



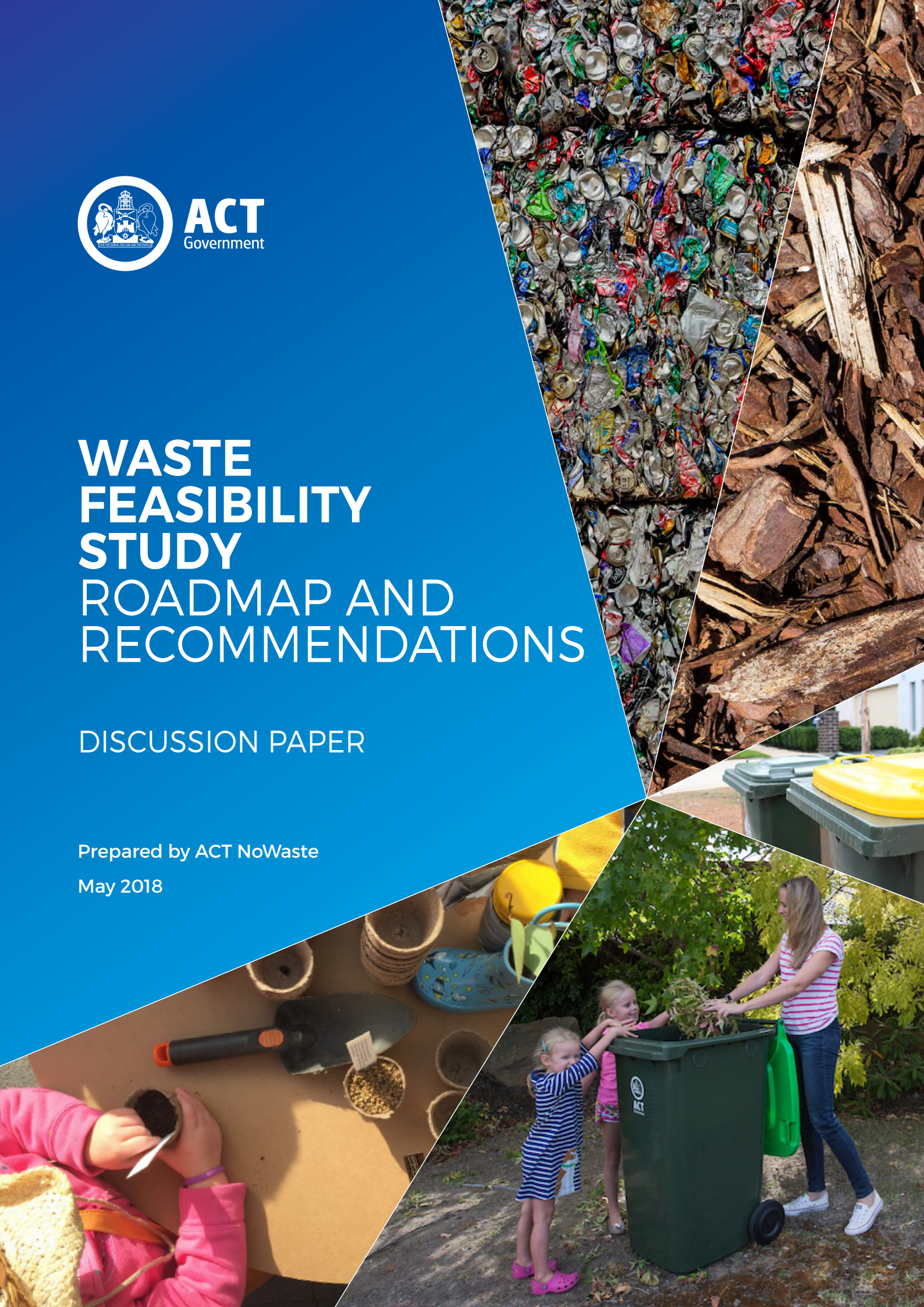
ACT
Government

WASTE FEASIBILITY STUDY ROADMAP AND RECOMMENDATIONS

DISCUSSION PAPER

Prepared by ACT NoWaste

May 2018



ACKNOWLEDGEMENT OF COUNTRY

We acknowledge the traditional Custodians of the ACT, the Ngunnawal people. We acknowledge and respect their continuing culture and the contribution they make to the life of this city and this region.

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Prepared by Publishing Services for Transport Canberra and City Services, April 2018.

Telephone (02) 13 22 81

Website <http://www.tccs.act.gov.au/>

Publishing Services Job no: 171485

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LIST OF ABBREVIATIONS

ACT	Australian Capital Territory
C&D waste	Construction and Demolition waste
C&I waste	Commercial and Industrial waste
CDS	Container Deposit Scheme
EPS	Expanded Polystyrene
FOGO	Food Organics and Garden Organics
GO	Garden Organics
MSW	Municipal Solid Waste
MUD	Multiple Unit Dwellings
NWR	National Waste Report
PEF	Process Engineered Fuel
the Study	the Waste Feasibility Study
WFS	Waste Feasibility Study (the Study)
WMRR Act 2016	Waste Management and Resource Recovery Act 2016
WtE	Waste to Energy

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HAVE YOUR SAY

The Transport Canberra and City Services directorate and ACT NoWaste invites you to have your say on the Waste Feasibility Study's Recommendations. This document provides a series of recommendations including a Roadmap for improved waste management and resource recovery in the ACT.

Consultation will be open for six weeks on the Your Say website from April 2018, and public consultation sessions and stakeholder engagement will be conducted into May 2019.

Comment and submissions are welcome and can be made:

- > online at the Your Say website at <http://www.yoursay.act.gov.au/>
- > via e-mail at TCCS.ACTWasteFeasibilityStudy@act.gov.au
- > by mail to Waste Feasibility Study, ACT NoWaste, GPO Box 158, Canberra ACT 2601

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Any personal information received in the course of your submission will be used only for the purposes of this community engagement process. Names of organisations may be included in any subsequent consultation report, but all individuals will be de-identified unless prior approval is gained.

MESSAGE FROM THE MINISTER

The ACT Government welcomes the results of the Waste Feasibility Study, and I invite the community and industry to consider the recommendations and provide us with feedback on the way forward.

The Study presents its recommendations at a time when public interest in waste management is high.

At the national level, television programs like ‘War on Waste’ and 4 Corners have prompted necessary discussions on waste management issues. The Senate Standing Committee on Environment and Communications is conducting an inquiry into the waste sector.¹ The recently enacted changes to China’s waste importation policies through the ‘National Sword’ initiative have also highlighted the need to better value-add to our waste products locally in Australia.

We are seeking pathways to achieving the ambitious goals outlined in the *ACT Waste Management Strategy 2011-2025*.

The strategy includes the aspirational targets of 90 per cent of waste being diverted from landfill by 2025 and a carbon-neutral waste sector by 2020.

However, the Territory’s resource recovery rate has plateaued at around 70 per cent for the last decade, and the waste sector is unlikely to be carbon neutral by 2020 under current management practices.²

The need for a ‘step change’ in order to move beyond this plateau was recognised in early 2015.

It was understood at the time that any large-scale waste infrastructure options for the Territory needed to be considered carefully, as the facilities were likely to operate on multi-decadal timeframes.

As a result, the Waste Feasibility Study was funded through the 2015-16 Budget with \$2.8 million over two years.

This document provides a summary of the Study’s achievements and recommendations, which aim to enhance Canberra’s reputation as a sustainable, progressive city with the ambition of having public, private and community partnerships work together to further opportunities.³

The recommendations will require community support and participation to succeed. The recent public interest in waste provides a springboard for action and an opportunity to ignite the community’s enthusiasm.

I invite the community to explore the recommendations in this report and have your say on how the ACT Government can work together with the community to set the Territory on a path towards becoming a national leader in responsible environmental management.



Meegan Fitzharris
Minister for City Services

¹ http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/WasteandRecycling
² Point Advisory Pathway Report: ACT 2050 emissions modelling – waste sector, 2017
³ Chief Minister’s ‘Canberra: A Statement of Ambition’ page 12

EXECUTIVE SUMMARY

WHY THIS STUDY?

The ACT Government views Canberra as home to a pro-active community with a positive concern for management of the environment, and as such the results of Waste Feasibility Study (the Study) are designed to achieve best practice waste management in partnership with the ACT community.

The Study identifies how waste management in the ACT can be improved to align with best practice.

The Study has proposed initiatives that respect the 'waste hierarchy' principle which is considered international best practice and outlined in Section 1.

KEY OUTPUT FROM THE STUDY

The key output from the Study is a Roadmap of initiatives designed to take the ACT closer to its 90 per cent resource recovery target through best practice waste management.

The Roadmap takes a holistic approach to waste management with the objective of increasing waste diversion from landfill quickly, reliably and efficiently, and in a relatively low-risk, cost-effective manner using mature technologies. It does not propose complex processing options.

It is estimated that the Roadmap initiatives could divert over 170,000 tonnes of waste from landfill and lift the resource recovery rate from 70 per cent to 87 per cent. The recommendations are detailed in Section 5.

Group 1 – Roadmap recommendations

Diverting organics from landfill

- | | |
|-----|--|
| 1.1 | Undertake a food waste reduction and recovery social marketing and education campaign for households and businesses |
| 1.2 | Provide ongoing participation and support to the national food waste initiatives |
| 1.3 | Implement a kerbside food and garden organics (FOGO) collection service aligned with the existing green bin roll-out program |
| 1.4 | Identify a site and establish an organics processing facility to process both food and garden organics |

Industry development and support

- | | |
|-----|---|
| 1.5 | Identify and facilitate market development for materials that are currently sent to landfill |
| 1.6 | Establish Government 'buy-back' schemes for recycled products through procurement commitments (e.g. compost from organics, road bases from crushing of inert waste and glass fines) |
| 1.7 | Design modified service contracts for existing services (e.g. gypsum, glass fines, crushing inert wastes), repair and dismantle (e-waste and mattresses), so these materials can be recovered and repurposed for beneficial reuse |
| 1.8 | Design a modified commercial and industrial (C&I) waste service to allow source-separated (e.g. recyclables, organics and residual) waste for improved processing outcomes |
| 1.9 | Design and establish improved advisory services to businesses around the ACT regarding how they can reduce their waste to landfill and save costs |

Energy from waste

- | | |
|------|---|
| 1.10 | Develop a waste-to-energy policy for the ACT |
| 1.11 | Investigate the establishment of a process engineered fuel (PEF) plant in the ACT |

Group 2– Further recommendations

The Study's second group of recommendations are more general initiatives, detailed in Section 6. It is recommended that these be implemented to facilitate integration with existing waste management operations.

2.1	Continue implementing regulatory reforms under the <i>Waste Management and Resource Recovery Act 2016</i> including: a. Improved data gathering capability b. Identification and development of necessary regulatory interventions for the commercial sector through social market research and regulatory impact assessments
2.2	Continue to explore product stewardship possibilities for various challenging waste streams
2.3	Periodically review the Development Control Code for Best Practice Waste Management in the ACT to ensure desired waste management and performance outcomes are achieved for multi-unit developments
2.4	Augment existing education efforts by designing and implementing an education and marketing behavioural change campaign to reduce the quantity of recyclables ending up in kerbside residual bins
2.5	Develop an integrated long-term strategic/spatial plan for waste service delivery infrastructure (e.g. transfer stations) and their locations/co-locations, using the principle of best use of land in triple bottom line assessments to determine and meet future needs and changes
2.6	Update the <i>ACT Waste Management Strategy 2011–2025</i> to maintain currency and alignment with new knowledge
2.7	Maintain ongoing support for the National Litter Index in line with the ACT's clean environment agenda

Recommended First Stage projects

The Study recommends that the following projects commence in 2018-19:

- > implement two major education programs focused on food waste reduction and improved recycling
- > identify a composting site to process FOGO
- > provide market identification, supportive government procurement and new contracts for specific waste streams
- > investigate the establishment of a processed engineered fuel (PEF) facility
- > develop a waste-to-energy policy for the ACT
- > review and update the *ACT Waste Management Strategy 2011-2025*.

