste to energy plants and methane to energy. Such an approach would allow fit-for-purpose arrangements that can be tailored to the circumstances and the location. Supplementary approaches are needed to encourage recovery and re-use of organics within wastewater.	reporting to help identify material sustainability issues and therefore focus efforts? How will this cater for different environmental objectives across regions and jurisdictions? ▪ ▪ Audit trail – How much detail and verification will be required? ▪ ▪ Users – DEWHA and state authorities, Waste facilities

Themes and directions	NWDS Considerations	
mulch, soil conditioners and biochar can significantly increase the water carrying capacity of the soil, add nutrients and improve horticultural and agricultural productivity. The displacement of chemical fertilisers by recycled organics can reduce nutrient runoff to receiving waters—a key contributor to algal blooms. Industrial biotechnology applications can reduce nitrogen build up and enhance water security, save energy and defer the need for infrastructure investment. Other waste, in particular plastics, tyres and organics, can be used to produce energy as part of manufacturing processes and reduce greenhouse emissions.		
4 Facilitating investment Facilitating investment in jobs, innovation and infrastructure		
Background Government, through its own operations and delivery of services, can be a driver in creating markets for recovered resources and supporting product stewardship approaches that enable more effective establishment of collection, distribution and reprocessing infrastructure. Governments can influence markets through their procurement and contracting policies and licensing practices where they relate to use of waste materials, products and services. Governments are also major purchasers and users of goods and	**Directions for change** Government procurement and licensing policies and practices can ensure tender specifications explicitly invite proposals that include use of recovered and recycled products and services where these meet desired performance characteristics, and meet 'value for money' criteria. This approach combined with product stewardship approaches can assist in deepening the market for recovered materials and goods. By improving consumer confidence and	What will NWDS do to support this theme? ▪ Manage data and reporting requirements for materials flow modelling? ▪ Manage data and reporting requirements for processing and distribution activities. ▪ Will it allow the registration of future government projects that will require input materials that can be recovered from waste streams? ▪ **Users** – Government departments, Waste industry

Themes and directions	NWDS Considerations	
materials and should take a leadership role. Such leadership could have wide coverage. For example, this could range from the conditions applying to the purchase, use and disposal of computers used by government on the one hand, to providing for a small proportion (possibly around four per cent) of recycled materials (tyres, concrete or glass) to be used in road base through the development of technical specifications, education of decision makers and tender requirements. Waste avoidance, efficient use of materials and addressing intractable waste problems can also be achieved by improving awareness, understanding and access to innovative technologies and approaches. Demonstration projects for a range of different technologies and processes exist in a number of sectors across the country and have reported quantifiable water, energy, greenhouse and waste benefits. Business, industry and governments have yet to realise the full economic potential better waste management approaches can offer to support their business drivers. Improved education of decision makers, ready access to enabling technologies and processes, ensuring that market signals reflect the true costs and creating a climate for private sector investment in infrastructure can drive change.	establishing best practice in this regard, other industries can replicate these arrangements, potentially enabling local solutions for recovered materials that can be costly to transport to alternative markets. Ensuring that standards for relevant materials and goods are based on performance and do not rule out use of recovered materials can also assist in providing market incentives. Facilitating investment in jobs, innovation and infrastructure will also occur as a result of undertaking other actions such as those designed to improve the market and pursue sustainability. For example, making better use of Australia's organic waste stream to harness improved agricultural productivity will require better understanding of priority materials flow modelling, investment in improved collection and sorting systems, processing and distribution infrastructure, technology and processes and the people to operate them. Emerging markets may also need support including awareness raising of the costs and benefits of using organic waste in agriculture and facilitation of partnerships to create economies of scale and fit-for-purpose	investment community, Stockpilers, Reprocessors ▪ Interdependencies – How do investment objectives support or be supported by Improving Marketplace and Sustainability themes

Themes and directions	NWDS Considerations	
Maximising benefit – (from points of clarification) Delivering a cohesive, efficient and effective National Waste Policy can help fulfil other goals. Reducing overall waste production and managing waste as a resource provides an opportunity to innovate and develop new processes, technologies, industries and markets, bringing associated growth in employment and the economy. The National Waste Policy can also contribute to greenhouse gas reductions, water security and quality and the productivity of our horticultural crops and agricultural land. Understanding in which circumstances these broader benefits can be achieved through actions to reduce waste or improve resource recovery is increasing.	outcomes.	
5 Reducing hazards Improved standards, identification, collection, treatment and disposal of problematic and hazardous materials.		
Background The presence of hazardous substances in waste and recycling streams has the potential to cause long term environmental and health impacts and prevent re-use. There are approximately three million tonnes per annum of hazardous waste produced in Australia (as defined by the Basel Convention) that is eight per cent of the national total. Hazardous wastes can be in the form of by-products or residues from agricultural,	**Directions for change** Adoption of national standards and requirements for labelling of manufactured goods and consumables in regard to hazardous materials, including heavy metals and chemicals. Such standards exist in a number of countries, and Australia should adopt the appropriate international requirement rather than developing its own.	What will NWDS do to support this theme? ▪ Maintain an inventory of hazardous materials. ▪ Administer the data requirements for the movement of materials around Australia. ▪ Facilitate reporting requirements of any cooperative facilities developed to manager hazardous wastes types.