SECTION 1

OVERVIEW OF MODERN WASTE MANAGEMENT

The Study was tasked with identifying how to achieve best practice waste management in the ACT.

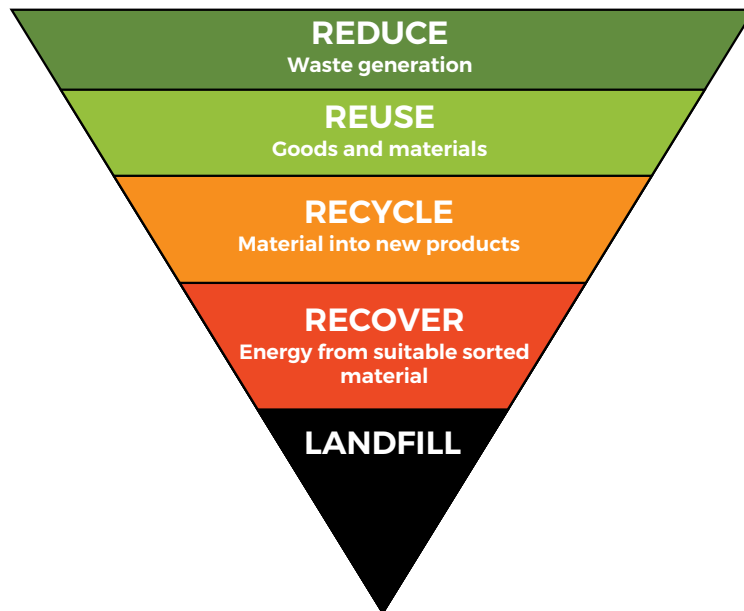
The 'circular economy' was identified early as the model which can counter the existing 'linear economy' that exists in Australia and encourages the purchase and consumption of complex materials that end up in landfill.

This linear economy is unsustainable as it requires more and more natural resources to be extracted to sustain high consumption lifestyles.

A circular economy aims to reduce environmental impacts by designing out waste and extracting resources from unwanted materials. This approach is enabled by changes to the waste system's design, including through regulation, and is ultimately a market-driven model.

As a vehicle to achieving the circular economy, the Study has used the 'waste hierarchy' as a filter through which all options were assessed. Figure 1 presents the hierarchy as an inverted triangle which places efforts to reduce, reuse and recycle waste above energy recovery and landfilling.

Figure 1: The waste hierarchy



The waste hierarchy is the foundation of the ACT Waste Management Strategy 2011-2025 and is reiterated in the *Waste Management and Resource Recovery Act 2016* (WMRR Act 2016). The hierarchy aims to:

- > minimise the generation of waste
- > maximise the recovery and re-use of resources
- > minimise the amount of waste that goes to landfill.

The waste hierarchy is also consistent with the Territory's legislated greenhouse gas reduction target of net zero emissions by 2050, required in the *Climate Change and Greenhouse Gas Reduction Act 2010*.⁴

Waste avoidance and reuse measures, particularly by avoiding the disposal of organic waste to landfill, can reduce the generation of methane gas. This is a powerful greenhouse gas generated through the decomposition of organic waste in landfills. The reuse of materials avoids greenhouse gases emitted in the production and transport of new goods. The Study proposes projects and initiatives that respect the waste hierarchy and do not undermine higher order waste management options where they are available or where markets can be developed.

4 <http://www.legislation.act.gov.au/a/2010-41/>

SECTION 2

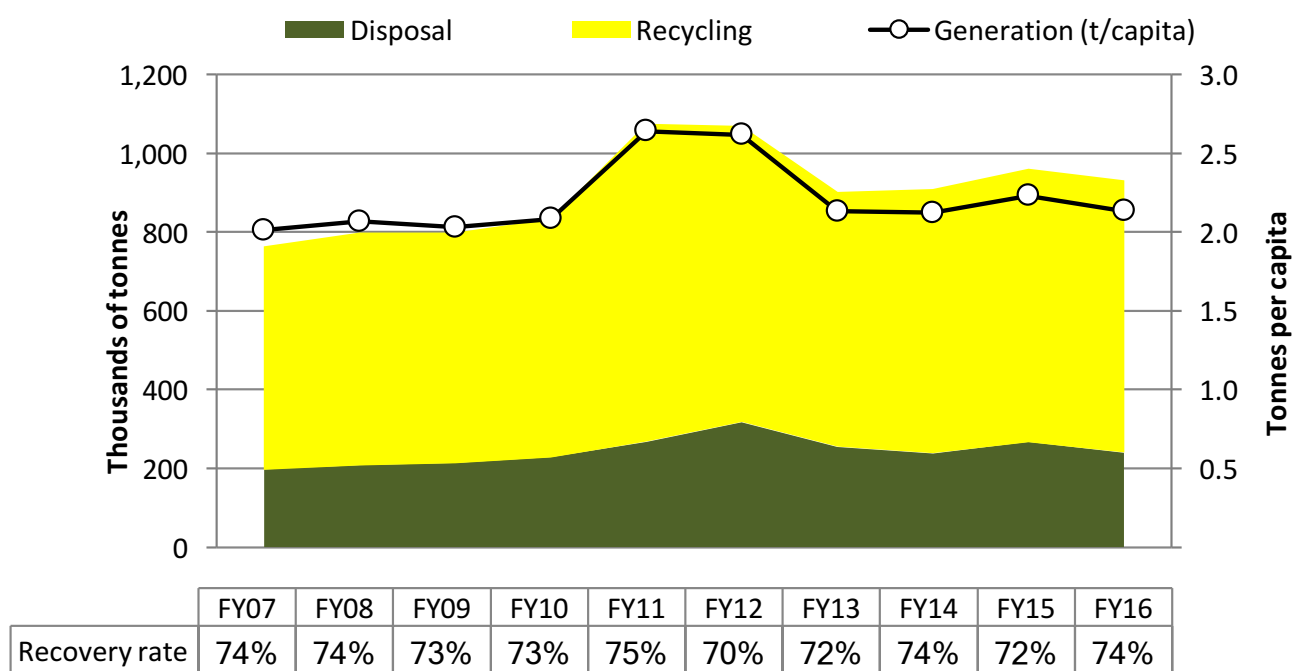
STATE OF PLAY IN THE ACT

The ACT generates around one million tonnes of waste per annum with about 70 per cent of this waste diverted from landfill.

The Study has collected and collated waste stream data to create a comprehensive model for waste flow in the ACT. This model works on baseline data sourced from 2014-15, with details provided in Section 3.

Figure 2 is a graph showing waste disposal and recycling in tonnes, and waste generation per capita, from 2007 to 2016. The green section represents the amount of waste going to landfill, while the yellow section represents the amount diverted and recycled. The figure also shows that waste per capita increased marginally from 2007 to 2016. It should be noted that the FY16 figure of 74 per cent was an estimate and does not include the impact of the 'Mr Fluffy' program waste, which safely disposed over 500 houses as part of the Loose Fill Asbestos Insulation Eradication Scheme in 2016-17.⁵

Figure 2: ACT waste generation 2007-2016⁶

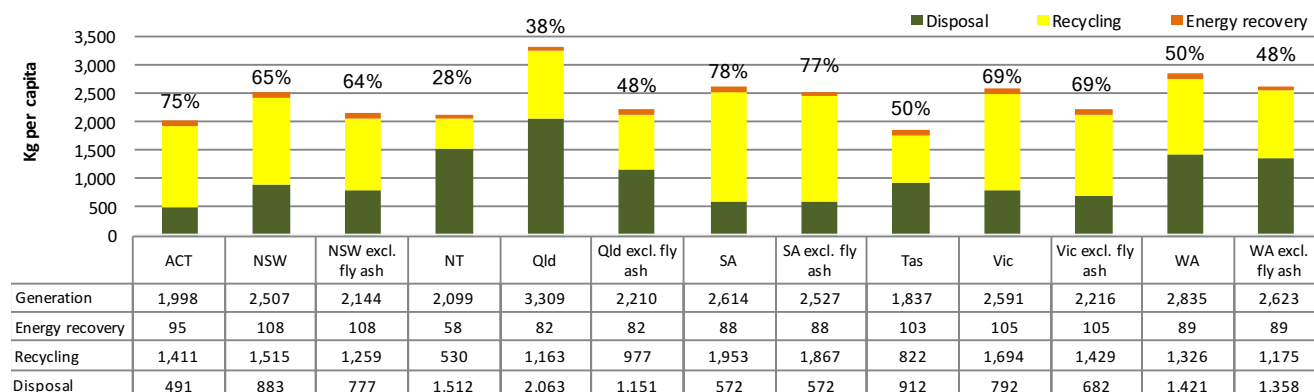


⁵ p.34 ACT Government Annual Report 2016-17, Transport Canberra and City Services, Vol.1

⁶ Based on 2014-15 baseline data.

Figure 3 is a bar graph depicting kilograms per capita of waste disposal, recycling and energy recovery for states across Australia, including with and without fly ash. Below, the graph is a table with the numbers that are represented in the graph. The ACT compares favourably with other Australian states in terms of resource recovery, second only to South Australia (the percentage of each state's resource recovery rate is noted above each column). The term 'fly ash' refers to a by-product of burning coal or other materials in energy-generating states. The figure shows that energy recovery from waste is minimal, as indicated by the red section at the top of each bar.

Figure 3: Waste generated per capita by fate and jurisdiction, Australia 2014-15⁷

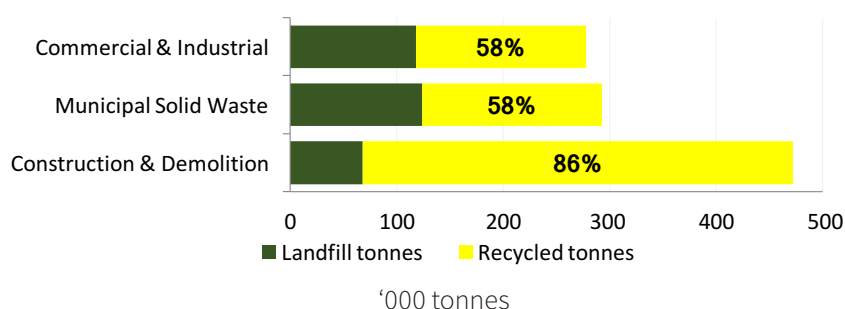


Waste is generally categorised into three streams: Municipal Solid Waste (MSW), Commercial and Industrial (C&I) Waste, and Construction and Demolition (C&D) Waste. Figure 4 below presents the number of tonnes and percentages for recycling in the three streams. The C&D stream makes up the largest proportion of waste generated in the ACT and also has the highest recovery rate at 86 per cent. This reflects the well-developed C&D recycling infrastructure in the Territory.

The amount of C&D waste may actually be higher, as some C&D materials (such as bricks and mortar) can also be found in the MSW and C&I streams.

The MSW and C&I waste streams also perform well at 58 per cent resource recovery, and recent indications from the National Waste Report show that this is significantly above the national average.

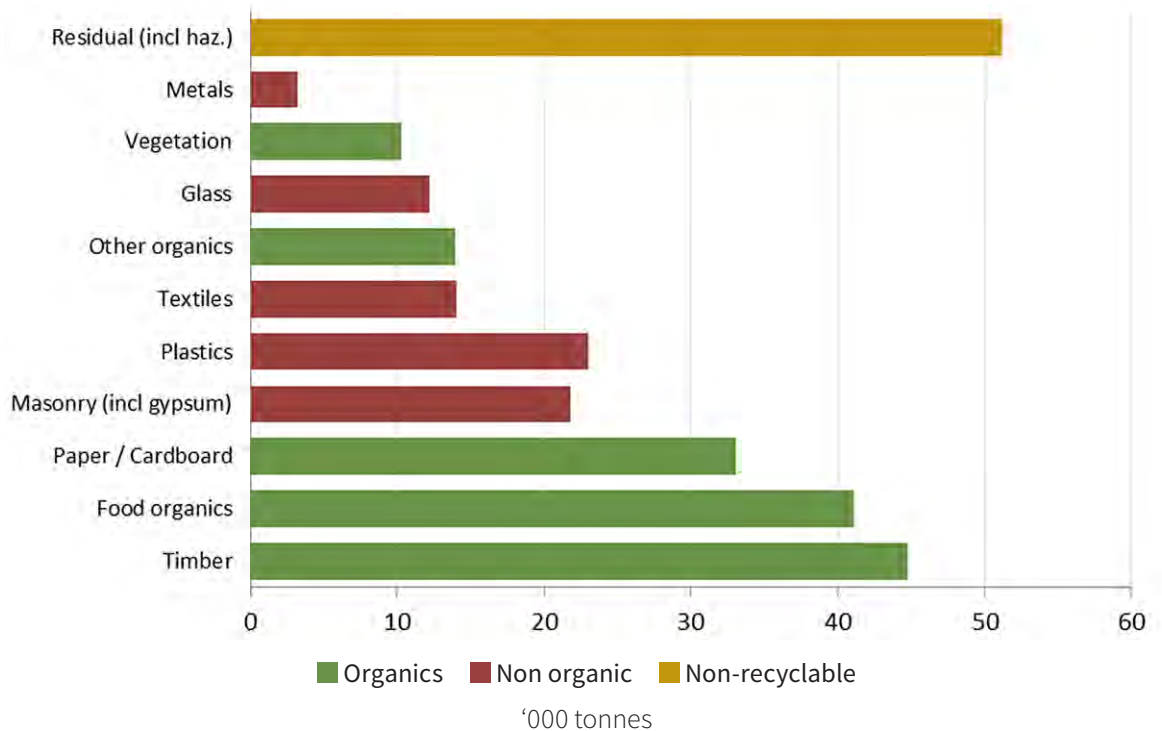
Figure 4: Three waste streams in the ACT⁶



The above categories can be separated further into more specific waste streams, as shown in Figure 5, which is a horizontal bar graph depicting eleven waste streams going to landfill in 2014-15. This allows the identification of 'focus wastes' that, if diverted from landfill, can have a large impact on the rate of resource recovery.

⁷ Blue Environment, Randell Environmental Consulting, and Ascend Waste and Environment prepared for the Department of the Environment the National Waste Report, 2016

Figure 5: Waste streams going to landfill



The largest stream, at around 50,000 tonnes, is 'residual' waste. This comprises hazardous materials, clinical waste, asbestos, and unusable materials such as by-products of other demolition recycling processes. This is waste that is likely to be landfilled in perpetuity as it has no further potential for beneficial use.

The next three largest waste streams are timber, food organics and paper/cardboard. They are represented as green bars as they are 'organic' in nature. After they are interred into landfill these materials decompose and produce methane gas – a potent greenhouse gas.

SECTION 3

STUDY ACHIEVEMENTS

The Study was tasked with understanding the complex and interconnected nature of waste management involving almost every aspect of life in Canberra.

The recommendations put forward were developed with an appreciation of accurate data, a recognition of the role that markets and industry must play, and a comprehensive approach to policy and regulation. To this end, from mid-2015 to mid-2017, the Study accomplished the following key achievements:

- > established base-line data
- > established a regulatory framework through the *WMRR Act 2016*
- > consulted with commercial and community groups
- > oversaw industry development activities
- > implemented a market sounding to gauge industry capabilities
- > developed a Roadmap towards 90 per cent resource recovery

These achievements are outlined in the following sections.

BASE-LINE DATA: YOU MEASURE WHAT YOU CARE ABOUT⁸

One of the first tasks for the Study in 2015 was to establish a baseline dataset as a solid platform to underpin research and analysis.

Data is critical to well-targeted, evidence-based and planned waste management. Data is also crucial for measuring performance of key indicators, progress and impact.

Yet waste data is difficult and expensive to collect and, in the absence of a national standard, waste data collection and reporting methods vary by jurisdiction and waste types. Similar to other jurisdictions in Australia, the ACT faces inconsistencies in the quality, collection, storage, analysis and sharing of waste and resource recovery data.

An audit approach was used by the Study to gain an understanding of the life of waste, from generation to final destination, and to quantify annual waste quantities and the ACT's resource recovery rate. The most recent data at the time of the Study was from financial year 2014-15, and this data formed the baseline.

The work involved analysis of waste management contracts and considered all existing data.

Landfill quantities were derived from the weighbridge system used at landfill and transfer station facilities.

Recycling quantities were obtained from the annual voluntary 'Industry Recycling Survey of Waste Organisations' across the ACT, undertaken by ACT NoWaste. The Study sought to cast a wide net and as such all quantities reported in the Recycling Survey were included in the baseline. One limitation of the voluntarily reported recycled material is that material from neighbouring councils may be included but not separately identified.

Gaps in the data were identified, and these gaps were reconciled through consultation with internal and external stakeholders, industry experts and other waste operators. These gaps included data on the volume of waste transported interstate, stockpiles of contaminated wood, and gaps in recycling data due to the voluntary nature of the Recycling Survey.

DRIVING IMPROVEMENTS IN THE REGULATORY FRAMEWORK

The Study played an integral role in establishing the *WMRR Act 2016*, which was passed in the ACT Legislative Assembly in August 2016 and came into effect 1 July 2017. This Act will improve data collection by requiring waste businesses to report their activities quarterly.

8 Jan Gehls, architect and urban design consultant

The Act also provides scope for the regulation of the commercial waste sectors through Codes of Practice, and addresses other waste management issues such as stockpiling through licensing requirements.

In mid-2017, the Study engaged expert consultants to assess the regulatory impacts for several interventions and product stewardship schemes through the WMRR Act 2016. This included tyres, polystyrene, food rescue, C&D and C&I waste sorting, coffee cups, mercury-containing lamps, handheld batteries and large batteries. This process has provided insight into the options for producer responsibility initiatives and will inform future policies.

CONSULTATION

Five reference groups were consulted in the Study, with their contributions adding value to the outcomes of the Study. Table 1 identifies these groups.

Table 1: Waste Feasibility Study reference groups

Groups	Function
Waste Steering Committee	An executive officer-led group, responsible for overall governance of the Study, authorising the release of deliverables to the relevant Ministers, and ensuring the Study thoroughly examined all options for the redesign of waste management. This Committee was required to ensure the options offer value for money and focus on delivering effective and robust waste solutions.
Project Control Group	A senior officer-level group which managed the Study and delivered the outcomes required by the Waste Steering Committee.
Key Influencer Group	A group comprising experts from institutions and waste industry organisations, who helped to inform, influence and guide the Study to a successful outcome.
Commercial Reference Group	A group comprising representatives from businesses, including waste businesses, waste generators, and ACT business groups. The group ensured the business community was involved in putting forward solutions.
Community Reference Group	A group comprising community members and community groups such as the Conservation Council. The group shared information about the social factors impacting waste management, and helped determine preferred solutions to positively impact the community and the environment.

INDUSTRY DEVELOPMENT

The Study oversaw industry development activities including the redesign of the Hume Materials Recovery Facility contract and the establishment of the successful Soft Landing social enterprise which diverted over 32,000 mattress from landfill in 2016-17.⁹

MARKET SOUNDING TO GAUGE INDUSTRY CAPABILITIES AND CAPACITY

The Study conducted a formal market sounding in early 2017 to more clearly understand the capacity and capabilities of the waste industry to deliver resource recovery solutions. The respondents varied greatly, from global operators to small-to-medium enterprises. Information gathered from the submissions provided insight and informed the Study's recommendations.

Key themes expressed by the waste industry included:

- > community engagement is critical for new projects
- > industry expects support from the ACT Government in terms of relevant siting, regulatory planning, zoning and policy decisions
- > industry seeks certainty regarding access to the Territory's municipal waste supply

⁹ p.32 .ACT Government Annual Report 2016-17, Transport Canberra and City Services, Vol.1

- > the reliability of access to the commercial waste supply is susceptible to fluctuations
- > commercial waste could flow interstate if the Territory's waste disposal charges or levies become uncompetitive
- > feed-in tariffs and carbon price mechanisms were considerations for some waste-to-energy based solutions
- > risks relating to the reliability of technology, as well as to the possibility that the composition of waste streams could vary from year to year.

WASTE MANAGEMENT IN MULTI-UNIT DEVELOPMENTS

The Study also initiated the review of the Development Control Code (DCC) for Best Practice Waste Management in the ACT, which aims to improve the waste performance of multi-unit developments in particular. Reviews aim to ensure relevancy and to provide greater flexibility to building designers and better waste management outcomes for residents.

ROADMAP TOWARDS 90 PER CENT RESOURCE RECOVERY

The key deliverable of the Study is the Roadmap. This is a series of initiatives for the Territory to consider over the period 2018-23. The aim of the Roadmap is to deliver incremental gains in resource recovery from the existing level of 70 per cent and driving towards 90 per cent.

The Group 1 - Roadmap recommendations are outlined in more detail in Section 4. These are supported by Group 2 – Further recommendations outlined in Section 5.

SECTION 4

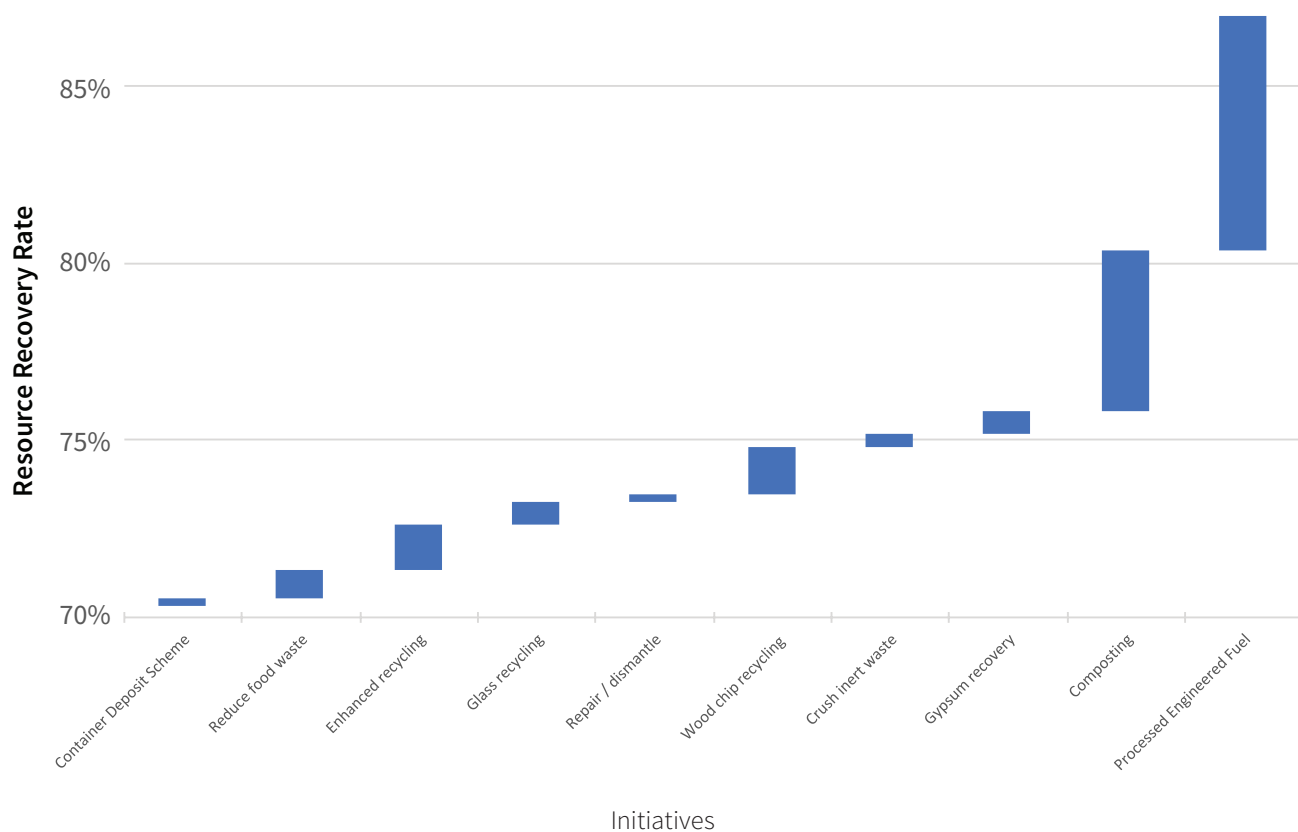
THE ROADMAP

The Roadmap consists of a structured set of initiatives designed to deliver incremental gains in resource recovery from the existing level of around 70 per cent and driving towards 90 per cent. It is summarised in the ‘waterfall diagram’ in Figure 6 below, which presents ten initiatives and their percentage contribution towards resource recovery.