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manufacturing or industrial processes and can also result from the substances embedded in products. As mentioned previously, Australia does not have a national approach to classifying waste, hazardous waste, scheduled waste and prescribed wastes, impacting on the cost and complexity of handling, treatment and disposal arrangements. The current approach to dealing with products that contain hazardous materials has been on a product-by-product basis at end-of-life. In Australia there are also no national standards and requirements for labelling for content and for risks in manufactured goods and consumables in regard to hazardous materials including heavy metals and chemicals. Hence toxic substances can be embodied in products without the purchaser being aware and waste managers and re-processors have no means of assessing appropriate disposal. Such standards exist in a number of other OECD countries and Australia could adopt appropriate international standards rather than developing its own under the auspices of the nascent national standard setting body for the environmental management of chemicals. A number of Australian businesses already produce to meet these overseas requirements. It is not sensible or practicable for each jurisdiction to	A co-operative approach to investments in the operation of, and access to a full suite of facilities and technologies for handling hazardous and controlled wastes in Australia to provide a national capability for hazardous waste. Provision of shared investment models for jurisdictions and business to cover the circumstances where to the cost of a specialised facility or technology is too great for one party or where mobile facilities are considered the most efficient approach to service delivery. Develop an approach for managing hazardous substances that links substances to agreed standards or guidelines for appropriate recovery, reprocessing and safe disposal. This would facilitate businesses and the community taking responsibility for reducing and managing hazardous substances.	Users – Producers, Waste facilities, Reprocessors Interdependencies – How do reducing hazards objectives support or be supported by Taking Responsibility and Sustainability themes Audit trail – How much detail and verification will be required? Reporting – What outputs and reports will be required to meet any international reporting? What reports will be valuable to industry that will be required to label products and potentially pay for recovery/disposal.

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have a full suite of facilities for handling all types of hazardous and controlled wastes as such waste facilities are highly specialised. However, without suitable access to such facilities or technologies (and combined with the cost of transport and destruction), hazardous wastes are currently stockpiled in situ, presenting an environmental risk. Consideration could be given to establishing a national hazardous waste infrastructure capability where access to and use of such facilities and technologies is open to other jurisdictions at an appropriate charge or where the development and funding could be shared by more than one jurisdiction or between jurisdictions and business.		
6 Reporting on Performance Developing capacity to effectively collect, report and compare consistent national waste and resource recovery data to inform policy and assess performance		
Background A national waste data system that informs policy performance and future directions at the jurisdictional and national level is required as an authoritative source of information across a range of aspects including avoidance, minimisation, generation, recovery, re-use, recycling and disposal, regulation and levies, infrastructure and profile of business engagement. The data should be nationally consistent and provide for streamlined collection to reduce industry and business	**Directions for Change** Develop and publish an annual summary and periodic (three or five yearly) current and future trends report on waste across all its attributes. The summary would provide data and information against a small subset of agreed key performance indicators. The current and future trends report would document performance against the strategies and agreed actions under the National Waste Policy and the	What will NWDS do to support this theme? ▪ Provide consistent reports nationally ▪ Report progress against targets ▪ Provide reports to meet international obligations ▪ ▪ Data Requirements ▪ Consistent definitions, terms and standards, waste hierarchy, waste stream classification, waste classifications, facilities and business models are