The Roadmap takes a holistic approach to waste management in the ACT with the objective of increasing waste diversion from landfill quickly, reliably and efficiently. It is designed to support the waste hierarchy, and is consistent with the Government’s *ACT Waste Management Strategy 2011-2025*.

The figure below is not intended to be read from left to right in chronological order but rather as a dynamic set of initiatives. The order of projects from left to right reflects the waste hierarchy. For example, ‘Reduce food waste’ is a waste avoidance measure sitting at the top of the hierarchy while ‘Composting’ is a more technical recycling process which sits lower down the hierarchy.

Figure 6: The Roadmap – key projects and initiatives



METHODOLOGY

In developing the Roadmap, it was necessary to consider a wide range of technologies, initiatives and approaches. Consultation with community and industry ensured critical stakeholder views were considered, and a leading industry consultancy was engaged to facilitate the adoption of optimal solutions.

Initially, three pathways were identified which could take the Territory towards 90 per cent resource recovery, each with a particular 'output' focus:

- > **materials output** focus – this pathway would separate waste streams, converting them into materials that have a value in existing or potential future markets
- > **soil improvement** focus – this pathway would produce soil-improving products and direct organic materials through a process of 'anaerobic digestion' to generate gas products for use in the local gas grid or as transport fuels
- > **energy output** focus – this pathway would use waste-to-energy processes (predominately anaerobic digestion and thermal treatment) to produce energy for the grid.

The next step established an assessment framework with a set of criteria against which the three resource recovery pathways were evaluated. The framework considered:

- > focusing on waste streams that make up a large proportion of landfilled waste, so that implementation will yield tangible results
- > utilising technologies that are simple to develop and operate
- > collecting waste in a way that is convenient and efficient
- > providing options that have a low net cost
- > seeking strong potential markets for recycled products, understanding that some markets may require development.

The three resource recovery pathways were considered for synergistic qualities, innovation potential, and risk. Synergies are present when waste diversion options reinforce each other. Examples are composting products that are mixed with gypsum recovery products to create soil conditioners, or the repair-and-dismantle process providing timber for further recycling. Innovation potential exists for certain options, such as the composting process, which can facilitate future innovations in biochar and anaerobic digestion. Risks exist for all technologies and product markets, and these were considered in a risk matrix.

The criteria informed the final recommended Roadmap based on the materials output focus, depicted in Figure 6. The recommended Roadmap would achieve resource recovery of roughly 87 per cent, which is just short of the 90 per cent target by 2025.

INITIATIVES

The horizontal axis of the diagram in Figure 6 shows recommended projects and initiatives, each delivering an increase in resource recovery towards 90 per cent and are explained in further detail below:

Container Deposit Scheme (CDS) – a scheme established by legislation where a refundable deposit is paid on nominated containers. The deposit is redeemable upon presentation at collection points around Canberra. A CDS provides an incentive for the return of containers rather than disposal via littering or general waste. The net outcome is a reduction of redeemable containers in recycling, general waste and public bins, as well as a reduction of these containers in litter.

A CDS will be introduced into the ACT in 2018, and, as much as practicable, the ACT scheme will be harmonised with the NSW scheme. The Study estimates a potential for approximately 2,600 tonnes of redeemable containers to be processed by the scheme.

Food Waste Reduction Program – an education program designed to reduce waste, and specifically the generation of food waste. An element of this campaign will include support for food rescue by charities from commercial sources.

A model program is the 'Love Food, Hate Waste' program which was implemented in the United Kingdom in 2007, and the business case reported in The Business Case for Reducing Food Loss and Waste.¹⁰ By 2012 the program had led to a reduction in food waste of 21 per cent across the UK relative to 2007 levels. The ratio of purely financial benefits to financial costs attributable to the UK initiative was more than 250:1. That is, every British Pound spent resulted in savings of 250 Pounds.

Six west London boroughs also found substantial reductions in food waste when they implemented a food waste initiative in 2012-13. Over a smaller time and geographic scale, a reduction of 15 per cent was realised with a benefit-cost ratio of 8:1 when considering just the financial savings to the boroughs. Similar savings were also realised for businesses that generate food waste.

The Study estimates there is potential to reduce the amount of food waste produced in the ACT by approximately 8,000 tonnes.

Enhanced recycling – by removing recyclables from waste currently sent to landfill via the transfer station by diverting to a sorting facility and educating the community to remove recyclable materials from kerbside and commercial rubbish bins. Enhanced recycling has a focus on large waste streams such as paper and cardboard, metals, rubber, plastics and textiles.

Recycling ultimately requires materials to be separated into different products, and then sold (or disposed) to different manufacturers. The separation can be done either at source or at a Materials Recovery Facility (MRF). At-source separation pushes sorting costs onto waste generators, and produces a product that is generally of a higher quality than MRF products.

Recycling leads to material streams that can be upcycled (purified of contaminants), remanufactured (converted back into their original product) or down-cycled (blended with other materials to produce a lower grade product).

Glass fines processing – while glass may be infinitely recyclable, it is difficult to achieve this in practice due to the economics of recycled glass compared to imported glass, combined with contamination issues and limitations on the market to absorb recycled glass.

Due to the limited glass-to-glass remanufacturing markets, glass is often converted into glass fines. Glass fines are processed through drying, crushing and screening to a range of size fractions. The potential markets for glass fines include aggregates for use in road base, and as a sand replacement in sand blasters and pool water filters.

The recent upgrade to the Hume MRF allows the facility to produce glass fines for use in construction. There is roughly 6,500 tonnes of glass available in the waste stream for processing into glass fines.

Repair / Dismantle – a system where unwanted household durables are either repaired for resale or redistribution, or dismantled into their component parts. This process is highly labour intensive, but also adds significant community benefit in the form of entry level jobs and high quality recovered products.

For the purposes of this analysis, it is assumed that household durables that are unable to be repaired and resold are dismantled. In some cases, this results in 100 per cent resource recovery. In other cases, the recovery rates are lower.

A key product from this diversion option is the recovered metals that are sold into global markets, and the net benefits are social engagement and significant savings of landfill airspace from around 2,000 tonnes of recycled waste. The ACT already supports initiatives such as Soft Landing Mattress Recycling.

Recycling wood chip – which involves the shredding of waste timber and screening the shredded product to produce different sized products for different markets. The shredding occurs in a two stage process: a low speed shredder on the first pass downsizes the material and removes large metal contaminants, while a high speed shredder reduces the size further for screening.

Product screened to a wood chip size is sold as a wood chip replacement, and is especially useful for particleboard manufacture (a common application in Europe). All product below the specified size for particleboard is sold as animal bedding, in particular to broiler sheds. Oversize product is shredded further.

10 https://ec.europa.eu/food/sites/food/files/safety/docs/fw_lib_business-case_en.pdf

Waste timber can also be shredded down into biomass pellets for use in boilers. This is a well established market in the USA, with substantial plants established to convert forestry wastes into biomass for export to Europe. The same can be achieved on a smaller scale in the ACT by tapping into the 19,000 tonnes passing through the waste stream.

Crushing inert waste – the crushing and screening of construction and demolition waste to produce landscaping materials and/or road base. Products are produced to varying specifications depending on their application.

Government standards can be a barrier to market uptake of these materials. One common barrier to uptake is the risk of asbestos in the material being crushed, and thus contaminating the final product.

An example of crushing already occurs at Canberra Concrete Recyclers in Pialligo. There are potentially 4,000 tonnes of construction and demolition waste available for processing in this way.

Gypsum recovery – a process that crushes plasterboard and screens out the associated paper, leaving gypsum as the final product. The screened paper can be processed through a composter or anaerobic digester. There is approximately 7,000 tonnes available for processing into recovered gypsum that can be used to manufacture new plasterboard or to amend soils (so-called “clay breaker”).

Composting – with over one hundred composting facilities nationally, the technology involved is both simple and robust, in either open windrows or proprietary enclosed systems such as Mobile Aerated Floor or tunnel composting systems. Since composting generates significant odours and greenhouse gases that need to be controlled, an enclosed in-vessel system is required where the composting plant is near sensitive receptors. The amount of organic waste available for processing is roughly 42,000 tonnes.

Processed Engineered Fuel (PEF) – PEF is created from waste in a process that removes incompatible materials and converts residual high-calorific waste into a fuel that is transported for use in power plants distant from the site. The power plant may be interstate or overseas.

Much of the residual waste currently sent to landfill in the ACT is of high calorific value and is suitable for use in energy generation for cement kilns outside the ACT. A PEF manufacturing facility within the ACT could offer an opportunity to convert a proportion of the 70,000 tonnes of residual waste into PEF fuels, and deliver around seven per cent improvement in the Territory’s resource recovery rate.

ROADMAP - NEXT STEPS

The above Roadmap constitutes provides a pathway for achieving the objectives of the *ACT Waste Management Strategy 2011-2025*. The following section covers the Group 1 – Roadmap recommendations in greater detail, while Section 6 discusses Group 2 – Further recommendations.

SECTION 5

GROUP 1 - ROADMAP RECOMMENDATIONS

This section summarises the Study's final recommendations. With each finding there is a list of initiatives – some are new, while others build on current Government activities. Some are important to consolidate progress and designed to holistically and collectively achieve the Government's aims.

The recommendations are divided into two groups.

- > Group 1 is the list of processes outlined earlier in the Roadmap in Section 4
- > Group 2 is a list of more general Roadmap initiatives. It is recommended that these be implemented to facilitate integration with existing waste management operations. These initiatives are outlined in Section 6.

The Roadmap forms the basis of the Study's recommendations and provides a pathway for the ACT to deliver its waste management targets in a relatively low-risk, cost-effective manner using mature technologies. It does not propose novel technologies or complex processing options.

The Roadmap sets out a set of services that can be further negotiated with waste collectors and generators to deliver materials to reuse and recycling facilities. It proposes support for the facilities through the ACT Government's procurement, and involves ongoing waste education and a minimum amount of regulatory change. The Roadmap also establishes a wide range of opportunities for further development.

It creates the cornerstone recovery infrastructure and opens the door for entrepreneurs to lead with innovation in the future.

Based on expert analysis, it is estimated that the ACT would achieve a diversion rate of over 85 per cent once all initiatives are successfully implemented.

Each of the diversion options require investment in infrastructure (either from the ACT Government or via the private sector), and the development of markets. The ACT Government will be required to assist market development where it can, particularly through its own procurement and specifications.

DIVERTING ORGANICS FROM LANDFILL

Food loss and waste is a global problem that affects our economy, society and environment. In 2013 it was estimated that food waste cost Australian households more than \$8 billion each year. A report released by the Department of Sustainability, Environment, Water, Population and Communities in 2011 estimated that Australians continued to generate 361 kilograms of food waste annually per person. The environmental cost is also significant and includes greenhouse gas emissions. Nationally an estimated 6.8 million tonnes of carbon dioxide was released as a result of sending organic waste to landfill in 2011.¹¹

The ACT is not isolated from the consequences of such global challenges. In response, the ACT Government has adopted progressive policies that allow Canberra to grow and prosper, while reducing emissions, demonstrating leadership to other communities in Australia and around the world. The Government has established the goal of the ACT being carbon neutral by 2050.¹²

A key policy initiative to achieve this goal is the shift from high carbon-based sources of energy to clean, renewable-based sources. As this transition occurs and the ACT's carbon footprint declines, waste will constitute an increasing percentage of the Territory's carbon footprint unless positive action is taken to achieve carbon neutrality in waste management, such as the diversion of organics from landfill.

11 Australian Department of Environment factsheet 'Working together to reduce food waste in Australia'

12 <http://www.legislation.act.gov.au/a/2010-41/current/pdf/2010-41.pdf>

Approximately 65,000 tonnes of organics from households, businesses and public organisations go to landfill each year in the ACT, predominately in the form of food organics. Opportunities exist for the ACT to divert this resource away from landfill by delivering initiatives such as food waste reduction and recovery campaigns targeted towards all sectors, implementation of a kerbside FOGO collection service, and co-designing a collection system for businesses to encourage organic source separation. It should be noted that an opt-in, phased garden organics (GO) collection service to the whole of Canberra commenced in April 2017 with a stepped roll-out until mid-2019. This offers further opportunity to align the two programs (GO and FOGO) so that a cost-effective service can be offered to the ACT community.

The Study recommends establishing a comprehensive food waste reduction and recovery program (Recommendation 1.1)

Like the FOGO initiative, a food waste reduction and recovery programme would be underpinned by the waste hierarchy's primary principle of avoiding and reducing waste generation in the first instance.

This initial food waste reduction and recovery program, could be modelled closely on the highly successful Love Food Hate Waste program from the UK. Results from the UK indicate reductions in food waste of 15 to 20 per cent. The financial savings, over various jurisdictions, range from \$16 to \$250 due to reduction of food waste for every dollar invested in the program.¹³

Love Food Hate Waste helps households and businesses avoid food waste, save time and money, and reduce their environmental impact by planning better, shopping smarter and storing food effectively.

The program features tips on buying, cooking and storing food to avoid or reduce food waste.

Similar programs have been successfully implemented by NSW and Victoria. In NSW, the Love Food Hate Waste program¹⁴ is managed by the Environment Protection Agency and run in partnership with retailers, food manufacturers, local government authorities and community or charity groups.

To be successful, these types of programmes as demonstrated in NSW and as the proposed approach for the ACT, require a collaborative approach across governments and related agencies, not-for-profit-organisations, local industry, and small to medium businesses to drive and champion the initiative and ultimately implement. This enables the benefits for the various food rescue charities to be realised and which in turn supports reduction of food waste.

Also supporting the primary principle of waste avoidance and reduction would be any future work looking to reduce retail and food packaging.

The Study recommends providing ongoing participation and support to the national food waste initiatives (Recommendation 1.2)

Managing food waste is at the forefront of the Australian Government's agenda. It has begun promoting a strategic dialogue involving all state, territory, and local governments on food waste outcomes, standards, and reducing greenhouse gas emissions. The ACT Government was an active member of the Working Group for the National Food Waste Strategy, and the Study recommends continuation of this role and for the ACT to be part of the commitment to cutting the amount of food the nation wastes in half by 2030.

At the November 2016 Meeting of the Environment Ministers (MEM), ministers agreed that jurisdictions, led by the Australian Government, would work cooperatively to support initiatives that lead to a 50 per cent reduction in food waste. These initiatives included the formal development of the National Food Waste Strategy¹⁵ which was recently launched by the Federal Government.

¹³ The Business Case for Reducing Food Loss and Waste, Champions 12.3, 2017

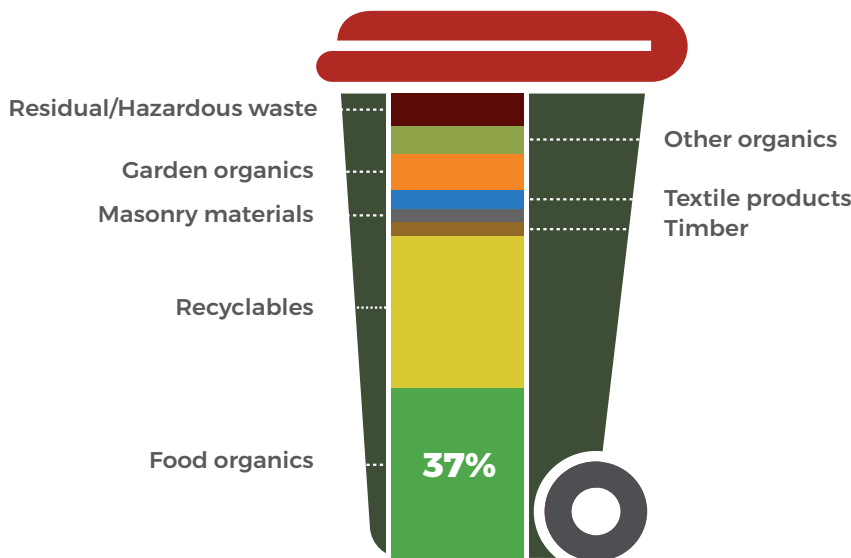
¹⁴ <http://www.lovefoodhatewaste.nsw.gov.au/>

¹⁵ <http://www.environment.gov.au/protection/national-waste-policy/publications/national-food-waste-strategy>

The Study recommends the implementation of a kerbside FOGO collection service which is aligned with the existing GO bin roll-out program (Recommendation 1.3)

The Study identified that an additional kerbside FOGO collection service provides an opportunity to significantly reduce the tonnes of food waste from households currently disposed of to landfill. Waste audit reports indicate that food organics comprise 37 per cent of kerbside waste collection (See Figure 7).

Figure 7: Food organics in kerbside waste collection¹⁶



A number of submissions from the 2017 market sounding also promoted and detailed the benefits of kerbside FOGO collection, as well as the issues of potential contamination. The introduction of a FOGO collection service will require a high level of community engagement together with a comprehensive education program to ensure community buy-in for 'at source' sorting of food organics.

The successful implementation of such a scheme is critically dependent on designing and undertaking effective longitudinal education campaigns, which need to be launched well ahead of full roll out as well as staged and maintained over a period of time. Ongoing education and communications with householders throughout the life of the FOGO collection service is essential in order to maintain household participation, high diversion rates and low levels of contamination.

A FOGO service has been implemented in 38 local councils in Victoria and 26 in NSW. Penrith was one of the first councils to introduce a FOGO service and experienced a 30 per cent contamination rate. The Council undertook an extensive education campaign to reduce the contamination rate to 11 per cent, one of the lowest in Australia. Other jurisdictions that have successfully implemented FOGO services include Albury, Parkes-Forbes-Bathurst, Lismore, Ballina, Grafton, Orange, Wodonga, Indigo Shire, Wangaratta, Benalla, Strathbogie Shire and Moira Shire.

There are other considerations to developing a successful FOGO initiative. A FOGO service requires a lead time of at least five years in order to establish, test and commission a processing facility. Washington D.C. has recently announced a FOGO service to be delivered in five years due to the need to secure a suitable processing site.¹⁷

Identification and approval of a site for a processing facility is a critical consideration before introducing the FOGO collection service. The existing plan for a Canberra-wide GO bin roll out, is to be completed in 2019.

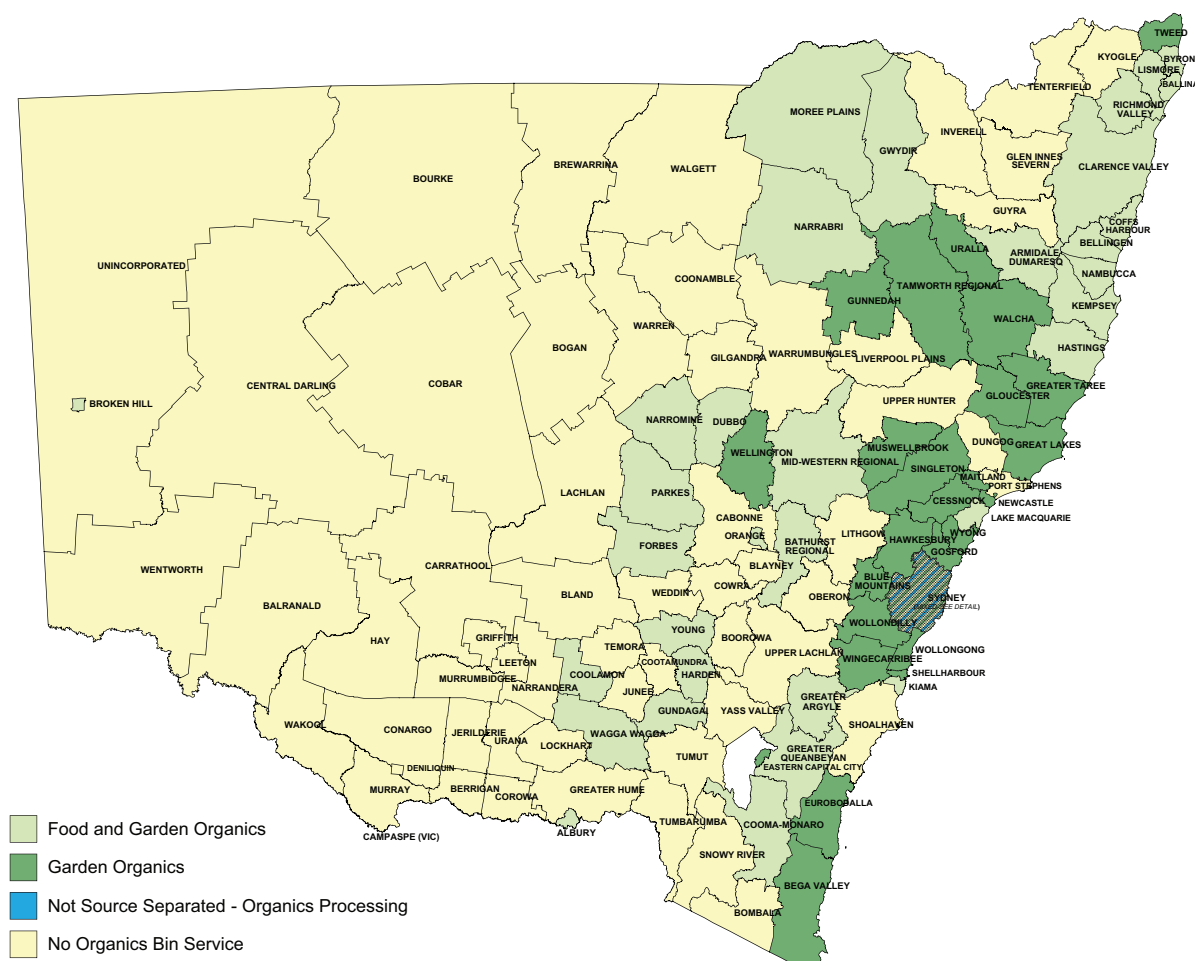
Significant planning and investment is required to align the proposed scheme with the existing opt-in GO bin roll out and the Territory's existing kerbside collection contract, which expires in 2023.

¹⁶ Based on 2014-15 baseline data.

¹⁷ <https://dpw.dc.gov/compostfeasibilitystudy>

The cost of processing FOGO material to produce compost products that meet EPA standards and market acceptance may be significant. However, once all ACT households have received their GO bins, it is anticipated that a FOGO bin will be straightforward and less costly to introduce.

Figure 8: Organics collection schemes implemented in NSW¹⁸



The Study recommends establishing a composting facility within the ACT that is capable of processing both food and garden organics (Recommendation 1.4)

The Study recommends adopting a technology such as composting that is proven, simple, scalable, practical and quick to both develop and operate.

There is also considerable expertise in the market for offering composting facilities which can be procured through a range of commercial contracts. The ACT Government can contract to supply a minimum volume of waste, collected through the FOGO service, for processing. To facilitate development of a compost market, it is recommended that the ACT Government contract to purchase back a minimum quantity of compost that can be used in ACT parks and gardens, or sold to the public.

A site needs to be identified that meets environmental codes for a composting facility. Furthermore, composting generates significant odours that need to be controlled, and planning and placement of the site will require consultation with the local community to resolve siting issues.

The Study recommends a timeline that involves site determination, community consultation, planning and environmental approvals, and the development of a tender process and awarding of a contract.