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costs and compliance risks. Developing effective policy responses, understanding the level of interstate waste movements, tracking and benchmarking performance and assessing the impost on business of different approaches and undertaking compliance actions, have been constrained by the differences between jurisdictions in how and what data are collected and reported. As well as gaps in statistical information there are also limits to scientific knowledge about the environmental and health impacts and future risks of some of the materials disposed to landfill. This has also had an impact on the ability of business to make decisions. **Targets – (from points of clarification)** At a strategic level, stakeholders through the consultation process have consistently sought an integrated National Waste Policy that provides a clear vision and contains objectives and targets to enable jurisdictions and industry to drive change and to provide a basis for measuring performance. The draft framework proposes targets as part of the vision. A national target would provide impetus for coordinated action while allowing individual jurisdictions to continue to implement waste policies that reflect the particular desires of their own communities. Some states and territories already have waste related	extent to which Australia is meeting its responsibilities under the Basel Convention. The report would provide information on progress and trends, inform policy development, facilitate comparison of performance, provide transparency to the public and be underpinned by a national waste data system. The national waste data system should identify a core data set that is necessary and sufficient for jurisdictions to meet their respective policy and program objectives, deliver greater consistency in reporting, minimise and streamline the administrative burden on business and government and have utility for business, government, investors and the community. The system should be flexible to track trends and enable adjustments to accommodate future policy settings, allow Australia to meet its international reporting obligations and align and integrate with existing reporting obligations and tools (e.g. National Greenhouse and Energy Reporting System and the National Pollutant Inventory).	required for effective management information. ▪ Overarching taxonomy that all must adhere to? ▪ Will exceptions exist at jurisdiction or regional/rural level? ▪ What will be reporting periods? (Calendar vs Financial Year, Monthly vs Quarterly) ▪ Include measures for legacy emissions ▪ From Policy Framework Introduction - include the MSW, C&I and C&D waste categories, which will include liquid, gaseous and solid waste streams. Waste streams within these categories should be defined and adopted by users of the system ▪ Interdependencies – What are the shared data points that align the NWDS with NGERS and NPI as well as other reporting obligations? Who will help to map and link the requirements? Should targets be of a similar nature to those used in the states or an alternative formulation such as tonnes of waste per capita compared to a baseline year? Should targets be equivalent to existing state and territory targets or more ambitious stretch targets? Would it be helpful to have both broad targets (e.g. reduction in total waste to landfill) and

Themes and directions	NWDS Considerations	
targets. These range from a broad goal of zero waste to specific targets to reduce waste to landfill, increase the recovery and use of materials from particular waste streams, reduce litter and phase out priority hazardous substances. Given that the National Waste Policy will set priorities for the next decade, a key question is how such targets should be derived. **Legacy emissions – (from points of clarification)** **Since the release of the consultation paper, the Australian Government has determined that liability for landfill emissions under the proposed Carbon Pollution Reduction Scheme will now only apply to greenhouse gas emissions that come from waste that is deposited after commencement of the scheme on 1 July 2010. Emissions from legacy waste will, however, continue to count towards a landfill's threshold in order to ensure broad coverage of new waste emissions. In light of this announcement, the need to develop complementary measures for legacy waste emissions will be considered as part of the National Waste Policy. Are such measures necessary and if so, what form should they take?**		specific targets (e.g. municipal solid waste, commercial and industrial and construction and demolition sectors)?
7 Tailoring solutions		

Themes and directions	NWDS Considerations	
Building capacity in regional, remote and Indigenous communities		
Background There are many regional, remote and Indigenous communities which face particular challenges in waste management and improved use of resources. The remoteness of these communities and their small size relative to the majority of urban centres are challenging considerations when looking at the approaches that would facilitate reduction in waste and improved waste management and recovery of resources. Specific geographic issues also come into play. For example the high water table in parts of the Northern Territory makes landfill problematic, but in other areas dry conditions can make composting difficult and compromise methane production. These communities also face challenges in accessing skills and resources to make informed decisions about appropriate waste management strategies. Specific tailored initiatives could provide health, environmental or other economic benefits to the community and could include scalable waste to energy plants, mobile facilities to collect and recycle particular wastes or arrangements that build on existing initiatives such as drumMUSTER. In terms of national best practice, guidelines and	**Directions for Change** For regional, remote and Indigenous communities, explore the potential for small scale energy generation facilities and re-use and recycling facilities, including funding models that would be flexible and provide local employment. For example, with the provision of crushing equipment, glass could be recycled in road base rather than being transported long distances to recycling plants. Tailored, fit-for-purpose guidelines for the development and operation of waste management in these areas and communities would also facilitate appropriate solutions and investment.	What will the NWDS do to support this theme? ▪ Facilitate the innovation and tailoring process by providing best practice information from other regions ▪ Facilitate ease of data collection ▪ Help identify opportunities to grow local economies through investment opportunities ▪ Interdependencies – How do reducing tailoring solutions support or be supported by Facilitating Investment and Sustainability themes Data requirements – How will a tiered approach assist local communities (eg. Collection of less data or incentives for collecting detailed data? If so, what incentives and flexibility for each small community)

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standards applying to waste management operations, a tiered approach could be adopted to cater for these smaller communities. Infrastructure for resource recovery, design for waste avoidance, recycling, alternative waste technologies and landfill establishment, operation and post closure maintenance are all major capital investments.		