18 MRA Consulting – The Tipping Point August 2017

INDUSTRY DEVELOPMENT AND SUPPORT

The Study recommends the ACT Government identify and facilitate market development for certain materials that are currently sent to landfill (Recommendation 1.5)

Industry development involves activity that generates and maintains industry knowledge and market intelligence to inform, prioritise and develop government policies. Industry development is an iterative process that requires ongoing engagement with industry groups and networks. It is essential to identify and facilitate the development of a market for recyclable materials.

Recycling only makes sense if it is economically sound. This means recycling markets need to be supported for development.

In addition, the ACT Government has a range of policy tools available to facilitate the market economy transition to a circular, low carbon economy. These tools include regulations, introducing price signals or product stewardship requirements, procurement models such as public-private partnerships, and government purchasing to support markets for recyclable materials. However, policy measures to encourage recycling will only meet with limited success if the markets for recycled products are not well developed and robust. Timber is a good example: it forms a large proportion of the ACT's waste, roughly 45,000 tonnes of timber is landfilled annually.

Timber waste arrives to landfill in various forms: plasterboard, chipboard, wood furniture, pallets, poles, stumps, logs and contaminated timber. Waste timber can also come from other waste streams while they are being processed and recycled. For example, mattress dismantling and recycling, and bulky kerbside waste collection. The Study has identified an opportunity to process timber waste into products that have value in local, national and international markets.

Recycled woodchip has a potential use for particleboard, animal bedding and coloured mulch. Woodchip is created by shredding waste timber and screening the shredded product to produce different sized products for different markets. Woodchip replacement is especially useful for particleboard manufacture. All woodchip below a specified size for particleboard can be sold as animal bedding, in particular to 'broiler' meat chicken sheds in southern NSW. Oversize product can be shredded further. The ACT Government can facilitate the identification of foundation markets in broiler sheds and regional feedlots, stockyards and saleyards.

The Study recommends establishment of government 'buy-back' schemes such recycled products through procurement commitments (Recommendation 1.6)

The previous example highlights the potential for the ACT Government to develop and support 'foundation' markets. These are markets for products that are underdeveloped or non-existent, either within the ACT or around Australia. The ACT Government has the potential to use its own procurement to develop and support these markets and, at the same time, remove waste from landfill, often with social and economic benefits. A number of opportunities exist for compost from organics, road bases from crushing and glass fines, where the former can be used in ACT parks and verges and the latter can be used in road bases.

The Study recommends designing simple and modified service contracts for existing services such that these materials can be recovered and repurposed for beneficial reuse (Recommendation 1.7)

There are facilities in the ACT that convert or recover a number of waste materials such as glass fines, gypsum, and crushed inert waste so they can be used for better purposes. The ACT Government can seek to procure these products through a simple or modified service contract, where contractors are assured quantities of feedstock and markets for finished products.

Given the importance of markets, the ACT Government should also contract to purchase back a minimum quantity of some of these products, which will help develop new markets. There are also opportunities for social enterprise to establish a service contract for 'repair and dismantle' of valuable products such as e-waste, household goods or furniture, modelled on the successful Soft Landing mattress facility.

The Study recommends designing modified commercial and industrial services to allow source separated (e.g. recyclables, organics and residual) waste for improved processing outcomes (Recommendation 1.8)

Commercial and industrial services are currently outside the direct control of the ACT Government except through limited legislative powers. As such, the role of the ACT Government is to influence buyers and providers of commercial waste collection services. The Government can lead these conversations by co-designing collection services with industry, and incorporating these services into planning approvals.

This will require the ACT Government working with collection service providers to develop a series of services that meet the requirements of processing sites, collection needs and the needs of their customers. This is a 'soft touch' approach as opposed to implementing interventions to make mandatory requirements by businesses to source separate their waste, organics, and recyclables.

The Study recommends designing and establishing a more comprehensive advisory service to businesses around the ACT regarding how they can reduce their waste to landfill and save costs (Recommendation 1.9)

The ACT Government can provide advisory services to businesses to help them understand how to reduce their waste management costs. There is capability within the Government for similar services. The Actsmart program based within the Environment, Planning and Sustainable Development directorate (EPSDD) is an education and sustainability program established by the ACT Government to help ACT households and businesses manage their waste, water and energy more sustainability. From the waste and recycling program established in 2009 (known originally as OfficeSmart, then BusinessSmart), Actsmart has developed a suite of programs addressing broader sustainability issues for over 900 businesses across the ACT and Queanbeyan.¹⁹

The provision of advisory services to businesses could be largely modelled on the 'Bin Trim' program that has been implemented in NSW. It is available for all small-to-medium businesses and tailored to encourage resource recovery. The program includes an assessment of business practice, and an action plan with objectives to reduce waste and save money. Rebates and grants are also made available to participants.

NSW EPA reports that 20,000 businesses have increased recycling through the Bin Trim program.²⁰

¹⁹ <https://www.actsmart.act.gov.au/what-can-i-do/business/recycling>

²⁰ <http://www.epa.nsw.gov.au/managewaste/bin-trim.htm>

WASTE TO ENERGY

The Study recommends the development of a waste-to-energy policy for the ACT (Recommendation 1.10)

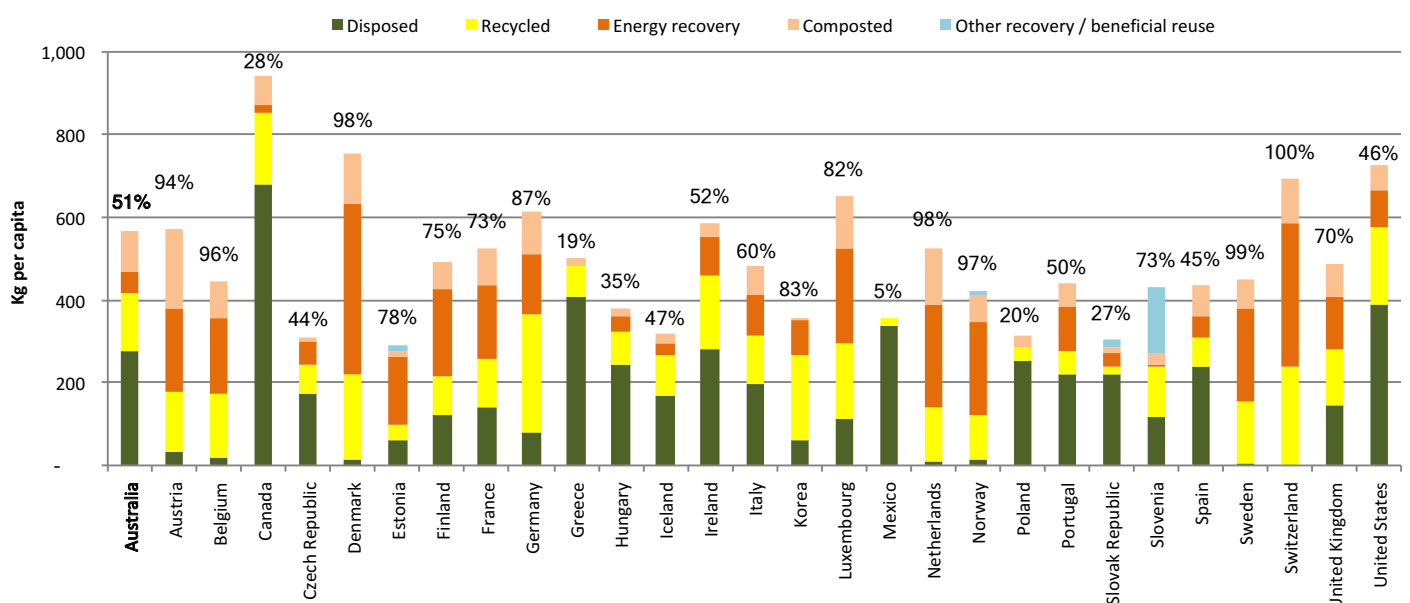
Waste-to-energy (WtE) describes a number of treatment processes and technologies for generating a usable form of energy. It can be divided into two broad categories:

- > biological processing of biodegradable waste through processes such as anaerobic digestion
- > thermal treatment of residual waste, including direct combustion, gasification and pyrolysis.

Other forms of WtE infrastructure include plants which convert waste to processed engineered fuel (PEF) and refuse derived fuel (RDF), which are alternative fuels to be transported to thermal power plants or for use in cement kilns.

Although adopting WtE is an option that sits just before landfilling in the waste hierarchy, it represents a significant proportion of resource recovery globally, with a large number of plants in Europe and Asia.

Figure 9: Global resource recovery rates²¹



21 Source: Blue Environment, Randell Environmental Consulting, and Ascend Waste and Environment prepared for the Department of the Environment the National Waste Report, 2016

While the amount of waste diverted from landfill has generally increased in recent years, there is relatively little energy recovered from waste in Australia other than in cement kilns, where some waste such as PEF, oil products and tyres are used as supplementary fuels. Historically, WtE has faced a number of hurdles in Australia, including:

- > low landfill fees or levies and the availability of low-value land for landfills which make WtE financially uncompetitive
- > a lack of supportive State Government policies
- > low community acceptance.

The ACT has used thermal processing of waste to manage sewage solids since the 1970s, medical wastes since the 1980s, and wood waste from C&D facilities since 2015. The ACT also uses small-scale WtE facilities in the form of extraction and combustion of methane gas from West Belconnen and Mugga Lane landfills. These two plants divert collected landfill gas into a turbine to produce 27.5 gigawatt hours of energy each year. This energy, in turn, offsets the production of 117,000 tonnes of carbon dioxide equivalent each year through the burning of fossil fuels, and eliminates the vastly more detrimental methane from the environment²².

The ACT community has become increasingly aware of WtE over the last 12 months, driven in part by media interest in waste and two high-profile WtE proposals. This public awareness is also reflected in many letters to the editor in newspapers by experts in the field, the general public, and community groups. Concerns have been raised regarding the perceived potential for pollution, and use of technologies that may disregard the waste hierarchy. There has been a call for the ACT Government to adopt the NSW Energy from Waste Policy. These concerns were also raised in the Study's Community Reference Group meetings.

The waste industry has also expressed significant interest in the possibility of implementing WtE technologies in the ACT through their submissions to the Study's market sounding. While most of the submissions mentioned elements of WtE, several submissions explicitly detailed projects that recover energy from waste. A common theme across the submissions was an expectation of planning and regulatory change to promote and support WtE.

Interest from both the community and industry means there is a need for a clear policy on WtE similar to other jurisdictions in Australia. Victoria has published guidelines, Western Australia has a Position Statement and NSW has a Policy Statement. The ACT needs to develop a policy on how it wishes to pursue WtE and in particular its attitude to innovation and risk. A well-developed WtE policy will provide greater certainty to the industry and clarity to the community, as well as a framework to the ACT Government for assessing WtE proposals. Such a policy will also need to consider changes to the planning framework including the Territory Plan and the *Planning and Development Act 2007*.

The Study recommends investigating the establishment of a PEF plant (see recommendation 1.11)

In the spectrum of WtE technologies, the highest risk approach is to use advanced thermal processing to make higher value products such as transport fuels or biochar. The lowest risk approach is to produce a processed engineered fuel (PEF) from residual wastes for export to interstate or international cement kilns or power stations. PEF can operate with flexible volumes of waste, and avoid the local community concerns around emissions associated with largescale incineration plants.

The Study has identified that much of the residual waste currently sent to landfill is of high calorific value and is suitable for the use in energy generation and cement kilns outside the ACT. A PEF facility within the ACT could offer an opportunity to convert the ACT's residual waste into alternative fuels, and deliver around seven per cent improvement in the Territory's resource recovery rate.

²² GreenPower Case study – Generator 'Tipping the Balance'

SECTION 6

GROUP 2 – FURTHER RECOMMENDATIONS

The following section details initiatives that ensure best integration with, and transition from, existing waste management operations.

THE ROLE OF ‘ACT NOWASTE’ IN RESOURCE RECOVERY

ACT NoWaste is the business unit within the TCCS directorate with responsibility for waste policy, strategy, regulation, service delivery, infrastructure and related school and community waste education programs on behalf of the ACT Government.

With a focus on encompassing best practice, responding to community demand, maximising resource recovery and meeting budget, ACT NoWaste designs, commissions and manages outsourced waste and recycling activities to residents and businesses across the ACT.

On behalf of the ACT Government, ACT NoWaste manages contracts and service agreements for domestic waste and recycling kerbside collections that reach approximately 145,000 Canberra households and 390,000 residents. ACT NoWaste also self-manages or contracts for waste acceptance and disposal facilities for both households and business users, including 24-hour access suburban Recycling Drop Off Centres (RDOCs), Mitchell, Mugga Lane, and West Belconnen Resource Management Centres (RMCs), C&D recycling centres at Mugga and Pialligo, and green waste facilities operated by independent contractors collocated at two RMCs, and one in Mitchell.

ACT NoWaste encourages the resource recovery industry to maximise the recovery and recycling of waste materials in the ACT and surrounding region. It works to ensure its operations, education programs and procurement processes support the waste industry and improve resource recovery. While ACT businesses contract their own waste collectors, they still need to comply with ACT Government regulations in relation to the location of bins and waste collection schedules.

The following are examples of recent flagship projects ACT NoWaste is charged with delivering:

- > implementation of the new *WMRR Act 2016* and identification of necessary regulatory initiatives required to establish the desired framework for ACT's waste management
- > development and implementation of a Container Deposit Scheme
- > management of contracts for the garden organics (GO) 'green bin' pilot
- > performance-based contracts
- > participation in national programs such as the Commonwealth product stewardship and national food waste initiatives.

The Study's final recommendations are designed to align with the business operations of ACT NoWaste.

THE WMRR ACT 2016

The Study recommends that the ACT Government continue to support the implementation of the WMRR Act 2016 to ensure the desired regulatory framework is established (Recommendation 2.1)

The *WMRR Act 2016* came into force on 1 July 2017. It repealed and replaced the Waste Minimisation Act 2001, which was no longer appropriate for modern waste management in the current policy and commercial environment.

The new Act is designed to help the ACT meet the longer term resource recovery objectives of the ACT Waste Management Strategy 2011-2025 of minimising the generation of waste and maximising the recovery of resources. It responds to a range of concerns about the Territory's capacity to manage waste and resource recovery, and to reduce the amount of waste going to landfill.

The Act establishes a comprehensive regulatory framework for waste industry operators, and provides clear guidance for the industry and broader community on the appropriate storage, treatment and disposal of waste. The new regulatory framework established by the Act is intended to facilitate and reward good practice in waste collection, transportation, recovery and reuse, and to discourage the disposal of waste into landfill.

With this aim, the Act has clearly articulated regulatory, investigation and enforcement powers including data collection. The overall regulatory framework requires the most comprehensive reporting of waste data in Australia, with an estimated one million records to be provided each quarter by the regulated community. This data will inform policy development and implementation in the ACT, and contribute to a national waste data set. Data volumes and the number of regulated entities will increase significantly over time as new programs are developed from policy initiatives. An information and communications technology solution is required to manage all aspects of the regulatory framework.

In addition, the Act also allows for the introduction of mandatory Codes of Practice to provide clear guidance on the central aspects of waste activity – particularly in relation to waste management businesses – and a flexible fees structure, potentially in the form of a levy that promotes waste avoidance and resource recovery over landfill. The regulations, and important statutory instruments such as Codes of Practice targeted towards C&I, and C&D sectors, are being developed as the implementation of the Act progresses.

PRODUCT STEWARDSHIP

The Study recommends the ACT Government continue to explore product stewardship possibilities for various difficult waste streams to allow improved management of these types of waste materials (Recommendation 2.2)

Product stewardship is an approach to waste management that places shared responsibility on producers, retailers, users and disposers to reduce the environmental impact of the waste generated. Following the adoption of the National Waste Policy, the *Commonwealth Product Stewardship Act 2011* was introduced to provide the framework for product stewardship schemes. The Act creates three types of schemes: mandatory, co-regulatory, and voluntary (either accredited or not). Most schemes are voluntary, and include schemes for mobile phones (MobileMuster, which is an accredited scheme); fluorescent lamps (Fluorocycle, an accredited scheme); tyres (Tyre Stewardship Australia); agricultural chemical containers (DrumMuster); paint (Paintback); PVC (PVC Stewardship); and newspapers. Furthermore the Federal Government has developed a number of mandatory and co-regulatory product stewardship schemes including for used oil and e-waste.

Paintback is a product stewardship scheme launched in the ACT in July 2017. The scheme transports the collected paint to a treatment facility where containers and paint are separated for recycling purposes. To fund the collection and treatment of the waste paint and packaging, a levy of 15 cents (plus GST) per litre is applied to the wholesale price of eligible products in containers over 1 litre and up to 20 litres sold in retail stores and paint trade centres. Similarly, The ACT Government is also implementing a Container Deposit Scheme to recover used beverage containers, with refunds of 10 cents per container.

The Study has identified six priority waste streams that are either hazardous in nature or currently end up in landfill, for further investigation under product stewardship, and has also sought to understand any impact they may have if product stewardship schemes were introduced within the ACT. The six waste streams are handheld batteries, large batteries, Expanded Polystyrene packaging, mercury-containing lamps, tyres, and disposable coffee cups.

While there is a need for broader national support, opportunities for product stewardship policy promotion exist across other policy options under consideration, especially given the supply chain and sustainability improvements of seeing product stewardship as going above and beyond just recycling.

A range of voluntary and complementary approaches including codes of practice under the *WMRR Act 2016* are available to provide an innovative, facilitative environment for product stewardship in the ACT.

ENHANCED RECYCLING

People don't recycle as well as they could for a range of reasons. As reported in the 2014 kerbside waste audit, at present recovery of recyclables from domestic kerbside waste in the ACT is at 66 per cent, meaning that 34 per cent of recyclable materials are incorrectly placed in the residual waste bins and are therefore lost from the recycling streams. The audit further reports that multi-unit developments (MUDs) generate a higher proportion of unrecovered recyclable material than single unit dwellings (SUDs).

To address and improve MUDs recycling performance, ACT NoWaste is leading a review of the 'Development Control Code (the Code) for best practice waste management in the ACT'. The Code directs building design professionals on how to incorporate best practice waste management principles and requirements into the design, construction and operation of new developments.

The Study recommends that the Code be reviewed periodically to maintain currency and to ensure desired waste management and performance outcomes are achieved for multi-unit developments (Recommendation 2.3)

The review of the Code commenced in early 2017 with a special focus on improving controls in multi-unit dwellings (MUDs) and mixed use precincts. In the mid-1990s, ACT NoWaste issued the '*ACT Waste Management Design Guide for Site Storage and Handling of Waste and Recyclables in the ACT*'. This guideline was replaced in 1999 by the '*Development Control Code for Best Practice Waste Management in the ACT*'. The Code has been reviewed a number of times since.

The current review has been sparked by regular complaints to ACT NoWaste from residents, particularly from MUDs where waste management facilities are often non-compliant with the Code and associated allocations are inappropriate. Any non-compliance makes the provision of waste services more difficult and sometimes impossible to provide, which means owners corporations may need to arrange their own services at an additional cost on top of resident's rate payments.

In addition, property developers and building designers have raised concerns that the existing Code is overly prescriptive such that some claim the ACT's urban design outcomes 'are driven by the size of waste trucks'. Industry also claims that the Code does not allow for innovative and tailored outcomes for waste management in MUDs.

The current review presents an opportunity to improve resource recovery rates from underperforming MUDs, while addressing concerns of residents and the development industry. The review will also help achieve positive customer service outcomes for the ACT Government.

The urban form in Canberra is changing, with the expansion MUDs and mixed use precincts being constructed. Waste management approaches change with time as well. The Code needs to keep up with a changing environment in the way our city is growing and waste management approaches are evolving.

While the revised Code will have a direct positive impact on the recycling performance of MUDs, ongoing support is also needed for SUDs to reduce the amount of recyclables ending up in the kerbside residual bins.

The Study recommends an education campaign targeted towards enhanced recycling in kerbside bins (Recommendation 2.4)

The Study identified the need for greater investment in ongoing education as a means to improve recycling behaviour among ACT community. The education campaign can be augmented by, initially, understanding the problem for each demographic through market research, and subsequently designing an audit program to collect data from representative areas within each demographic, understanding current performance and the response to interventions.

SPATIAL AND INFRASTRUCTURE PLANNING

Develop an integrated long term strategic spatial plan for waste service delivery infrastructure (e.g. transfer stations) and their locations, using the principle of best use of land to determine and meet future needs and changes (Recommendation 2.5)

The key locations for waste management facilities and infrastructure in the ACT are shown in the map within Figure 10. The facilities open to the public are:

- > **Recycling Drop-off Centres (RDOCs)** – government-owned, district level, are located on the edges of the town centres. The RDOC model of service provision is mainly car-dependent, with residents and small businesses driving to drop off overflow from the recycling bin or larger items. The RDOCs are also used by rural residents of the ACT and the surrounding region.
- > **Resource Management Centres (RMCs)** – government-owned RMCs are located at Mugga Lane, Mitchell and West Belconnen. The RMCs have diversion facilities, the Green Sheds for drop off and sale of second-hand goods at Mugga Lane and Mitchell transfer stations – to drop off and re-direct waste for sorting different waste groups including hazardous wastes. Co-located with these centres are green waste drop-off facilities for vegetation (leaves, grass clippings and branches) which is mulched or composted. The Mitchell waste facility provides both RDOC and RMC facilities, no landfill, and a transfer facility for green waste.
- > **Landfill sites** – The ACT's landfills at Mugga Lane and West Belconnen take waste collected and transported by Government, licensed contractors and the RMCs. Mugga Lane has been expanded and based on current and expected rates of waste generation has capacity until 2023.

The West Belconnen landfill accepts asbestos contaminated C&D materials. The ACT Government has committed to the closure and rehabilitation of the West Belconnen RMC site as part of its contribution to the Ginninderry Joint Venture (West Belconnen Joint Venture Agreement 2011). Key functions of the site will need to cease by the end of 2019 and alternatives found in order to allow for land release as part of the Ginninderry development.

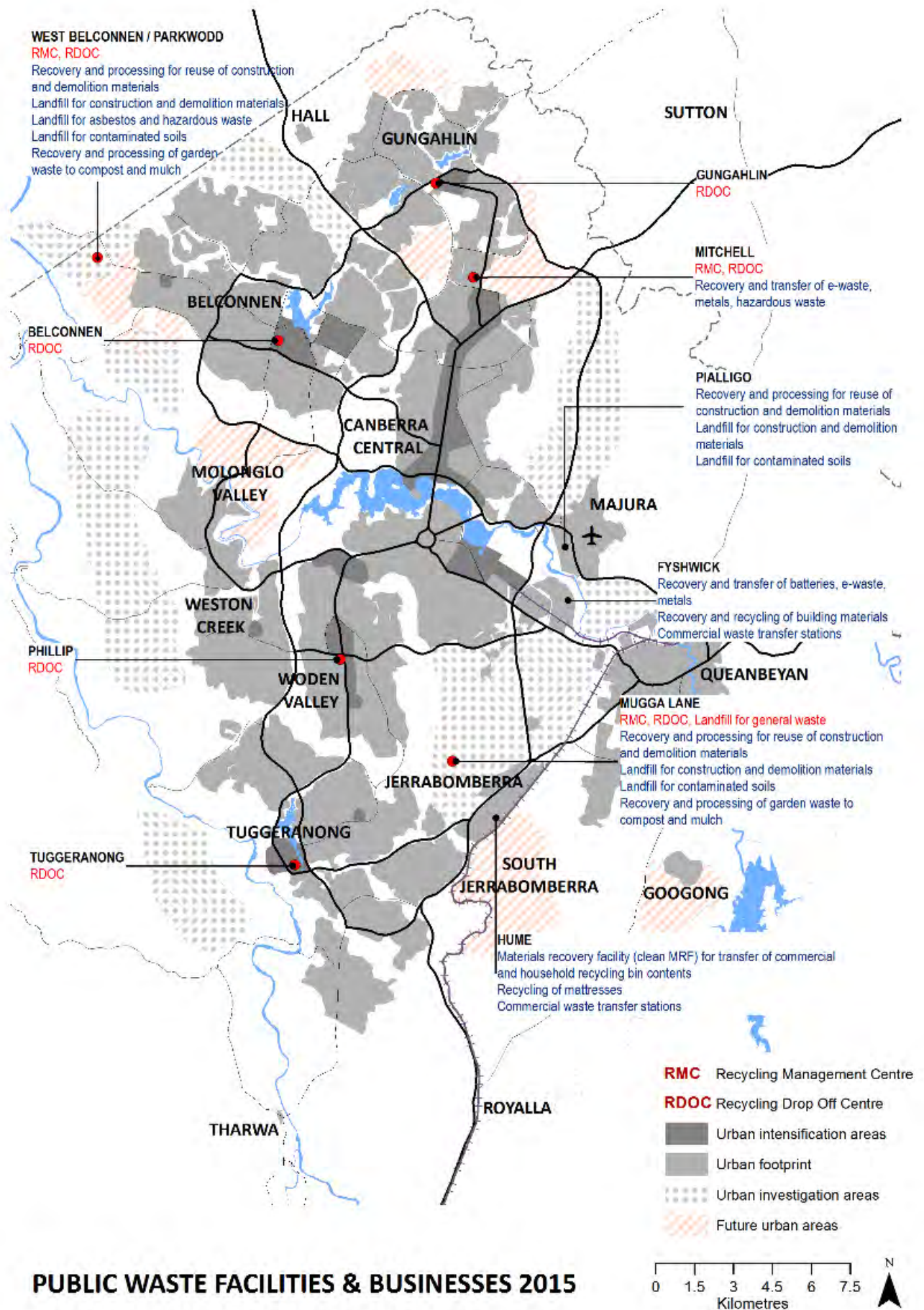
The West Belconnen Resource Management Centre currently provides a range of valuable functions. There will be costs associated with finding alternative arrangements, in addition to the cost of site rehabilitation.

The ACT Government directs how and where the city grows and since the turn of the 21st century the overarching policy has been to make Canberra a more compact and sustainable city, a policy objective that is being pursued by most Australian cities. The current spatial planning policy, the *ACT Planning Strategy 2012*, identifies a target of at least 50 per cent 'greenfield' residential estates versus 50 per cent infill with urban renewal and intensification to slow the rate of city sprawl.

To accommodate our growing city, the ACT Government has a number of development 'fronts'. These are locations where land is released for new housing developments as well as precincts where redevelopment to a higher density urban form is prioritised. These development fronts are locations where high volumes of C&D waste are generated during development and where increasing quantities of MSW will be generated as the population grows.

The strategic intent of the ACT Government is that Canberra will be a small, sustainable, liveable city; that is a destination of choice for knowledge workers, providing a high quality of life through an attractive public realm, well managed services and a vibrant community. Canberra will increasingly provide a diversity of dwelling types and lifestyle choices. The lower density suburbs will remain dominant, but with an increasing proportion of higher density precincts, townhouses with gardens, apartments and mixed-use buildings.

Figure 10: Key locations for waste management facilities and infrastructure in the ACT



Planning for this future, including for future waste facilities, infrastructure and services, needs to take account of demographic changes, societal trends and the patterns of urban growth over time. The existing system of waste facilities and services were well suited to Canberra's low density suburban form and lifestyles that were prevalent in previous decades. The composition of our community and our choices in how we live and work has fundamentally changed over the last 20 years. Furthermore, the waste policy objectives have moved from protecting population, health and environmental amenity to achieving sustainability through resource recovery. Hence, our waste services and infrastructure need to be reconsidered to meet current and likely future needs. Historically, appropriate planning for waste infrastructure was based on opportunities presented around location and facility design of the time. However, there are greater pressures such as population growth and government and non-government waste facilities need to now consider appropriate geographic location, efficient design and effectively laid out facilities.

A major challenge for residential waste management is equality of provision for these different urban patterns. The relatively simple and uniform facilities and services needed in low density suburban areas are different to the complex solutions required to achieve sustainable waste outcomes from mixed use, high density buildings with diverse ownership and management structures, and public spaces used intensively all the time. The nature of workplaces has also changed in the last 20 years and this has implications for the waste materials generated.

It is therefore recommended that the ACT Government take a strategic approach with a focus on customer experience and service level. A network based approach to waste infrastructure planning is recommended, with a lifecycle consideration of operational and capital costs.

A typical waste network is comprised of collection systems, customer-facing infrastructure (such as transfer stations), and processing and disposal facilities. Each of these elements is integrated and decisions in one part of the system invariably have an influence on other parts of the system. Future flexibility and adaptability to change is therefore critically important in waste infrastructure planning.

WASTE MANAGEMENT STRATEGY

The Study recommends that the Strategy be reviewed immediately to reflect the changes since 2009 when the Strategy was compiled (Recommendation 2.6)

The Government is committed to improving the Territory's performance in waste management. This is reflected in the ACT *Waste Management Strategy—Towards a Sustainable Canberra 2011-2025* which was released in 2011. The Strategy is the principal Government policy statement outlining resource recovery aspirations and future directions.

The Strategy was an extension of the 1996 *No Waste by 2010 Strategy* which successfully reduced the waste sent to landfill from nearly 60 per cent of total waste in 1995–96 to below 30 per cent in 2003-04.

The study found that the strategy's goal and objectives remain aligned with the ACT Government's climate change and sustainability agenda. Its objectives are aligned with the National Waste Policy 2010 and are broadly consistent with the policy objectives of other Australian jurisdictions and leading international jurisdictions. However, various targets and actions within the 2011 Waste Strategy have been superseded by events of the last six years. In particular, major new policies have been announced including a kerbside garden waste collection service, a domestic bulky waste collection service, and a CDS. Furthermore, new direction from Government on FOGO, the development of the recent WMRR Act 2016, and any new waste-to-energy policy, in aggregate, mean that a formal review of the Strategy is overdue.

In addition, the Strategy mandates self-review every three to five years to maintain currency and align it with changes occurring in waste management practices around the world.

NATIONAL LITTER INDEX

The Study recommends the ACT Government maintain ongoing support and funding for the National Litter Index, in line with the ACT's clean environment agenda (Recommendation 2.7)

Every year the Keep Australia Beautiful National Association compiles a National Litter Index (NLI), a quantitative measure of the location, volume and composition of litter around Australia.

The ACT has a number of new and existing programs, policies and regulatory interventions related to litter and illegal dumping. These include the plastic bag ban, the CDS and the activities of City Services.

The NLI is critical to assessing the efficacy of these initiatives, as it is the primary source of data on litter and illegal dumping.

The ACT Government has supported the NLI since 2006. In July 2017, State and Territory officials convened to discuss the strengths and weaknesses of NLI and agreed to a plan. In principle agreement was reached between the participants on a variety of measures, including the sharing of raw data and a peer review of methodology by the CSIRO.

ACT NoWaste has funded the 2016-17 NLI from existing budgets and agreed in principle to fund it in 2017-18.

SECTION 7

WHERE TO FROM HERE?

The Study's Roadmap and recommendations are designed to provide a framework to drive change in the ACT community, businesses and waste industry over the next five years. The next steps are for the ACT NoWaste business unit within the TCCS directorate to implement the Study recommendations through a program of projects funded within the bounds of the Territory Budget.

Many of the recommended steps have already commenced – the *WMRR Act 2016* is now being enforced by TCCS, and the 'green bins' pilot project is assessing the future volume of garden organics and associated processing requirements. The CDS has been established by legislation and will commence in 2018. Education recommendations should be integrated with existing communications teams in TCCS and complement work conducted in other directorates such as the Actsmart program.

FINANCIAL IMPLICATIONS

The estimated financial impacts of implementing the Roadmap are in the range of \$5 to \$10 million per annum, with the assumption that the majority of the initiatives would be carried-out on behalf of the Territory by the private sector.

The true financial impact of implementing the initiatives will be dependent on foregone revenue from landfill gate fees and the investment in infrastructure some diversion options require (either from the Territory or via the private sector) or the development of markets. The ACT will assist in market development where it can, particularly through its own procurement and specifications.

Further benefits arise from the impact that diversion of waste from landfill would have on the lifespan of the Mugga Lane facility's existing cells and future cells from around the year 2022. The lifespan of a landfill is dependent on several variables, including the rate of 'settling' over time and other engineering factors such as 'overtopping' which can extend the life of a cell. In any case, the landfill is a significant asset for the Territory and the prolonging of the useful life of this resource is a key benefit of higher resource recovery.

It is intended that the first stage Roadmap projects materialise in budget business cases. This will establish the framework for the Roadmap, including designing education campaigns, specifically reduced food waste and enhanced recycling, industry development consultancies and the development of a waste-to-energy policy.

IMPLEMENT TWO MAJOR EDUCATION PROGRAMS FOCUSED ON FOOD WASTE REDUCTION AND IMPROVED RECYCLING

- > Kerbside bin audits reveal that up to 37 per cent of ACT household rubbish bin contents are food waste and 25 per cent are recyclables. The successful UK program *Love Food Hate Waste* provides a model which has reportedly reduced residential and commercial food waste in London by 15 to 20 per cent. A food waste reduction program could see over 8,000 tonnes of waste diverted from landfill each year.
- > Recycling behaviours would be improved by programs similar to those implemented by NSW local governments, including Albury and Wodonga's *Halve Waste* and Hunter Region Councils' *Small Acts Big Change*. Enhanced recycling could see 10,000 tonnes of recyclables diverted from landfill each year.

ESTABLISH A COMPOSTING SITE TO PROCESS FOGO

- > In anticipation of the expansion of the current green bins service to a FOGO service in five years' time, it is recommended that TCCS commission a siting study. A facility could be established through a 'Build/Own/Operate' model with a gate fee charged to the Territory for municipal FOGO waste.

This facility could also accept FOGO waste from commercial operators which would further improve the Territory's resource recovery rates. It is estimated that a composting site and FOGO collection service could see over 40,000 tonnes of waste diverted from landfill.

PROVIDE MARKET IDENTIFICATION, SUPPORTIVE GOVERNMENT PROCUREMENT AND NEW CONTRACTS FOR SPECIFIC WASTE STREAMS

- > The Study has identified specific waste streams currently being sent to landfill that could be separated and processed into products for landscaping or animal bedding, sand replacement for government works, aggregates for road base, gypsum or new plasterboard.

There are also opportunities for social enterprise to establish a service contract for the 'repair and dismantle' of valuable products such as e-waste, and household goods or furniture, which could be modelled on the successful Soft Landing mattress facility. Industry consultants would be engaged to assess various market and government procurement opportunities. These initiatives could see over 40,000 tonnes of waste diverted from landfill.

INVESTIGATE THE ESTABLISHMENT A PROCESSED ENGINEERED FUEL (PEF) FACILITY

- > The Study has identified that much of the waste currently sent to landfill is of high calorific value and is suitable for use as PEF which is a fuel that could be sold to energy generators and cement kilns outside the ACT. A PEF facility can operate with flexible volumes of waste, and would reduce local community concerns around emissions associated with large-scale incineration plants. Consultants would be engaged to conduct a siting study and marketing plan in preparation for a tender process in the subsequent years. The PEF facility could see up to 70,000 tonnes of waste diverted from landfill.

DEVELOP A WASTE-TO-ENERGY POLICY

- > The Study has found that the community and industry would benefit from a clearer understanding of the ACT Government's position on waste-to-energy.

REVIEW THE ACT WASTE MANAGEMENT STRATEGY 2011-2025

- > The *ACT Waste Management Strategy 2011-2025* should be reviewed to reflect the changes since 2009 when the strategy was drafted, and any new direction from Government.

HAVE YOUR SAY

The Waste Feasibility Study body of work has given TCCS a better understanding of local and national waste management systems, their sensitivities and areas for improvement.

The Study recommends that ACT NoWaste conduct a thorough consultation program to allow key stakeholders to comment on the Roadmap report.

This will occur over the first half of 2018. Visit the Your Say website for details: <http://www.yoursay.act.gov.au>

